

Addressing Social Determinants of Health at Well Child Care Visits: A Cluster RCT

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abstract

OBJECTIVE: To evaluate the effect of a clinic-based screening and referral system (Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education [WE CARE]) on families' receipt of community-based resources for unmet basic needs.

METHODS: We conducted a cluster randomized controlled trial at 8 urban community health centers, recruiting mothers of healthy infants. In the 4 WE CARE clinics, mothers completed a self-report screening instrument that assessed needs for child care, education, employment, food security, household heat, and housing. Providers made referrals for families; staff provided requisite applications and telephoned referred mothers within 1 month. Families at the 4 control community health centers received the usual care. We analyzed the results with generalized mixed-effect models.

RESULTS: Three hundred thirty-six mothers were enrolled in the study (168 per arm). The majority of families had household incomes <\$20 000 (57%), and 68% had ≥ 2 unmet basic needs. More WE CARE mothers received ≥ 1 referral at the index visit (70% vs 8%; adjusted odds ratio [aOR] = 29.6; 95% confidence interval [CI], 14.7–59.6). At the 12-month visit, more WE CARE mothers had enrolled in a new community resource (39% vs 24%; aOR = 2.1; 95% CI, 1.2–3.7). WE CARE mothers had greater odds of being employed (aOR = 44.4; 95% CI, 9.8–201.4). WE CARE children had greater odds of being in child care (aOR = 6.3; 95% CI, 1.5–26.0). WE CARE families had greater odds of receiving fuel assistance (aOR = 11.9; 95% CI, 1.7–82.9) and lower odds of being in a homeless shelter (aOR = 0.2; 95% CI, 0.1–0.9).

CONCLUSIONS: Systematically screening and referring for social determinants during well child care can lead to the receipt of more community resources for families.



WHAT'S KNOWN ON THIS SUBJECT: Although pediatric professional guidelines emphasize addressing a child's social environment in the context of well child care, it remains unclear whether screening for unmet basic needs at visits increases low-income families' receipt of community-based resources.

WHAT THIS STUDY ADDS: This study demonstrates that systematically screening and referring for social determinants of health during primary care can lead to the receipt of more community resources for families.

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Dr Garg conceptualized and designed the study and drafted the initial manuscript; Ms Toy designed the data collection instruments, was involved with the acquisition of data, and critically reviewed the manuscript; Dr Tripodis carried out the analyses and reviewed and revised the manuscript; Dr Silverstein and Mr Freeman contributed to the design of the study and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

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There is nearly universal agreement in the scientific and public health communities that social determinants,¹ the circumstances in which people live and work, affect health.¹ This impact is particularly powerful for children, who constitute the poorest segment of the US population.² Children raised in poverty experience poorer health than children from more advantaged backgrounds and commonly face unmet basic needs such as food security, stable housing, or an adequately heated home.³⁻⁸

For decades, leaders in the field of pediatrics have argued that addressing a child's social needs falls within the purview of the child health provider.⁹⁻¹² Numerous American Academy of Pediatrics policy statements and Bright Futures health supervision guidelines support this view and have been published in an effort to reinforce this practice.¹³⁻¹⁷ To date, however, there has been limited interventional research on how to address basic social needs during the delivery of pediatric primary care.¹⁸⁻²¹ Therefore, addressing the social determinants of child health in the clinical setting is currently more of a moral imperative than it is an evidence-based practice.

In this context, and based on our previous study results demonstrating that a pediatric-based intervention led to increased discussion and referrals for family psychosocial problems by pediatric trainees,¹⁹ we sought to determine whether systematically screening for unmet basic needs at well child care visits and providing simple referrals and follow-up based on screening results actually increases a family's receipt of publicly available resources in the first year of a child's life. Our primary objective was to prove the principle of systematic screening and referral for social needs as a component of the delivery of primary care. Therefore, we deliberately designed our screening and referral system to be

inexpensive, applicable to diverse practice settings, independent of computer technology, and tailored to the community in which it was deployed. We tested this system, Well Child Care, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE), in a cluster randomized controlled trial (RCT).

METHODS

Study Design and Setting

We conducted a cluster RCT involving 8 urban community health centers (CHCs) located within a 5-mile radius in Boston, Massachusetts. We chose a cluster study design to reduce the risk of intervention contamination at the patient and clinician levels. Using administrative data, we ranked the CHCs according to the proportion of low-income patients (<20% poverty level) cared for and divided them into 2 strata. Within each stratum, CHCs were randomized 1:1 to either the WE CARE or control group.

