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# A Randomized Trial on Screening for Social Determinants of Health: the iScreen Study

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## KEY WORDS

psychosocial issues, emergency medicine

## ABBREVIATIONS

ED—emergency department

CHO ED—Children's Hospital Oakland Emergency Department

Dr Gottlieb conceptualized and designed study, carried out the initial analyses, and drafted the initial manuscript; Drs Hessler, Long, Adler conceptualized and designed study, carried out initial analyses, and critically reviewed the manuscript; Ms Amaya helped recruit patients for the study, supervised data collection on site, and critically reviewed the manuscript; and all authors approved the final manuscript as submitted.

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**WHAT'S KNOWN ON THIS SUBJECT:** Despite growing interest around clinical screening for health-related social and environmental risk factors, little evidence exists regarding screening formats that maximize disclosure of psychosocial information.



**WHAT THIS STUDY ADDS:** This study compares psychosocial and socioeconomic adversity disclosure rates in face-to-face interviews versus electronic formats in a large, urban pediatric emergency department.

## abstract



**BACKGROUND:** There is growing interest in clinical screening for pediatric social determinants of health, but little evidence on formats that maximize disclosure rates on a wide range of potentially sensitive topics. We designed a study to examine disclosure rates and hypothesized that there would be no difference in disclosure rates on face-to-face versus electronic screening formats for items other than highly sensitive items.

**METHODS:** We conducted a randomized trial of electronic versus face-to-face social screening formats in a pediatric emergency department. Consenting English-speaking and Spanish-speaking adult caregivers familiar with the presenting child's household were randomized to social screening via tablet computer (with option for audio assist) versus a face-to-face interview conducted by a fully bilingual/bicultural researcher.

**RESULTS:** Almost all caregivers (96.8%) reported at least 1 social need, but rates of reporting on the more sensitive issues (household violence and substance abuse) were significantly higher in electronic format, and disclosure was marginally higher in electronic format for financial insecurity and neighborhood and school safety. There was a significant difference in the proportion of social needs items with higher endorsement in the computer-based group (70%) than the face-to-face group (30%).

**CONCLUSIONS:** Pediatric clinical sites interested in incorporating caregiver-reported socioeconomic, environmental, and behavioral needs screening should consider electronic screening when feasible, particularly when assessing sensitive topics such as child safety and household member substance use. *Pediatrics* 2014;134:1–8

Adverse social conditions experienced in childhood contribute to an elevated burden of disease in affected children, spanning acute and chronic diseases such as injury, diabetes, asthma, infectious disease, and cardiovascular disease.<sup>1–4</sup> Exposures such as poverty and other financial stress,<sup>5–7</sup> food insecurity,<sup>8–14</sup> and poor housing quality and housing instability<sup>15–19</sup> have been linked with greater stress, socioemotional behavior problems, cognitive and academic deficits, and poor health status. The probability of poor health increases as the number of adverse exposures increases,<sup>20,21</sup> and risks extend to disease onset and premature mortality in adulthood.<sup>22–24</sup> Adverse conditions affect a substantial portion of children. As 1 example, in recent estimates, 1 in 5 US children lives below the federal poverty level,<sup>25</sup> making children the largest subgroup of the US impoverished population. Over the past 10 years, there has been increasing interest in identifying and addressing social adversities in pediatric clinical settings. In 2002, the American Academy of Pediatrics recommended that pediatricians increase their understanding of health and social risks as these affect child outcomes.<sup>26,27</sup> More recently, the Academic Pediatric Association Taskforce on Childhood Poverty endorsed promotion of evidence-based strategies that disproportionately help children living in poverty.<sup>28</sup> More than 80% of clinicians surveyed by the Robert Wood Johnson Foundation believe that unmet social needs affect health and are as important to address in clinical settings as medical needs.<sup>29</sup> These all point to the need for systematic comprehensive social screening in pediatric health care settings.<sup>30</sup> Rates of such screening are low, even in settings serving low-income populations where social adversities are more prevalent.<sup>30–32</sup> Informal social screening is inadequate: providers routinely underestimate social needs in most areas except drug and

alcohol use,<sup>33</sup> and standardized screening has been shown to be more sensitive than provider clinical interviews.<sup>34</sup>

One obstacle to social and economic needs screening is potential patient discomfort in reporting what may be sensitive or stigmatized conditions. Although face-to-face interviews can build rapport and trust, they may result in more socially desirable responses and underestimate need. In contrast, electronic screening can be cost- and resource-effective but may fail to build rapport and trust. We undertook this study to determine if social needs reporting would be greater via computer-based self-completed questionnaire than face-to-face interviews in an emergency department (ED) setting. The randomized trial included items on household violence and substance use, both of which have been shown to elicit significantly higher disclosure rates in electronic formats, as well as items (eg, income, child-care access, housing stability and habitability) that have not been directly compared across formats or in this setting. We hypothesized that there would be no difference in disclosure rates on face-to-face versus computer-based screening formats for items other than highly sensitive items.

