

### Part I: A Quantitative Study of Social Risk Screening Acceptability in Patients and Caregivers



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**Introduction:** Despite recent growth in healthcare delivery-based social risk screening, little is known about patient perspectives on these activities. This study evaluates patient and caregiver acceptability of social risk screening.

**Methods:** This was a cross-sectional survey of 969 adult patients and adult caregivers of pediatric patients recruited from 6 primary care clinics and 4 emergency departments across 9 states. Survey items included the Center for Medicare and Medicaid Innovation Accountable Health Communities' social risk screening tool and questions about appropriateness of screening and comfort with including social risk data in electronic health records. Logistic regressions evaluated covariate associations with acceptability measures. Data collection occurred from July 2018 to February 2019; data analyses were conducted in February–March 2019.

**Results:** Screening was reported as appropriate by 79% of participants; 65% reported comfort including social risks in electronic health records. In adjusted models, higher perceived screening appropriateness was associated with previous exposure to healthcare-based social risk screening (AOR=1.82, 95% CI=1.16, 2.88), trust in clinicians (AOR=1.55, 95% CI=1.00, 2.40), and recruitment from a primary care setting (AOR=1.70, 95% CI=1.23, 2.38). Lower appropriateness was

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associated with previous experience of healthcare discrimination (AOR=0.66, 95% CI=0.45, 0.95). Higher comfort with electronic health record documentation was associated with previously receiving assistance with social risks in a healthcare setting (AOR=1.47, 95% CI=1.04, 2.07).

**Conclusions:** A strong majority of adult patients and caregivers of pediatric patients reported that social risk screening was appropriate. Most also felt comfortable including social risk data in electronic health records. Although multiple factors influenced acceptability, the effects were moderate to small. These findings suggest that lack of patient acceptability is unlikely to be a major implementation barrier.

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## INTRODUCTION

Recognition that social risk factors, such as inadequate access to healthy food or stable housing, are linked to poor health outcomes<sup>1–5</sup> has fostered growing efforts within the healthcare system to identify and address patients' social risks as part of routine care delivery.<sup>6–13</sup> Screening for social risks has been endorsed by multiple professional organizations.<sup>14–19</sup> Despite these recommendations, the uptake and prevalence of healthcare-based screening and delivery of services is highly variable.<sup>20</sup>

In 2018, the Center for Medicare and Medicaid Innovation launched the Accountable Health Communities (AHC) demonstration project,<sup>21</sup> in which Medicare and Medicaid patients at 31 participating sites are asked to complete social risk screening using a 10-item screening tool developed by the Center.<sup>22</sup> The screening tool focuses on 5 social risk domains—housing stability, food security, transportation, utilities, and personal safety—selected based on evidence linking them to healthcare outcomes, utilization, or cost, as well as feasible interventions.<sup>23,24</sup> To date, there have been no published studies examining the acceptability of this multidomain screening instrument.

Patient acceptability has important implications for implementation of healthcare-based social risk interventions, including for the adoption and sustainability of social risk screening.<sup>25</sup> Successful screening implementation in select settings may suggest that patients do not object to screening,<sup>26–37</sup> though some clinicians have expressed concerns about time constraints<sup>38</sup> and the potential for increasing patient stigma.<sup>36,39,40</sup> Prior studies on feasibility and acceptability of social screening are limited by small samples,<sup>32,33</sup> a focus on site-specific

screening tools,<sup>26</sup> or inclusion of only academic pediatric primary care settings.<sup>28,29,31,41</sup>

This study evaluated the acceptability of the AHC social risk screening tool by adult patients and adult caregivers of pediatric patients in diverse healthcare settings. Acceptability was assessed in terms of perceived appropriateness of screening as well as comfort with electronic health record (EHR) documentation of screening results. The study measured overall acceptability and the extent to which acceptability varied by patient and caregiver characteristics, including social risk burden,<sup>41</sup> trust in clinicians,<sup>29,33,42,43</sup> prior exposure to social risk screening,<sup>29</sup> and prior experience of healthcare discrimination.<sup>44,45</sup>

## METHODS

This was a cross-sectional mixed-methods study of primary care and emergency department (ED) patients and adult caregivers of pediatric patients from 10 healthcare settings. This manuscript reports findings from the quantitative data; qualitative findings are reported in a companion manuscript.<sup>46</sup> Study sites were recruited through the Social Interventions Research & Evaluation Network<sup>47</sup> Research Advisory Committee and the program's e-mail listserv. To be eligible, a site had to (1) serve a minimum of 30% publicly insured or uninsured patients, reflecting healthcare settings participating in the AHC demonstration project; (2) contribute to the geographic diversity of the study sites; (3) provide either primary or acute care; and (4) not be a designated AHC demonstration site. The final sample was drawn from 9 states and included 4 family medicine clinics, 2 internal medicine clinics, 2 general EDs, and 2 pediatric EDs. Of the primary care sites, 2 were rural practices, 1 was an urban community clinic, and 3 were part of urban academic health centers. All 4 EDs were based in urban academic health centers. Adult caregivers of pediatric patients could be recruited from family medicine clinics and EDs.