The study was approved by the Boston University Medical Center Institutional Review Board and registered on clinicaltrials.gov (NCT01303458).

Participants and Enrollment

Families of infants ≤ 6 months old who presented for well child care were eligible. Families were excluded if the primary caregivers were not mothers, mothers were <18 years old or foster parents, caregivers were non-English and non-Spanish speaking, families anticipated changing their infant's site for care, infants were born at <32 weeks' gestational age, infants had chronic cardiac or respiratory illness, or infants had a previous hospitalization. We excluded preterm infants and infants with special health care needs because such infants are often engaged with other services (eg, Early Intervention) and could be expected to benefit from WE CARE differently

from healthy infants in terms of our outcome measures.

Because of staff limitations, enrollment occurred in 4 waves, with each wave consisting of 1 intervention and 1 control site. We enrolled subjects from January 2011 to March 2012. Written informed consent was obtained from all participants before enrollment.

Baseline Data

Before intervention delivery, subjects completed a self-administered baseline research questionnaire to assess unmet basic needs, maternal depressive symptoms, sociodemographic characteristics, and current receipt of community-based resources.

Questions from the Children's HealthWatch survey were used to measure 6 basic needs: child care, food security, household heat, housing, parent education, and employment.²² This survey has been administered by Children's HealthWatch to >50 000 adult caregivers of young children during the past 16 years at hospitals in 6 cities across the United States.^{23,24} Within the Children's HealthWatch survey, food insecurity is assessed on the 18-item US Food Security Scale, a valid and reliable instrument with established clinical cutoffs.^{23,25} Single-item questions are used to measure child care needs, education needs (defined as not having completed high school), and employment. For our study, home heating adequacy was measured via 1 item assessing whether there were days in the winter that the subject's home was not heated because of the inability to pay for the heating bill. We assessed housing instability using 3 questions from the Children's HealthWatch survey that involve having a steady place to sleep, household crowding (>2 people per bedroom), or having moved >2 times in the past year; housing instability was defined as an affirmative

response to any of these questions. All Children's HealthWatch questions are internally validated, and a composite Children's HealthWatch measure of cumulative hardships combining food, housing, and energy insecurity has previously been correlated with children's health status, developmental concerns, and a composite child wellness indicator.²³

The Personal Health Questionnaire Depression Scale was used to measure maternal depression. This scale consists of 8 questions; a score of >10 has an 88% sensitivity and 88% specificity for major depressive episode.²⁶

Study Arms

WE CARE

Mothers in the WE CARE arm completed a clinical screening tool to identify 6 basic needs (child care, food security, household heat, housing, parent education, and employment) in clinic waiting rooms just before their children's well visits. We decided to screen for these needs because of their high prevalence among urban families,^{19,27} the public availability of community resources designed to address them, and previous research demonstrating the association of these needs with negative child outcomes.^{23,28-34}

The WE CARE clinical screening instrument was adapted from a larger family psychosocial screening instrument with test-retest reliability of .92.¹⁹ For the current study, the survey consisted of 12 questions designed to identify the 6 basic needs and determine whether mothers wanted assistance with each need (Supplemental Appendix). The survey was written at a third-grade level and took <5 minutes to complete. Mothers were instructed to give the completed survey to their child's clinician at the beginning of the visit. The research team provided the survey to all mothers at the index visit and attempted to readminister it at subsequent well child visits through 9 months.

A WE CARE Family Resource Book was developed for each CHC by the study team and CHC staff. The book contained 1-page tear-out information sheets listing 2 to 4 free community resources available for each need. The information sheets contained the program name, a brief description, contact information, program hours, and eligibility criteria. The resource book was placed in each pediatric examination room within easy view of the clinicians. Of note, both the screening instrument and Family Resource Book were available in English and Spanish.

Clinicians were instructed to review the WE CARE survey with the mother and make a referral (ie, provide an information sheet from the book) if the mother indicated she wanted assistance with that particular need.

After the well child visit, research staff provided applications to the community services to which families were referred. One month after the index visit, staff telephoned WE CARE mothers to assess contact of resources and entered an updated note in the child's medical record.

Control Condition Arm

Participants at the control CHCs received standard of care, which typically included access to basic social work services and social history questions embedded in the electronic health records. Pediatric providers are encouraged to use the social history questions and refer families to clinic support staff and community resources.