## METHODS

### Setting, Participants, and Eligibility Criteria

Participants were drawn from adult caregivers seeking treatment of a child in a fast-track arm of a large, urban children's hospital ED in Oakland, CA (CHO ED Annex). The CHO ED Annex is the lower acuity section of the CHO ED where more stable patients (triage categories 4–5 on the 5-level Emergency Severity Index system<sup>35</sup>) are evaluated. In 2012, CHO's ED Annex saw 13 924 unique patients over a total of 17 536 encounters. Seventy percent of patients have Medicaid insurance; 33% of patients are African American and 42% Latino.

Self-reported eligibility criteria for participation by the child's caregiver included aged  $\geq 18$  years; accompanying a child aged  $< 18$  years; familiar with the child's household environment; and primary language English or Spanish. Respondents were allowed to complete the survey once, and only 1 respondent was permitted per household, regardless of the number of visits or children admitted to the ED Annex.

### Study Procedures

English and/or Spanish-speaking families triaged to CHO ED Annex between May and August 2013 during study hours (1 PM to 10 PM, Monday–Sunday) were approached at any point in the child's visit after registration and screened for eligibility by a research assistant. Randomization by day was predetermined by a computer program. Consenting participants completed the subsequent social needs questionnaires either in face-to-face interview or via computer-based self-completed questionnaire between medical evaluations and, in some cases, after discharge. Identical surveys in both arms of the screening trial were designed to a fifth-grade readability level.

#### Face-to-Face Interview Arm

Participants randomized to this condition were interviewed in person by a fully bilingual (English and Spanish), bicultural research assistant trained in cultural humility, standard research protocols, and interviewing practices. Interviews were conducted in clinical rooms in respondent's preferred language, and the survey could be reinitiated at any point of discontinuation if interrupted. Participant responses during face-to-face interviews were recorded by the research assistant on paper and later recorded electronically.

#### Computer-Based Self-Completed Survey Arm

Participants randomized to the computer-based self-completed survey arm were

issued a tablet computer to answer survey questions. All participants were encouraged to ask for technical assistance if needed at any point, and, as in the face-to-face interviews, the electronic survey could be reinitiated after any discontinuation. Those in the tablet survey arm could also view the survey in their preferred language and additionally were given headsets so they could use audio assist with identical, prerecorded questions.

Respondents in both survey arms were given the option to skip any items. Participants in each study arm were issued a \$5 gift card after survey completion. All study procedures were approved by the University of California San Francisco Committee on Human Research.

## Measures

### *Demographic Variables*

Respondents provided information on their gender, race/ethnicity, age, caregiver education level, and household income, size, and composition. Federal poverty level was derived from 2013 national guidelines on annual household income and people in household.<sup>36</sup>

### *Psychosocial Needs Assessment*

Twenty-three individual items asked about problems in 16 psychosocial domains. (The survey instrument is available via online Supplemental Information.) Some items (child care, immigration, school safety, public benefits, housing costs, housing safety, and housing stability) were adapted from the 10-item Medical Advocacy Screening Questionnaire used in previous studies.<sup>34</sup> Other items were based on existing validated survey items on income security,<sup>37</sup> food security,<sup>38</sup> and neighborhood safety.<sup>39</sup> Likert-scale response options were as follows: 1 = "not at all stressful," 2 = "a little bit stressful," 3 = "moderately stressful," 4 = "very stressful," 5 = "extremely stressful," and 0 "issue listed is

not applicable to my family." Each social need was coded in a binary format as either 0 (if "not at all stressful" or "not applicable to my family") or 1 (if "a little stressful" to "extremely stressful") to indicate a positive disclosure.