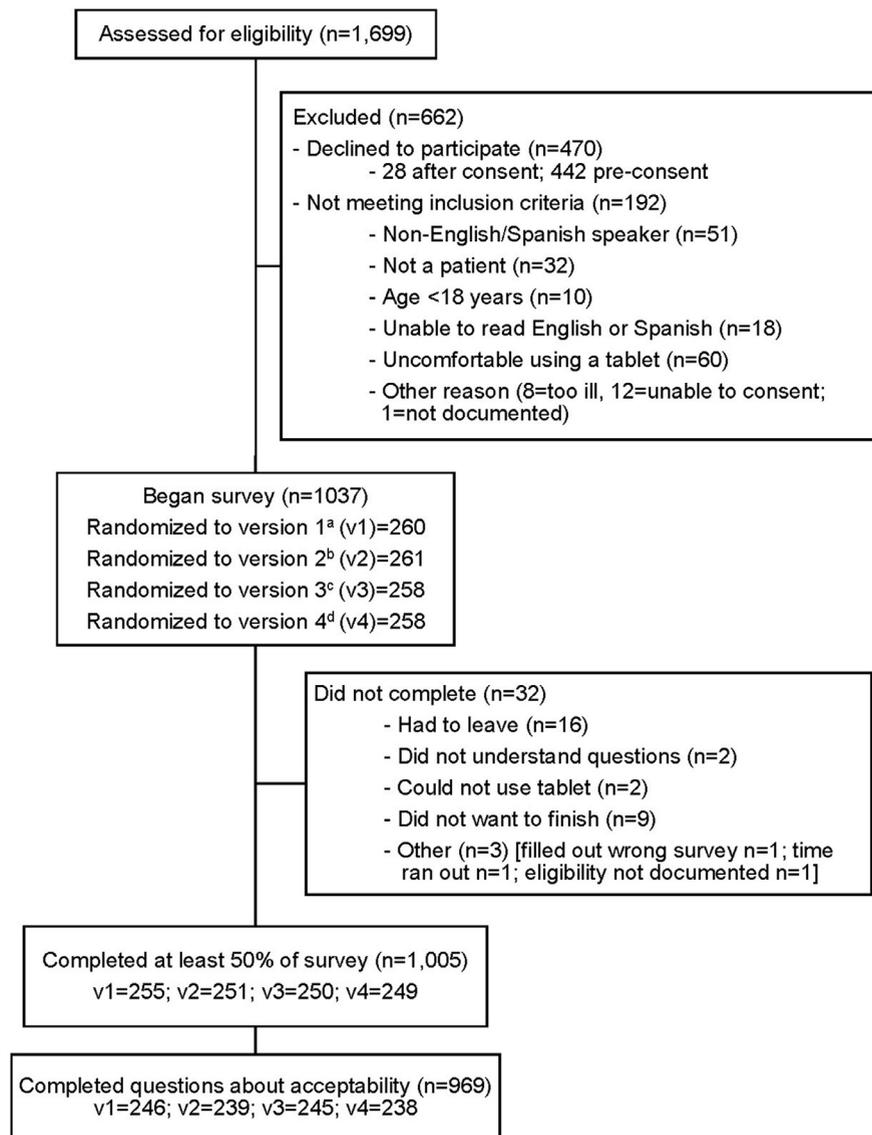
## Study Population

Each study site recruited 100 adult patients or caregivers of pediatric patients, hereafter referred to as participants. Participants were eligible if they did not require immediate medical attention, were aged  $\geq 18$  years, able to speak and read English or Spanish, able to provide informed consent, and comfortable using a tablet device. Participants could complete the survey only once. Participation was limited to 1 caregiver per household.

## Measures

Participants were recruited during the course of clinical encounters; study activities were paused as needed to prevent delays in medical care. Research staff reviewed study details and consented participants

in private patient areas at all study sites. The consent highlighted that responses were confidential. All potential participants were offered a list of relevant community resources, regardless of decision to participate. The central coordinating study site provided standardized training on study protocols to all site-based research staff. Study recruitment occurred Monday through Friday between 8:00AM and 8:00PM. Participants were randomized into 4 subgroups to test whether slight differences related to social risk questions affected social risk disclosure or acceptability of screening. Half of the total sample completed a survey that included an option to select *I prefer not to answer* as an answer choice for each of the 10 social risk screening questions. These groups were further randomized (25% of total sample in each half) to complete a survey that placed a single question about interest in assistance with social risks before the 10



**Figure 1.** CONSORT flow diagram.

<sup>a</sup>Version 1= AHC 10-item social risk questions first; no additional response option. <sup>b</sup>Version 2= Question on interest in assistance with social risks first; no additional response option. <sup>c</sup>Version 3= Question on interest in assistance with social risks first; "I prefer not to answer" option. <sup>d</sup>Version 4= AHC 10-item social risk questions first; "I prefer not to answer" option. AHC, Accountable Health Communities.