Study Outcomes

The primary study outcome was enrollment in new community-based resources at the time of the child's 12-month well visit. A self-administered, written follow-up questionnaire was given to subjects in the waiting room. The follow-up questionnaire measured the same domains as the baseline questionnaire. Resource enrollment

questions were the same for all subjects, regardless of previous referral receipt. If a mother did not attend the visit, study personnel attempted to contact the mother by telephone. Mothers were considered lost to follow-up if the questionnaire was not completed by the time the infant was 15 months of age.

We defined a mother to be enrolled in a new resource if she reported enrollment at follow-up but not at baseline. To determine enrollment, 2 different study team members reviewed the questionnaires, with the primary reviewer being masked. There was strong concordance ($\kappa = .97$) between the 2 team members on labeling a family as having a new resource; the remaining 4 cases were resolved with the senior author (A.G.), who was masked to group assignment. In a randomly selected subset of 25 mothers enrolled at 4 WE CARE health centers who reported receiving resources ($n = 41$), we confirmed receipt of 37 resources (90.2%) directly through data from community-based organizations (ie, Supplemental Nutrition Assistance Program, Special Supplemental Nutrition Program for Women, Infants, and Children, housing and utility programs).

Secondary outcomes included process measures believed to be along the causal pathway to receiving a community-based resource: referral at the index visit and initial contact with the resource. Receiving a referral was measured by a brief standardized form administered after the index well visit. Initial contact was assessed in both study arms by a brief structured telephone interview performed by a masked research assistant when the infant was 9 months of age.

Sample Size and Statistical Analysis

We estimated that each study arm would need 168 mothers to detect an absolute difference of 15% in the overall enrollment in resources

assuming equal cluster sizes, an intraclass correlation of .01, an enrollment rate of 5% in the control group, statistical power of 80%, 2-tailed α of .05, and a 15% loss to follow-up. The 15% difference between groups was thought to be clinically significant and feasible based on our previous study.¹⁹

An intention-to-treat approach was used to compare intervention and control groups on study outcomes. Generalized mixed-model regressions were used to estimate the differences in covariates between groups and to test direct intervention effects on primary and secondary outcomes. To assess potential confounding, we examined group differences between sociodemographic variables and basic needs at baseline. Because we did not find any meaningful confounding, and per Murray and Blistein's³⁵ suggested method, we chose covariates (race, marital status, and maternal employment) that reduced the intraclass correlation effect for our regression models. Additionally, for all outcome measures collected after the index visit, we adjusted the models for duration of follow-up time. We tested effect modification by enrollment wave and maternal depression by entering interaction terms into the regression models. We also calculated the number needed to treat (NNT) for maternal receipt of referrals and enrollment in resources.

RESULTS

Baseline Characteristics

Eight CHCs consisting of 37 pediatric clinicians were randomly assigned to either WE CARE or control (Fig 1). Seven CHCs had social workers, case managers, or volunteers available to assist families with social needs during the study period; 1 control CHC had no support staff. Six CHCs (3 intervention and 3 control) had social screening questions embedded in their electronic health records.