### Data Analytic Plan

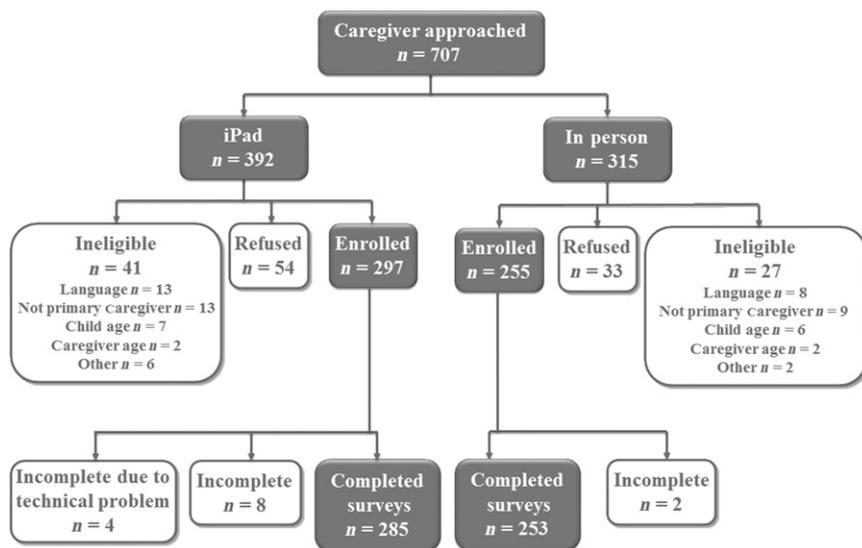
Sample size and power estimates are based on  $\alpha = .05$  and 2-sided *t* tests on between-group differences. The study was powered  $\geq 0.80$  to detect an effect size of 12% with 250 participants in each group. Generalized estimating equation models were used to account for clustering by randomization day for both continuous and categorical data. Differences between groups were compared on demographic variables and social needs. A test of proportions was used to compare the total number of social needs with higher endorsement in the 2 groups. Missing data were treated as missing (not imputed). Statistical analyses were performed by using SPSS 19.0 (SPSS Inc, Chicago).

## RESULTS

Of 707 caregivers approached, 639 (90%) were eligible to complete the survey, 87 (14% of eligible respondents) refused survey participation, and 538 (84% of eligible respondents) completed the survey (Fig 1). Two hundred eighty-five caregivers were randomized to the computer-based survey arm and 253 to the face-to-face arm. Overall, the mean age of the sample was 33 (SD = 9) years, and the sample was primarily female caregivers (85%). More than half of participants were Hispanic, with the next largest ethnic group being non-Hispanic African American (25%). Approximately two-thirds of respondent households were below the federal poverty level. Missing data were kept to a minimum, with an overall rate of <5%. There were no significant differences in demographic variables between the computer-based self-completed survey and face-to-face arms (Table 1).

Almost all caregivers (96.8%) reported experiencing stress related to  $\geq 1$  social need with no difference by group (face-to-face = 96.1%, computer-based = 97.6%; odds ratio = 1.65,  $P = .32$ ). On average, participants reported experiencing 10 of the 23 social needs assessed (face-to-face mean = 10.17, SE = 0.40; computer-based mean = 9.87, SE = 0.35), and this did not differ by modality ( $P = .60$ ). The most commonly reported social needs, endorsed by at least two-thirds of the respondents, included not having enough money at the end of the month, lack of health insurance, and concerns about getting health care (Table 2).

Significant differences between the computer-based survey and face-to-face interview groups' responses were identified. Respondents reported more stress via computer-based surveys on the items related to interpersonal violence/threats in the home ( $P = .03$ ); and substance use in the home ( $P = .05$ ). Marginally significant differences in the same direction were also found for not having enough money at the end of the month ( $P = .10$ ), child's safety at school or in the neighborhood ( $P = .09$ ), and lack of/inadequate health insurance ( $P = .10$ ). Participants in the computer-based group (71.7%) were more likely than the face-to-face group (63.5%) to disclose their annual household income (odds ratio = 0.60,  $P = .02$ ). Although there were no significant differences in reporting on the other 18 individual items evaluated, there was a significant difference ( $z = 2.65$ ,  $P = .008$ ) in the total number of social needs items with higher overall endorsement in the computer-based group than the face-to-face group; the computer-based group had higher endorsement in more than two-thirds of the social screening items (70%,  $n = 16$  needs), and the face-to-face group had higher endorsement in one-third of the social screening items (30%,  $n = 7$  needs). All *P* values are based on 2-tailed tests.