AHC social risk screening questions versus after the screening questions. This randomization process resulted in 4 versions of the study survey (Figure 1; Appendix Text 1, available online).

Participants self-completed surveys using a tablet device. Participants could ask research staff questions, but staff could not assist participants in completing the survey. Research staff received an alert about potential safety concerns if any participants endorsed physical or verbal abuse. Sites established their own protocols for handling positive personal safety screens. Participants received a \$5 incentive for survey participation. Data were collected and managed using REDCap electronic data capture tools hosted at the University of California, San Francisco (Appendix Text 2, available online).<sup>48</sup> Recruitment occurred from July 2018 to February 2019. The study was approved by the University of California San Francisco IRB (17–23,110); 7 study sites also obtained site-specific IRB approvals.

The survey included the 10-item AHC social risk screening questions, plus 22 questions exploring perceived acceptability of screening and other variables thought to influence social risk disclosure and acceptability (Appendix Text 1, available online). Two distinct measures of social risk screening acceptability were developed, (1) perceived appropriateness of screening in the healthcare setting (*Do you think it is appropriate to be asked these questions about your social and economic needs at [“this clinic” OR “this emergency department”]?*), and (2) comfort with including social risk data in EHRs (*Would you be comfortable having these kinds of needs included in your health records [also known as your medical record or chart]?*) Responses to both questions were measured on a 5-point Likert scale ranging from *very appropriate/very comfortable* to *very inappropriate/very uncomfortable* with a midpoint of *neither appropriate nor inappropriate/neither comfortable nor uncomfortable*.

The survey also included the following participant characteristics based on their potential to impact screening acceptability: age, sex, race/ethnicity, educational attainment, income, preferred language (English or Spanish), self- or caregiver-reported child health, social risks,<sup>41</sup> interest in assistance with social risk factors, trust in clinicians,<sup>29,33,42,43</sup> prior healthcare-based social risk screening, prior healthcare-based receipt of social assistance, and prior discrimination within health care.<sup>44,45</sup> Previously validated survey items were utilized or adapted when available. Table 1 provides variables and relevant citations. The following healthcare setting characteristics were also documented: type of setting (primary care versus ED) and the estimated percentage of patients publicly insured or uninsured (based on study site director report). All study materials were professionally translated into Spanish, with additional minor edits made and verified by 2 native Spanish speakers. A third native Spanish-speaking research associate back-translated surveys into English. Surveys were piloted in both English and Spanish ( $n=5$ ) at the central study site. The full study survey was rated 9th grade level by Flesch-Kincaid,<sup>53</sup> including both the individual AHC 10-item screening tool and the additional study questions.

## Statistical Analysis

Descriptive statistics and univariable analyses were used to explore the 2 measures of acceptability and their associations with participant and healthcare setting characteristics. Based on small percentages of participants at the low end of the Likert scales and patterns of univariable associations, both acceptability measures were dichotomized into: *very/somewhat appropriate* (or comfortable) versus *neither/somewhat/very inappropriate* (or uncomfortable).

Univariable and multivariable logistic regression analyses were used to identify factors associated with each acceptability measure. Robust SEs were employed to account for clustering by site. Separate models were run for each of the acceptability measures based on moderate correlation between the 2 measures (Spearman rank correlation, 0.379), which suggests they are related but distinct concepts. Variables associated with either acceptability measure at the 0.2 significance level in univariable logistic regression analyses were included in multivariable analyses.<sup>54</sup> The only exception was income, measured as calculated percentage of federal poverty level, which was associated with comfort with including social risks in EHR in univariable analysis ( $p=0.10$ ) but was excluded from the multivariable model because of missing data (>20%). Statistical significance was considered  $\alpha<0.05$ .

Sensitivity analyses were performed to evaluate the impacts of (1) using a lower  $p$ -value cut point for variable inclusion in the multivariable models (0.1), (2) using multiple imputations by chained equations ( $m=50$ ) to impute missing data for covariates, and (3) including or excluding the raw income variable in the multivariable model for comfort with EHR integration. All data analyses were conducted using Stata/SE, version 15.0 in 2019.

