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Do Subspecialists Ask About and Refer Families with Psychosocial Concerns? A Comparison with General Pediatricians

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Abstract

Objectives Calls for pediatricians to tend to children's psychosocial concerns have existed for decades because they are known to negatively impact child health. Children with chronic illnesses frequently have child- and family-level psychosocial concerns that complicate the care provided by their pediatric subspecialists. This study compares pediatricians who exclusively practice general pediatrics with subspecialists regarding their inquiring/screening and referring for psychosocial concerns. Physician and practice characteristics associated with these behaviors were examined. *Methods* We conducted a cross-sectional study using the 2013 American Academy of Pediatrics Periodic Survey of Fellows. Respondents included 304 pediatricians who exclusively practice general pediatrics and 147 subspecialists. The primary analysis compared the current practices of generalists vs. subspecialists with regard to inquiring/screening and referring children with 10 different psychosocial concerns. Covariates included socio-demographics, practice characteristics, and training experiences. Weighted univariate, bivariate and multivariable analyses were performed. *Results* Less than half of all pediatricians in the sample reported routinely inquiring/screening for most psychosocial concerns, and 2/3 of subspecialists failed to routinely inquire/screen for most of these conditions. Pediatricians who practice general pediatrics exclusively were more likely to inquire/screen (incident rate ratio (IRR) 1.41, $p < .05$) and refer (IRR 1.59, $p < .001$) for a greater number of psychosocial concerns than subspecialists, after adjusting for provider and practice characteristics. Having attended a child or adolescent mental health (MH) lecture/conference in the past 2 years was also related to inquiring/screening (IRR 1.24, $p < .05$). *Conclusions* Pediatricians infrequently inquire/screen and refer psychosocial concerns, with subspecialists addressing these concerns even less frequently.

Keywords Mental health · Psychosocial factors · General pediatricians · Subspecialists · Developmental and behavioral pediatrics

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Significance

What is already known on this subject? Children with chronic conditions are at a higher risk for having psychosocial issues that impact their disease. The majority of general pediatricians are not routinely addressing psychosocial aspects of disease. *What this study adds?* Subspecialists inquire/screen and refer for these issues less frequently than general pediatricians. Less than half of general pediatricians reported routinely inquiring about psychosocial factors and one-third of subspecialists. Training programs need to improve education around psychosocial aspects of disease for all trainees, including trainees who intend to subspecialize.

Introduction

Calls for pediatricians to tend to children's psychosocial concerns have existed for decades because they are known to negatively impact child health (American Academy of Pediatrics Committee on Psychosocial Aspects of Child and Family Health 1982; Haggerty 1974). Prior definitions of psychosocial problems include "mental disorders, psychological symptoms or social situations warranting clinical attention or intervention." In 1974 Haggerty used the term the "new morbidity" to refer to the environmental and family-level factors that place children at risk for developing developmental and behavioral health problems (Haggerty 1974). In the 1980s to 2000 the new morbidity began to include social disarray including new epidemics of violence, homelessness, and substance use (Haggerty and Friedman 2003). In 2005 Palfrey adapted the term to the millennial morbidity to describe not only disorders secondary to the social environment and socioeconomic status of children, but also increasing mental health (MH) problems (Palfrey et al. 2005).

Over the past several decades, researchers have examined these relationships empirically. One of the first studies to document the impact of the home environment on physical health found that familial stress made individuals more susceptible to develop invasive streptococcal infection (Meyer and Haggerty 1962). In the 1990s, the adverse childhood experiences (ACEs) study found associations between chronic childhood adversity and adult mental and physical health problems, such as diabetes and depression (Felitti et al. 1998). In more recent years, advances in epigenetics and neuroscience have demonstrated biologic mechanisms that begin to explain the long-term effects psychosocial factors have on health and development (Garner et al. 2012). These findings strengthen the argument that pediatricians need to address psychosocial concerns that lead to chronic, toxic stress responses.