**FIGURE 1**  
Study enrollment flow chart.

Those meeting the poverty criteria reported more social needs than those above the poverty level ( $B = -1.62, P = .007$ ) and were more likely to report a specific need around income ( $B = -0.16, P = .001$ ). There were no differences in reporting, however, by caregiver age or education, nor were there any differences by condition (computer-based versus face-to-face) in the association of demographic variables and social need.

## DISCUSSION

Increasing evidence of the importance of social determinants of health<sup>40</sup> and new funding mechanisms that incentivize attention to these determinants (eg, accountable care organizations and patient-centered medical homes) require accurate information about patients' exposures and risks. Ways in which information is collected may affect its accuracy; specifically, providing opportunities to electronically report in-

formation using computer-based self-reporting may improve disclosure rates. The findings of the current study suggest that computer-based screening may be more effective than face-to-face assessment in identifying social needs of low-income families. Looking over 23 items, there was a significantly higher proportion of social needs items with higher endorsement in the computer-based group than the face-to-face group. On specific items, there were significantly higher disclosure rates of household violence and substance use on computer-based self-reporting survey formats, along with marginally higher rates of reporting on financial insecurity, risk of violence in the child's neighborhood or school, and inadequate health insurance. These are potentially stigmatizing experiences that may elicit concerns about social desirability.

Socially desirable responses to surveys in general can be affected by data collection format.<sup>41,42</sup> Computer-based surveys have been shown to be acceptable to adults and to elicit more truthful responses on some sensitive health issues than in-person interviews.<sup>43–46</sup> Though providers may hesitate to use electronic surveys to elicit information on what could be sensitive topics, research in health care settings has shown greater disclosure by adolescents, adults, and adult caregivers via computer-based screenings versus face-to-face interviews on highly sensitive items surrounding substance use, sexual behavior, and intimate partner violence,<sup>46–57</sup> with some of this work done in ED settings.<sup>50,58</sup> In line with results from the current study, other studies have found little difference in reporting rates for less sensitive items across these formats.<sup>59</sup> Recently, Wylie and colleagues conducted a qualitative study with young adults regarding their willingness to disclose socially relevant information

**TABLE 1** Characteristics of Participants by Study Arm

|                       | Total Sample    | Computer-Based  | Face-to-Face    | <i>P</i> |
|-----------------------|-----------------|-----------------|-----------------|----------|
|                       | M ± SD or % (n) | M ± SD or % (n) | M ± SD or % (n) |          |
| Age                   | 32.7 ± 9.1      | 32.4 ± 8.9      | 32.9 ± 9.3      | .57      |
| Gender (female)       | 85.0% (453)     | 83.6% (234)     | 86.6% (219)     | .30      |
| Language of survey    |                 |                 |                 | .62      |
| English               | 60.8% (327)     | 61.8% (176)     | 59.7% (151)     |          |
| Spanish               | 39.2% (211)     | 38.2% (109)     | 40.3% (102)     |          |
| Race/ethnicity        |                 |                 |                 | .41      |
| Hispanic              | 57.2% (307)     | 55.6% (158)     | 58.9% (149)     |          |
| Non-Hispanic black    | 25.1% (135)     | 25.4% (72)      | 24.9% (63)      |          |
| Non-Hispanic white    | 5.0% (27)       | 4.6% (13)       | 5.5% (14)       |          |
| Other/multiethnic     | 12.7% (68)      | 14.4% (41)      | 10.7% (27)      |          |
| Education             |                 |                 |                 | .19      |
| Less than HS graduate | 28.8% (151)     | 29.6% (81)      | 27.8% (70)      |          |
| HS graduate or GED    | 28.9% (152)     | 29.9% (82)      | 27.8% (70)      |          |
| Some college          | 26.0% (137)     | 27.0% (74)      | 25.0% (63)      |          |
| College graduate      | 16.3% (86)      | 13.5% (37)      | 19.4% (49)      |          |
| Federal poverty level | 65.4% (244)     | 66.8% (141)     | 63.6% (103)     | .52      |

GED, general education diploma; HS, high school.