## RESULTS

A total of 1,699 adult patients and caregivers of pediatric patients were approached to participate in this study. Of these, 470 declined to participate (27.7%) and 192 did not meet inclusion criteria (11.3%) (Figure 1). Of the 1,037 participants who consented and were surveyed (61.0% response rate), 969 answered both measures of acceptability (96.4%) and were included in the analysis. Among these, 61.4% screened positive for at least 1 of 5 social risks based on AHC cut points on the screening instrument.<sup>22</sup> A total of 857 (88.4%) did not skip or select *I prefer not to answer* for any of the 10 AHC questions. Of the 77 who skipped or selected *I prefer not to answer*, 69 (89.6%) did so for only 1 of the 10 questions. No participant skipped all 10 questions. Table 1 provides study sample descriptive statistics and differences in perceived appropriateness of social risk screening and comfort with including social risk data in EHRs by participant and health setting characteristics. There were no significant differences in either acceptability measure between adult patients and caregivers of pediatric patients, between sites, or between survey versions, so these variables were not included in the analyses.

Of the 969 study participants, 79% reported screening was *very* or *somewhat appropriate*, 14% were neutral, and 7% reported screening was *very* or *somewhat inappropriate*. Among participant subgroups, the percentage reporting screening was appropriate varied between 73% and 87% (Table 1). Table 2 shows results of univariable (unadjusted) analyses. In multivariable (adjusted) analyses, only prior exposure to social risk screening (AOR=1.82, 95% CI=1.16, 2.88), trust in clinicians (AOR=1.55, 95%

**Table 1.** Participant Characteristics by Acceptability Response Among 969 Adult Patients and Adult Caregivers of Pediatric Patients

Variable	Total	Appropriateness <sup>a</sup>		Comfort with EHR integration <sup>a</sup>	
		Appropriate (n=770, 79%) Very: 54% Somewhat: 25%	Neither/ inappropriate (n=199, 21%) Neither: 14% Somewhat: 4% Very: 3%	Comfortable (n=658, 65%) Very: 44% somewhat: 20%	Neither/ uncomfortable (n=374, 35%) Neither: 17% Somewhat: 9% Very: 10%
Participant characteristics					
Age, years (n=959)					
18–44	533	422 (79.2)	111 (20.8)	331 (62.1)	202 (37.9)
45–64	284	229 (80.6)	55 (19.4)	191 (67.3)	93 (32.7)
≥65	142	110 (77.5)	32 (22.5)	100 (70.4)	42 (29.6)
Sex (n=958)					
Female	678	550 (81.1)	128 (18.9)	442 (65.2)	236 (34.8)
Male	280	212 (75.7)	68 (24.3)	182 (65.0)	98 (35.0)
Race/Ethnicity (n=923)					
White, non-Hispanic	336	266 (79.2)	70 (20.8)	215 (64.0)	121 (36.0)
Black, non-Hispanic	199	164 (82.4)	35 (17.6)	130 (65.3)	69 (34.7)
Hispanic	309	243 (78.6)	66 (21.4)	205 (66.3)	104 (33.7)
Other, non-Hispanic/Multiple races	79	60 (76.0)	19 (24.0)	48 (60.8)	31 (39.2)
Education (n=963)					
<12 years	171	142 (83.0)	29 (17.0)	119 (69.6)	52 (30.4)
≥12 years	792	623 (78.7)	169 (21.3)	504 (63.6)	288 (36.4)
Approximate %FPL <sup>b</sup> (n=683)					
≤100%	265	217 (81.9)	48 (18.1)	177 (66.8)	88 (33.2)
101% to 199%	165	129 (78.2)	36 (21.8)	97 (58.8)	68 (41.2)
≥200%	253	207 (81.8)	46 (18.2)	171 (67.6)	82 (32.4)
Preferred language (n=969)					
English	798	625 (78.3)	173 (21.7)	508 (63.7)	290 (36.3)
Spanish	171	145 (84.8)	26 (15.2)	118 (69.0)	53 (31.0)
Self-reported health or child's health <sup>49</sup> (n=946)					
Excellent/Very good/Good	718	581 (80.9)	137 (19.1)	468 (65.2)	250 (34.8)
Fair/poor	228	173 (75.9)	55 (24.1)	147 (64.5)	81 (35.5)
Participant type (n=969)					
Patient	738	591 (80.1)	147 (19.9)	486 (65.9)	252 (34.1)
Pediatric caregiver	231	179 (77.5)	52 (22.5)	140 (60.6)	91 (36.4)
Social risk screening <sup>22</sup>					
Housing instability (n=965)					
Yes	397	328 (82.6)	69 (17.4)	255 (64.2)	142 (35.8)
No	568	440 (77.5)	128 (22.5)	368 (64.8)	200 (35.2)
Food insecurity (n=960)					
Yes	401	329 (82.0)	72 (18.0)	263 (65.6)	138 (34.4)
No	559	435 (77.8)	124 (22.2)	359 (64.2)	200 (35.8)
Utilities problems (n=953)					
Yes	119	99 (83.2)	20 (16.8)	69 (58.0)	50 (42.0)
No	834	661 (79.3)	173 (20.7)	550 (66.0)	284 (34.0)
Transportation problems (n=951)					
Yes	193	152 (78.8)	41 (21.2)	135 (70.0)	58 (30.0)
No	758	603 (79.6)	155 (20.4)	481 (63.5)	277 (36.5)