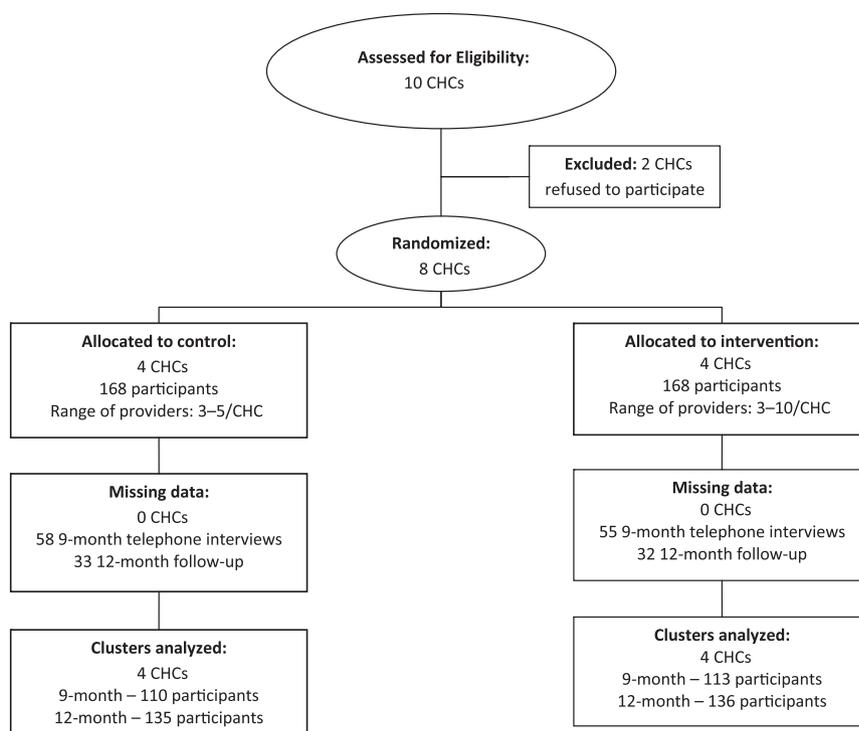


FIGURE 1 Flow of CHC clusters, pediatric providers, and participants in the WE CARE trial.

There were no differences in age, gender, clinician type (pediatrician, nurse practitioner), or years in practice between intervention and control arm clinicians (data not shown).

A total of 495 caregivers were approached to participate in the study. Recruitment of subjects continued until 336 subjects were enrolled (42 per site). Of the 495 parents, 102 (21%) were not eligible, most commonly because of language (38 of the 102 ineligible families). Fifty-seven mothers refused to participate (Fig 1).

Most of the mothers were black (44%), born in the United States (60%), and unmarried (73%). Their mean age was 28.3 years (SD 6.1). The majority of subjects reported a household income of <\$40 000. The mean infant age at enrollment was 2.5 months (SD 2.1); 81% received Medicaid. There were no clinically significant differences between intervention and control participants (Table 1).

More than 90% of subjects reported ≥ 1 unmet basic need at baseline, 68% reported ≥ 2 needs, and 39% reported ≥ 3 needs. The most common need was unemployment (57%), followed by housing instability (43%) (Table 2). There were no clinically significant differences in needs between the RCT groups.

Fidelity of Administration of WE CARE Screening

All WE CARE mothers received the WE CARE screening at enrollment. Seventy-two percent of eligible mothers ($n = 118$) received the screening at their child's subsequent well child visit.

Referrals, Contact, and Enrollment

Overall, we obtained follow-up data for 271 participants (81%) (Fig 1). Follow-up rates were virtually identical between study groups. Mean time to follow-up was similar across the WE CARE and control groups (44.5 [10.3] weeks vs 44.2 [10.9] weeks; $P = .84$).

TABLE 1 Baseline CHC and Participant Characteristics

Characteristic	Total (8 CHCs, 336 mothers)	WE CARE (4 CHCs, 168 mothers)	Control (4 CHCs, 168 mothers)
CHC level			
Patients <1 y of age, no. ^a	1574	981	593
Pediatric clinicians, no.	37	21	16
Low-income population, %	65	62	67
Participant level			
Maternal age, mean (SD), yr	28.3 (6.1)	28.1 (6.2)	28.6 (6.0)
Infant age, mean (SD), mo	2.5 (2.1)	2.5 (2.0)	2.6 (2.1)
Maternal race and ethnicity, no. (%)^b			
Hispanic	77 (23)	43 (26)	34 (20)
Non-Hispanic white	77 (24)	25 (15)	52 (32)
Non-Hispanic black	143 (44)	80 (49)	63 (39)
Non-Hispanic Asian	8 (2)	1 (<1)	7 (4)
Non-Hispanic Native Hawaiian	2 (<1)	1 (<1)	1 (<1)
Non-Hispanic >1 race	16 (4)	12 (7)	4 (3)
Unknown or not reported	13 (4)	6 (4)	7 (4)
Maternal birth in the U.S., No. (%)	200 (60)	100 (60)	100 (60)
Maternal education, no. (%)^b			
Less than high school	54 (17)	26 (16)	28 (18)
High school graduate	105 (31)	52 (32)	53 (33)
Some college	87 (26)	43 (27)	44 (28)
College degree	75 (22)	40 (25)	35 (22)
Married, no. (%)	89 (27)	46 (28)	43 (27)
Household income, no. (%)^b			
<\$40 000	260 (79)	134 (81)	126 (75)
≥\$40 000	72 (22)	32 (19)	40 (24)
Children in household, mean (SD)	2.1 (1.3)	2.0 (1.2)	2.2 (1.3)
Maternal depression, no. (%) ^c	34 (11)	21 (14)	13 (8)
Child's insurance coverage, no. (%)^b			
Medicaid	261 (81)	136 (84)	125 (78)
Private insurance	23 (7)	7 (4)	16 (10)
Other or self-pay	39 (12)	19 (12)	20 (12)
Public benefits, no. (%)			
TANF	86 (27)	44 (27)	42 (26)
SNAP	176 (54)	90 (56)	86 (53)
WIC	265 (81)	138 (84)	127 (78)
Section 8 voucher	42 (13)	26 (16)	16 (10)
Child care voucher	30 (9)	16 (10)	14 (8)