**TABLE 2** Percent Endorsed Stress on Individual Social Needs by Study Arm

| Screening Question  | Total Sample | Computer-Based | Face-to-Face | OR   | P   |
|---|--------------|----------------|--------------|------|-----|
|   | % (n)        | % (n)          | % (n)        |      |     |
| Lack of health insurance or inadequate insurance                                  | 71.7 (386)   | 75.4 (215)     | 67.6 (171)   | 0.60 | .10 |
| Concerns about getting health care (visits, medications) when your child needs it | 66.7 (344)   | 67.4 (178)     | 65.9 (166)   | 0.93 | .74 |
| Dealing with your child's behavioral or mental health problems                    | 44.3 (232)   | 46.9 (127)     | 41.5 (105)   | 0.80 | .22 |
| Dealing with your own mental health or mental health care                         | 45.5 (221)   | 40.7 (109)     | 44.4 (112)   | 1.17 | .43 |
| Your child not getting the services they are supposed to learn                    | 58.9 (311)   | 60.0 (165)     | 57.7 (146)   | 0.91 | .60 |
| Your child's exposure to tobacco smoke  | 63.0 (335)   | 60.9 (170)     | 65.2 (165)   | 1.20 | .24 |
| Concerns about your child getting enough physical activity (>60 min/day)          | 34.1 (181)   | 32.7 (91)      | 35.6 (90)    | 1.13 | .55 |
| Concerns about finding activities for your child during the summer/after school   | 47.4 (251)   | 48.9 (135)     | 45.6 (116)   | 0.88 | .49 |
| Concerns about the physical condition of your housing                             | 35.9 (192)   | 35.2 (100)     | 36.7 (92)    | 1.07 | .73 |
| Concerns about the cost or stability of your housing                              | 43.8 (233)   | 45.5 (127)     | 41.9 (106)   | 0.86 | .47 |
| Concerns about not having enough money at the end of the month                    | 76.3 (408)   | 79.2 (224)     | 73.0 (184)   | 0.70 | .10 |
| Concerns that food will run out before you get money or food stamps to get more   | 56.6 (301)   | 58.1 (162)     | 54.9 (139)   | 0.88 | .48 |
| Concerns about not having enough healthy food                                     | 48.1 (254)   | 50.5 (140)     | 45.4 (114)   | 0.81 | .22 |
| Difficulty getting benefits and services for yourself or your child               | 55.2 (296)   | 54.9 (156)     | 55.6 (140)   | 1.03 | .89 |
| Concerns about finding affordable and reliable child care                         | 52.6 (280)   | 55.2 (154)     | 49.8 (126)   | 0.81 | .27 |
| Concerns about affording transportation or getting around                         | 48.6 (259)   | 47.9 (134)     | 49.4 (125)   | 1.06 | .75 |
| Difficulties finding or keeping a job   | 56.2 (296)   | 56.4 (155)     | 56.0 (141)   | 0.98 | .92 |
| Threats to your child's safety at school or in the neighborhood                   | 51.8 (276)   | 55.4 (155)     | 47.8 (121)   | 0.72 | .09 |
| Adults in the home who are physically violent or threaten your child              | 10.8 (57)    | 13.8 (38)      | 7.5 (19)     | 0.50 | .03 |
| Use of drugs or alcohol by yourself or family members                             | 14.3 (75)    | 17.2 (47)      | 11.1 (28)    | 0.57 | .04 |
| Past or current incarceration of $\geq 1$ of your child's household members       | 13.9 (73)    | 15.3 (42)      | 12.3 (31)    | 0.76 | .36 |
| Problems with child support or custody  | 22.0 (117)   | 22.9 (64)      | 21.0 (53)    | 0.89 | .59 |
| Concerns about a family member's immigration status                               | 35.6 (187)   | 34.1 (93)      | 37.2 (94)    | 1.14 | .45 |

via Web-based platform and found that >80% of participants supported their use for routine screening.<sup>60</sup>

Our findings make several unique contributions to the literature. This is the first study to test social screening formats with caregivers of pediatric patients in the context of a visit to the ED. Testing these formats in an ED setting is particularly valuable because families lacking a consistent source of primary care are more likely to use EDs, and these visits are more strongly associated with

elevated levels of family stress than are other outpatient visits.<sup>61–64</sup> Both adult patients and adult caregivers of pediatric patients are willing to address health risks and behaviors in this setting.<sup>65–67</sup> Longer wait times in EDs make social screening more feasible, and a self-report electronic format has advantages in terms of time and cost.