(continued on next page)

**Table 1.** Participant Characteristics by Acceptability Response Among 969 Adult Patients and Adult Caregivers of Pediatric Patients (continued)

Variable	Total	Appropriateness <sup>a</sup>		Comfort with EHR integration <sup>a</sup>	
		Appropriate (n=770, 79%) Very: 54% somewhat: 25%	Neither/ inappropriate (n=199, 21%) Neither: 14% Somewhat: 4% Very: 3%	Comfortable (n=658, 65%) Very: 44% somewhat: 20%	Neither/ uncomfortable (n=374, 35%) Neither: 17% Somewhat: 9% Very: 10%
Safety concern (n=934)					
Yes	18	15 (83.3)	3 (16.7)	13 (72.2)	5 (27.8)
No	916	725 (79.2)	191 (20.8)	589 (64.3)	327 (35.7)
Overall social risk (n=969)					
No risk factors	374	287 (76.7)	87 (23.3)	247 (66.0)	127 (34.0)
1–2 risk factor	443	355 (80.1)	88 (19.9)	280 (63.2)	163 (36.8)
3–5 risk factors	152	128 (84.2)	24 (15.8)	99 (65.1)	53 (34.9)
Any prior social risk screening exposure (n=938)					
Yes	298	<b>259 (86.9)</b>	<b>39 (13.1)</b>	<b>210 (70.5)</b>	<b>88 (29.5)</b>
No	654	<b>499 (76.3)</b>	<b>155 (23.7)</b>	<b>407 (62.2)</b>	<b>247 (37.8)</b>
Any prior social risk assistance from healthcare setting (n=951)					
Yes	176	140 (79.5)	36 (20.5)	<b>128 (72.7)</b>	<b>48 (27.3)</b>
No	775	613 (79.1)	162 (20.9)	<b>486 (62.7)</b>	<b>289 (37.3)</b>
Any discomfort with questions in any screening domains (n=949)					
Yes	65	50 (76.9)	15 (23.1)	35 (53.9)	30 (46.1)
No	884	704 (79.6)	180 (20.4)	576 (65.2)	308 (34.8)
Any interest in assistance (n=938)					
Yes	356	294 (82.6)	62 (17.4)	242 (68.0)	114 (32.0)
No	582	452 (77.7)	130 (22.3)	365 (62.7)	217 (37.3)
Trust in clinician <sup>50</sup> (n=936)					
Complete (10)	473	<b>384 (81.2)</b>	<b>89 (18.8)</b>	<b>333 (70.4)</b>	<b>140 (29.6)</b>
High (8–9)	273	<b>223 (81.7)</b>	<b>50 (18.3)</b>	<b>162 (59.3)</b>	<b>111 (40.7)</b>
Medium-Low (1–7)	190	<b>139 (73.2)</b>	<b>51 (26.8)</b>	<b>112 (59.0)</b>	<b>78 (41.0)</b>
Any experience prior discrimination within health care <sup>51,52</sup> (n=959)					
Yes	264	<b>195 (73.9)</b>	<b>69 (26.1)</b>	452 (65.0)	243 (35.0)
No	695	<b>566 (81.4)</b>	<b>129 (18.6)</b>	168 (63.6)	96 (36.4)
Healthcare setting characteristics (n=969)					
Primary care	579	<b>479 (82.7)</b>	<b>100 (17.3)</b>	385 (66.5)	194 (33.5)
Emergency department	390	<b>291 (74.6)</b>	<b>99 (25.4)</b>	241 (61.8)	149 (38.2)
Region					
North East	296	<b>228 (77.0)</b>	<b>68 (23.0)</b>	190 (64.2)	106 (35.8)
South	99	<b>72 (72.7)</b>	<b>27 (27.3)</b>	61 (61.6)	38 (38.4)
Midwest	190	<b>166 (87.4)</b>	<b>24 (12.6)</b>	129 (67.9)	61 (32.1)
West	384	<b>304 (79.2)</b>	<b>80 (20.8)</b>	246 (64.1)	138 (35.9)
Percentage patient population publicly insured or uninsured					
<80%	677	<b>525 (77.6)</b>	<b>152 (22.4)</b>	440 (65.0)	237 (35.0)
≥80%	292	<b>245 (83.9)</b>	<b>47 (16.1)</b>	186 (63.7)	106 (36.3)

Note: Boldface indicates statistical significance ( $p < 0.05$ ).

<sup>a</sup>Outcome variables rated on 5-point Likert-scale in survey; collapsed into 2 categories.

<sup>b</sup>Calculated based on participant-reported income bracket and number of participant-reported dependents. Income brackets matched to closest 2018 FPL income numbers.

EHR, electronic health record; FPL, federal poverty level.