SNAP, Supplemental Nutrition Assistance Program; TANF, Temporary Assistance for Needy Children; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

^a Data are from the 2009 Boston HealthNet database and represent 6 CHCs; data from 2 CHCs (1 intervention and 1 control) were not available.

^b Percentages may not add up to 100 because of rounding.

^c Personal Health Questionnaire Depression score ≥10.

More WE CARE mothers received ≥1 referral at the index visit than control mothers (70% vs 8%; aOR = 29.6; 95% CI, 14.7–59.6). Overall, 42% of WE CARE mothers received ≥2 referrals at the visit; 21% received ≥3 referrals. For each type of need,

WE CARE mothers had significantly greater adjusted odds of receiving a referral (Table 3). At 9-month follow-up, more WE CARE mothers had contacted a community resource than control mothers (65% vs 49%; aOR = 1.5; 95% CI, 1.1–2.1).

At the 12-month well child care visit, more WE CARE mothers had enrolled in ≥1 new resource (39% vs 24%; aOR = 2.1; 95% CI, 1.2–3.7). WE CARE mothers had greater odds of being employed or enrolled in a job training program (aOR = 44.4; 95% CI, 9.8–201.4), WE CARE children had greater odds of being enrolled in a child care (aOR = 6.3; 95% CI, 1.5–26.0), and WE CARE families had greater odds of receiving fuel assistance (aOR = 11.9; 95% CI, 1.7–82.9) and lower odds of being in a homeless shelter (aOR = 0.20; 95% CI, 0.1–0.9) (Table 4).

TABLE 2 Prevalence of Unmet Basic Needs at Baseline

Basic Needs	Total (n = 336)	Intervention (n = 168)	Control (n = 168)
Child care	95 (29)	44 (28)	51 (31)
Food insecurity	54 (20)	26 (21)	28 (20)
Home heating	29 (9)	11 (7)	18 (12)
Housing instability	133 (43)	68 (45)	65 (42)
Inadequate education (less than high school)	54 (17)	26 (16)	28 (18)
Unemployment	185 (57)	91 (56)	94 (57)

TABLE 3 Clinician Referrals to Community Resources at Index Well Child Care Visit

Variable	No. (%) in WE CARE Group	No. (%) in Control Group	ICC	Adjusted ICC	Adjusted Odds Ratio (95% CI) ^a
No. of CHCs	4	4	—	—	—
No. of clinicians	21	16	—	—	—
No. of mothers	163	166	—	—	—
Clinician referrals					
Any community resource	114 (70)	13 (8)	.02	.004	29.6 (14.7–59.6)
Type of need					
Child care	75 (46)	5 (3)	.03	.03	31.3 (9.0–109.6)
Food	29 (18)	10 (6)	.02	<.0001	3.0 (1.7–5.5)
GED	19 (12)	3 (2)	<.0001	.007	5.8 (2.2–15.5)
Employment	44 (27)	2 (1)	<.0001	<.0001	41.5 (8.2–209.8)
Fuel assistance	42 (26)	1 (1)	.08	.07	52.4 (8.1–338.2)
Housing	28 (17)	3 (2)	<.0001	<.0001	10.5 (3.7–29.8)

GED, General Educational Development; ICC, intraclass correlation coefficient.

^a Adjusted for race, marital status, and maternal employment.

There was no effect modification on any outcome measure by study wave or maternal depression.

The NNT for WE CARE to result in a mother receiving a referral to community-based resources was 1.6; the NNT for families to enroll in a resource was 6.7.

DISCUSSION

We found that a simple primary care screening and referral system for unmet basic needs increased families' receipt of community-based resources. This system needed to assist 2 families to result in a referral that would not have otherwise occurred in the clinical setting and 7 families to result in receipt of a new resource. Given the nearly universal reach of child health

care, our results carry potentially significant public health implications for the role that the medical home could play in addressing social determinants of health for children and their families.