This is also the first study to include a wider range of risk factors than previously assessed, including food security, school environment, habitability and

housing stability, immigration and employment concerns, income adequacy, transportation and child-care access, custody problems, family members' incarceration history, and child and household members' mental health concerns. Although many individual items did not reach statistical significance, there was a significant difference in the proportion of social needs items with higher endorsement in the computer-based group than the face-to-face group, suggesting differences in disclosure extend to items beyond those previously understood to be highly sensitive items, such as violence and substance use. Even a small change in likelihood of disclosure around violence or substance use is likely to be relevant to child health.

This study shows an association between reported actual income and an item on income-related social need. Fewer people responded to the actual income question via in-person survey compared with the tablet format, suggesting that the tablet format was more sensitive than face-to-face interview for the demographics income questions. This is consistent with our main survey results, which showed higher disclosure rates around income-related social needs on the tablet format. Combining these 2 findings suggests that the tablet format is both more sensitive to report actual income and also to report when there is an actual need around income.

The high prevalence of social needs identified in our study was consistent with those in other low-income populations. Nonresponse rates to individual items were low, and the total of eligible participants who refused screening in this study was 14%. These rates support the feasibility of providing families with a comprehensive social and behavioral needs screening tool in the ED. This is consistent with other research showing that among parents participating in research studies,

there is high acceptability for comprehensive social screening<sup>32</sup> and computer-based psychosocial screening<sup>30,68,69</sup> in primary care settings. For example, among parents of 21 065 children enrolled in a pediatric primary care setting, the Pediatric Symptom Checklist, which screens for psychosocial concerns, was completed 97% of the time.<sup>70</sup> In ED settings, computerized health risk and intimate partner violence screening with adult patients has also been shown to be both feasible and acceptable.<sup>65,67</sup> The current study, which was conducted with both English and Spanish speakers, found no evidence that acceptability or accuracy in the pediatric ED setting is affected by ethnicity or language.

### Strengths and Limitations

Our randomized design and study size provide robust, rigorous evidence of the relative rates of disclosure between face-to-face and computer-based self-reporting. The availability of both bilingual interviewers and computer surveys with bilingual audio assist increases the generalizability of our findings. The enrolled study population reflected the same distribution of racial/ethnic and economic diversity of the nonstudy population using this urban ED, minimizing the likelihood of selection bias.

Despite these strengths, we cannot assess the validity of reports in either format. The data only tell us that rates of reporting social needs were higher in the computer-based format than rates of reporting in face-to-face interviews. We interpret these as more honest responses

but have no verification of their veracity. Although we considered a crossover design in which participants would report in both formats, this was impractical in this setting. In addition, we used endorsement of stress related to a given social topic as equivalent to disclosure that this issue affected the child's household. There may be subtle differences between stress and disclosure that may influence findings, although these differences would have affected treatment and control groups equally. The study also included 23 items examined independently. This increases the likelihood of finding statistically significant differences when there are none. We believe the overall pattern of higher reporting in the computer-based group supports our more specific findings, but these findings will need to be replicated in other settings. Finally, the study addresses only the generation of risk information and does not assess the use and impact of this information on health care management. Additional work examining the effectiveness of interventions related to social needs disclosed in clinical settings is required before screening is widely disseminated.

There are many potential applications for an interactive, computer-based, audio-assisted social risk assessment deployed in a clinical setting. Our screening tool was designed for 1-way communication from patients to clinical providers (in this case, study staff) and focused exclusively on disclosure rates between survey formats. Other researchers have examined the availability of computerized assessments, ease of use, and content, as well as the

challenges that psychosocial screening may pose around workflow, team-based care, and competencies.<sup>71</sup> Future research in this field will need to integrate findings around psychosocial screening anticipated from the Institutes of Medicine Committee on Recommended Social and Behavioral Domains and Measures for Electronic Health Records.<sup>72</sup>

### CONCLUSIONS

The current study demonstrated advantages to using a computer-based self-report to obtain patient psychosocial information among low-income English- and Spanish-speaking caregivers of children seeking care in a fast track pediatric ED. Our findings may be helpful to providers and health systems that recognize the value of obtaining information on social determinants of health. If computerized screening is not available in settings aiming to incorporate social screening, comprehensive social screening conducted via in-person interview by trained staff may yield adequate disclosure rates on individual social and mental health items examined in our screening survey, although across multiple domains, the likelihood of disclosure increases via electronic screening. Whether such data are collected electronically or in person, they will be helpful for identifying both children at high risk who may need more intensive clinical attention and conditions affecting children's health that may be addressed through linkage with on-site or community social services.

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