**Table 2.** Unadjusted and Adjusted Associations Between Acceptability Outcomes (Appropriateness of Screening and Comfort With EHR Integration of Social Risk Data) and Variables of Interest Among Adult Patients and Caregivers of Pediatric Patients

Variable	Appropriate vs Neither/Inappropriate (base) OR <sup>a</sup> (95% CI)		Comfortable vs Neither/Uncomfortable (base) OR (95% CI)	
	Unadjusted <sup>b</sup>	Adjusted (n=823)	Unadjusted <sup>b</sup>	Adjusted (n=886)
Participant characteristics				
Age, years				
18–44	ref	— <sup>c</sup>	ref	ref
45–64	1.10 (0.76, 1.57)		<b>1.25 (0.94, 1.68)*</b>	1.23 (0.87, 1.75)
≥65	0.90 (0.59, 1.39)		<b>1.45 (0.88, 0.41)*</b>	1.45 (0.79, 2.69)
Sex				
Female	<b>1.38 (1.03, 1.84)***</b>	<b>1.27 (0.96, 1.69)**</b>	1.01 (0.79, 1.29)	—
Male	ref	ref	ref	
Race/ethnicity				
White, non-Hispanic	ref	ref	ref	—
Black, non-Hispanic	<b>1.23 (0.92, 1.66)*</b>	1.28 (0.84, 1.93)	1.06 (0.73, 1.55)	
Hispanic	0.97 (0.70, 1.35)	0.71 (0.37, 1.34)	1.11 (0.88, 1.40)	
Other, non-Hispanic/Multiple races	0.83 (0.54, 1.29)	0.90 (0.63, 1.28)	0.87 (0.61, 1.24)	
Education				
<12 years	<b>1.33 (0.95, 1.86)**</b>	1.01 (0.64, 1.59)	<b>1.31 (1.05, 1.63)*</b>	1.14 (0.80, 1.63)
≥12 years	ref	ref	ref	ref
Approximate %FPL <sup>d</sup>				
≤100%	ref	—	ref	—
101%–199%	0.79 (0.52, 1.21)		<b>0.71 (0.47, 1.06)**</b>	
≥200%	1.00 (0.62, 1.61)		1.04 (0.79, 1.36)	
Preferred language				
English	ref	ref	ref	ref
Spanish	<b>1.54 (0.95, 2.51)**</b>	1.70 (0.69, 4.19)	<b>1.27 (0.91, 1.78)*</b>	1.18 (0.75, 1.85)
Self-reported health or child's health				
Excellent/Very good/Good	<b>1.35 (0.92, 1.97)*</b>	1.26 (0.81, 1.95)	1.03 (0.74, 1.43)	—
Fair/poor	ref	ref	ref	
Overall social risk				
No risk factors	ref	ref	ref	—
1–2 risk factor	1.22 (0.78, 1.91)	1.09 (0.63, 1.87)	0.88 (0.64, 1.23)	
3–5 risk factors	<b>1.62 (0.90, 2.90)*</b>	1.52 (0.64, 3.59)	0.96 (0.59, 1.57)	

(continued on next page)

**Table 2.** Unadjusted and Adjusted Associations Between Acceptability Outcomes (Appropriateness of Screening and Comfort With EHR Integration of Social Risk Data) and Variables of Interest Among Adult Patients and Caregivers of Pediatric Patients (*continued*)

Variable	Appropriate vs Neither/Inappropriate (base) OR <sup>a</sup> (95% CI)		Comfortable vs Neither/Uncomfortable (base) OR (95% CI)	
	Unadjusted <sup>b</sup>	Adjusted (n=823)	Unadjusted <sup>b</sup>	Adjusted (n=886)
Any prior social risk screening exposure				
Yes	<b>2.06 (1.27, 3.35)***</b>	<b>1.82 (1.16, 2.88)***</b>	<b>1.45 (1.06, 1.98)***</b>	<b>1.37 (0.98, 1.92)**</b>
No	ref	ref	ref	ref
Any prior assistance from healthcare setting				
Yes	1.03 (0.70, 1.50)	—	<b>1.59 (1.14, 2.20)***</b>	<b>1.47 (1.04, 2.07)***</b>
No	ref	—	ref	ref
Any discomfort with questions in any screening domain (n=949)				
Yes	0.85 (0.60, 1.21)	—	<b>0.62 (0.34, 1.14)*</b>	<b>0.60 (0.30, 1.22)*</b>
No	ref	—	ref	ref
Any interest in assistance (n=938)				
Yes	<b>1.36 (0.98, 1.89)**</b>	0.97 (0.64, 1.47)	1.26 (0.83, 1.91)	—
No	ref	ref	ref	—
Trust in clinician				
Complete (10)	<b>1.58 (0.96, 2.61)**</b>	<b>1.55 (1.00, 2.40)***</b>	<b>1.66 (0.98, 2.79)**</b>	<b>1.63 (0.95, 2.80)**</b>
High (8–9)	<b>1.64 (0.94, 2.84)**</b>	1.74 (0.95, 3.18)	1.02 (0.61, 1.69)	1.07 (0.64, 1.75)
Medium-Low (1–7)	ref	ref	ref	ref
Any experience prior discrimination within health care				
Yes	<b>0.64 (0.46, 0.90)***</b>	<b>0.66 (0.45, 0.95)*</b>	0.94 (0.73, 1.21)	—
No	ref	ref	ref	—
Healthcare setting characteristics				
Primary care	<b>1.63 (1.09, 2.43)***</b>	<b>1.70 (1.23, 2.38)***</b>	<b>1.23 (0.96, 1.56)**</b>	1.12 (0.85, 1.48)
Emergency department	ref	ref	ref	ref
Percentage patient population publicly insured or uninsured				
<80%	ref	ref	ref	—
≥80%	<b>1.51 (1.03, 2.21)***</b>	<b>1.71 (1.03, 1.86)***</b>	0.95 (0.68, 1.31)	—