From its inception, the field of pediatrics has recognized that children are vulnerable to the deleterious effects of the social environment. Research has confirmed this finding with recent studies demonstrating that poverty, and the unmet basic needs that result from it, results in greater susceptibility to disease and poorer health across the life span.^{3–6,23,28–34,36–38} Despite numerous leaders in the field advocating for addressing social needs as part of primary care^{9–12,39} and professional guidelines emphasizing the need to

address social determinants,^{13–17} there has been little evidence to help guide this practice.^{27,40}

A previous study by our group demonstrated that a similar system can lead to more discussion and referrals for family psychosocial problems by pediatric trainees.¹⁹ Silverstein et al⁴¹ demonstrated that a computer-generated clinic-based referral system increased enrollment of low-income children in Head Start. Wylie et al⁴² demonstrated the impact that a Web-based screening and referral system has on the identification of social needs in adolescents. The current study adds to this literature in 2 ways. First, it demonstrates that screening for social needs and acting on these results during the delivery of well child care can assist families in

TABLE 4 Enrollment in Community Resources Since Baseline When Child Was 12 Months of Age

Variable	No. (%) in WE CARE Group	No. (%) in Control Group	ICC	Adjusted ICC	Adjusted Odds Ratio (95% CI) ^a
No. of CHCs	4	4	—	—	—
No. of mothers	135	136	—	—	—
Enrollment in community resource					
Any community resource	53 (39)	33 (24)	.04	<.0001	2.1 (1.2–3.7)
Type of need					
Child care	20 (15)	9 (7)	.07	<.001	6.3 (1.5–26.0)
Food assistance programs (SNAP, WIC)	15 (11)	12 (9)	<.0001	<.0001	0.9 (0.4–2.1)
Food pantry	6 (4)	3 (2)	.11	<.0001	2.2 (0.7–6.7)
GED programs	2 (2)	1 (1)	<.0001	<.0001	1.9 (0.1–27.0)
Employment or job training center	11 (8)	2 (2)	<.0001	<.0001	44.4 (9.8–201.4)
Fuel assistance program	10 (7)	1 (1)	<.0001	<.0001	11.9 (1.7–82.9)
Homeless shelter	2 (2)	7 (5)	<.0001	<.0001	0.2 (0.1–0.9)
Rental assistance program (Section 8, public housing)	6 (4)	9 (7)	<.0001	<.0001	0.5 (0.1–2.0)

GED, General Educational Development; ICC, intraclass correlation coefficient; SNAP, Supplemental Nutrition Assistance Program; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

^a Adjusted for race, marital status, maternal employment, and follow-up time.

obtaining potentially helpful community resources. Second, our results make a case that screening for social determinants should not be a piecemeal process that focuses on a single need but rather, a comprehensive effort that focuses on multiple needs simultaneously. It remains unclear how often to screen for unmet social needs at well child care visits, particularly given additional screening recommendations for issues such as developmental disorders, autism, and maternal depression.^{43,44} Garg and Dworkin⁴⁵ suggested that social screening should take place at initial intake with families and then periodically (eg, annually). Frequency should also be determined by the prevalence of social needs in the practice's patient population along with clinic staff capacity.

There are limitations to the study. The study was conducted at CHCs, which may limit its generalizability. Community-based resources may be more available in Boston than in other locations. Although Boston is resource rich, there are also many city-wide initiatives such as early childhood and home visitation programs that subjects may have

been exposed to. However, we are not aware of any systematic biases in receipt of these programs, which probably would have exerted a conservative bias. Because of staffing limitations, many mothers did not receive WE CARE surveys at subsequent well visits. We did not collect data about the intervention's influence on visit time or on the therapeutic relationship between physicians and patients; our previous work found that visit time was marginally increased.¹⁹ We relied on maternal self-report to measure our outcomes, which may have introduced social desirability and recall biases. However, we confirmed receipt in a subset of subjects and found high reliability. Finally, because of a lack of previous studies, we overestimated our adjusted intraclass correlation coefficient effect. This adjustment resulted in our ability to detect smaller between-group differences than we originally anticipated. However, we believe that these results are clinically relevant.

Considering these limitations, our study provides supporting evidence that a simple screening and referring system can address the

social determinants of health and connect families seen in primary care to community-based resources. We view our results as more of a proof of principle than evidence of a specific program. Additional work is necessary to optimize well child care screening and referral programs that are tailored specifically to practice sites and communities.

CONCLUSIONS

Our study suggests that systematically screening and referring for unmet basic needs during the delivery of well child care leads to greater receipt of community resources for poor families.

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