Note: Boldface indicates statistical significance (\*\*\* $p < 0.05$ ; \*\* $p < 0.10$ ; \* $p < 0.20$ ).

<sup>a</sup>Higher ORs signify higher acceptability.

<sup>b</sup>Table 1 provides sample sizes in unadjusted models.

<sup>c</sup>Variable not included in multivariable model.

<sup>d</sup>Calculated based on participant-reported income bracket and number of participant-reported dependents. Income brackets matched to closest 2018 federal poverty level income numbers. FPL, federal poverty level.

CI=1.00, 2.40), prior healthcare discrimination (AOR=0.66, 95% CI=0.45, 0.95), recruitment from a primary care setting (versus ED; AOR=1.70, 95% CI=1.23, 2.38) and recruitment from a site with a high percentage of publicly insured or uninsured patients (AOR=1.71, 95% CI=1.03, 1.86) were associated with screening appropriateness at  $p \leq 0.05$  (Table 2).

Of the study participants, 65% reported being either *very* or *somewhat comfortable* with their social risk data being included in the EHR, 17% reported being neutral, and 19% reported being *very* or *somewhat uncomfortable*. Among participant subgroups, comfort with including social data in EHRs ranged from 54% to 73% (Table 1). Table 2 provides results of univariate (unadjusted) analyses. In multivariable analyses, only prior exposure to social assistance remained associated with higher odds of comfort at the  $p \leq 0.05$  significance level (AOR=1.47, 95% CI=1.04, 2.07) (Table 2).

Participant age, race/ethnicity, education, preferred language, health status, number of social risks, discomfort with screening domains, and interest in assistance were not significantly associated with either measure of acceptability. In sensitivity analyses (results not shown; available upon request), the AOR point estimates remained similar but some CIs widened or shifted slightly. When only variables that were associated at  $p < 0.10$  significance level in univariable analyses were included in the multivariable analyses, healthcare-based discrimination was not significant at  $p \leq 0.05$  (AOR=0.72, 95% CI=0.49, 1.04) and female sex was significant (AOR=1.38, 95% CI=1.01, 1.89) for appropriateness of screening. There were no differences in the model for comfort with EHR integration. For multiple imputations, virtually identical patterns of results were found with imputed values in univariable and multivariable analyses. Two of the covariates changed from significant to marginal in the model of appropriateness of screening, complete trust in clinicians (AOR=1.39, 95% CI=0.84, 2.27) and recruitment from a site with a high percentage of publicly insured or uninsured patients (AOR=1.31, 95% CI=0.95, 1.81). There were no differences in the model for comfort with EHR integration. In the multivariable model for comfort with EHR integration, when federal poverty level was included in the raw analyses, prior exposure to social assistance was not significant at  $p \leq 0.05$  (AOR=1.39, 95% CI=0.95, 2.05). There were no differences in the imputed univariable and multivariable analyses when federal poverty level was included.

## DISCUSSION

This multisite cross-sectional study is the first to directly assess the acceptability of a social risk screening tool in a large and diverse sample of adult patients and caregivers

of pediatric patients. Across settings, a sizable majority of participants reported that social risk screening was appropriate and that they were comfortable having social risk screening results documented in EHRs. Those reporting less than *very* or *somewhat acceptable* most often indicated a neutral response rather than a negative one. Although significant differences in acceptability were identified based on prior exposure to social screening and assistance, trust in clinicians, prior healthcare discrimination, recruitment from a primary care setting, and recruitment from a site caring for higher percentages of publicly or uninsured patients, the observed differences were moderate to small and both screening appropriateness and comfort with EHR integration were high for all subgroups. To the extent that patient acceptability facilitates adoption of screening practices,<sup>55</sup> these findings suggest that lack of patient acceptability should not be a major barrier to implementation of social risk screening in primary care and ED settings.

The finding that more patients were comfortable with social screening itself than with its documentation in the EHR is consistent with a recent study on social risk screening where participants reported concern with privacy and utilization of social risk data<sup>33</sup> and findings from other work describing patients' unease around sharing health data.<sup>56,57</sup> There are already calls for developing standards to protect social risk data in EHRs,<sup>58</sup> which is increasingly relevant in the context of new efforts to share data across sectors.<sup>59,60</sup> Qualitative findings presented in the companion paper in this supplement augment understanding of participant EHR-related concerns.<sup>46</sup> Future work could better explore the possible unintended consequences of sharing social risk information<sup>61</sup> and efforts to give patients control over data.

These results may help identify potential avenues for further strengthening screening acceptability mitigating unintended consequences. The fact that perceived appropriateness was associated with recruitment from primary care settings may relate to the longitudinal patient–healthcare team relationships fostered in primary care. Trust and discrimination were independently associated with perceived appropriateness, even after controlling for healthcare setting. When feasible, clinical practices engaging in social risk screening activities should develop strategies to ensure screening is conducted by team members with empathy<sup>62</sup> and implicit bias training.<sup>63,64</sup> Future work will need to explore whether social risk–related activities in healthcare settings reduce or exacerbate perceptions of unfair treatment generally and in specific subgroups.

The finding that perceived appropriateness was positively associated with prior exposure to social risk screening appears consistent with findings from 1

prior study in which caregivers of pediatric patients were more comfortable with food insecurity screening after discussing screening with their clinicians.<sup>28</sup> Similarly, comfort with including social risk data in EHRs was positively associated with prior healthcare-based assistance with social factors. This suggests that as social risk screening activities become more common in the U.S. healthcare system, patient acceptability is likely to increase. Borrowing from the patient education literature, one testable strategy to normalize screening and thereby reduce discomfort for patients who have not experienced healthcare-based social care-related activities could be to train staff to offer brief patient education and framing on the rationale for such activities.<sup>65–67</sup>

### Limitations

The results of this study should be interpreted in light of several limitations. First, acceptability of social risk screening was tested in a study; screening acceptability to those who did not participate in the study are not represented. In addition, the inclusion criteria excluded patients who did not speak or read English or Spanish and who did not feel comfortable using a tablet device. Although study questions were matched to the reading level of the AHC screening tool, some participants may not have understood all questions. It is possible that those who did not participate, were excluded, or potentially misinterpreted questions would have been less likely to find screening acceptable. The fact that <5% were excluded based on literacy or comfort with a tablet and <7% of participants reported less than a 9th grade education (including at sites serving high proportions of vulnerable patient populations) suggests that self-completed, technology-mediated screening is feasible in diverse healthcare settings. Second, in the context of high acceptability rates, ORs can overestimate associations, and so should be interpreted with caution.<sup>68</sup> Third, findings are subject to social desirability bias. Surveys were self-completed electronically on tablets, however, which has been shown to increase disclosure of social risks<sup>69</sup> and may therefore lessen social desirability bias-related concerns. Fourth, because the existing literature offers little clarity on how best to measure the acceptability of healthcare interventions,<sup>70</sup> study measures of social screening acceptability (appropriateness of screening and comfort with EHR integration) have not been tested for psychometric validity. Finally, these cross-sectional survey findings cannot be used to infer causality. Despite these limitations, the findings provide new insights into the acceptability of healthcare-based social risk screening to patients and caregivers in diverse healthcare settings.

## CONCLUSIONS

A strong majority of adult patients and caregivers of pediatric patients in this study reported finding social risk screening appropriate in primary care and ED settings. A majority also felt comfortable with social risk data being included in the EHR. These findings suggest that lack of patient acceptability should not be a major barrier to implementation of social risk screening in healthcare settings. Initiatives to expand social risk screening in U.S. healthcare settings should explore implementation strategies that maximize acceptability for all patients.

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EFW is a consultant for Veta Health, which is a company that develops software for chronic disease management. Veta Health also supports HelpSteps, a system for connecting families to social services developed by EFW. In the future, it is possible that this technology will be sold commercially. If this were to occur, EFW and Boston Children's Hospital might receive financial benefits in the form of compensation. As in all research studies, the Boston Children's Hospital has taken steps designed to ensure that this potential for financial gain does not endanger research subjects or undercut the validity and integrity of the information learned by this research. The research published in this paper is not related to any of the above consulting work and was conducted prior EFW working with Veta Health. STL directed a Center for Medicare and Medicaid Innovation Health Care Innovation Award (1C1CMS330997-03) called CommunityRx. This award required development of a sustainable business model to support the model test after award funding ended. To this end, STL is founder and co-owner of NowPow, LLC. Neither the University of Chicago nor the University of Chicago Medicine is endorsing or promoting any NowPow entity or its business, products, or services. No other financial disclosures were reported by the authors of this paper.

## SUPPLEMENTAL MATERIAL

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