Deficiencies in pediatricians' preparation to care for these psychosocial concerns in patients have existed since the 1970s (Dworkin et al. 1979). The first Future of Pediatric Education meeting held in 1978 recognized that pediatricians will increasingly need "to manage children with emotional disturbances, learning disabilities, chronic illnesses, and other problems of a developmental, psychological, and social nature" (Haggerty and Friedman 2003) and made improved training developmental and behavioral pediatrics (DBP) one of their highest priorities. In 1997, the Accreditation Council for Graduate Medical Education (ACGME) mandated all pediatric residents to complete a 4-week developmental and behavioral (DB) rotation in addition to providing longitudinal experiences in DBP (Accreditation Council for Graduate Medical Education 2016; Haggerty and Friedman 2003).

The Ambulatory Pediatric Association created educational guidelines to further specify the rotation. Goals included preventing DBP problems by addressing the environmental, social and family influences that promote and interfere with optimal development of a child (Kittredge et al. 2005). More specific objectives included using parent risk assessment tools to screen for social concerns and to provide appropriate anticipatory guidance related to these issues.

However, our recent studies demonstrate that, in practice, there are still large gaps in addressing many psychosocial concerns (Kerker et al. 2016; Stein 2015; Stein et al. 2017, 2016). For example, we found that three-quarters of pediatricians surveyed were not aware of the ACE study and a third did not inquire about any of the seven ACEs (Kerker et al. 2016). However, our previous work has not looked at all of the social and environmental factors that were included in Haggerty's original definition of the new morbidity and only focused on general pediatricians (Kerker et al. 2016; Stein et al. 2016).

Past studies have shown that identifying and addressing psychosocial needs are important objectives across all pediatric settings. Children with chronic medical conditions are at a higher risk for family-level psychosocial stressors that negatively impact their disease control, adherence to management plans, and quality of life (Perrin et al. 2012; Shankar et al. 2017). As a response, some medical societies have added specific guidelines about how to address these psychosocial conditions within their discipline. Clinical guidelines created by the International Society for Pediatric and Adolescent Diabetes state the team needs to "receive training in the recognition, identification, and provision of information and counseling on psychosocial problems related to diabetes" (Delamater et al. 2014).

Psychosocial concerns also play a large role in children's outcomes in the intensive care units (ICU) and emergency departments (ED). For example, women who have infants born in the neonatal ICU (NICU) have higher rates of depression making it necessary for the NICU team to recognize these conditions and refer appropriately when found (Vanderbilt et al. 2009). Many adolescents use the ED as their usual source of care (Wilson and Klein 2000). Also, problems that bring children to the ED can lead to acute and persistent stress and ED staff can play a pivotal role in alleviating stress in the acute setting and providing resources for persistent stress. ED staff agree that addressing psychosocial concerns is part of their scope of practice (Alisic et al. 2016).

While the primary medical home may be the ideal place for children with special health care needs (CSHCN) to receive coordinated care, parents report contacting their subspecialists more frequently than their primary care pediatricians, and pediatricians' comfort level in caring for CSHCN varies (Agrawal et al. 2013; deJong et al. 2016; Van Cleave et al. 2016). However, whether pediatric subspecialists address psychosocial concerns when caring for their patients is unknown.

Therefore, the goals of the current analyses were to (1) compare pediatricians who exclusively practice general pediatrics with subspecialists in terms of their current practices in inquiring/screening for psychosocial concerns of their patients and referring them for assistance; and (2) after adjusting for differences between generalists and subspecialists, to examine physician and practice characteristics that are associated with higher rates of inquiring/screening for and referring psychosocial concerns. We hypothesize that: (1) subspecialists are addressing fewer psychosocial concerns than general pediatricians; and (2) pediatricians who trained after the DB rotation mandate address more psychosocial concerns compared to pediatricians who trained before the mandate. Understanding factors associated with higher rates of addressing psychosocial concerns can help inform future educational interventions given that training needs to expand beyond the DB rotation.

Methods

Sample

The American Academy of Pediatrics (AAP) collects data on various topics several times a year from a random sample of approximately 1600 of its 66,000 US non-retired members through the Periodic Survey (PS). These data come from the 2013 PS #85. The details of the surveys have been previously described (Horwitz et al. 2015). In brief, between July and December of 2013, the PS #85 questionnaire was sent to 1617 members, of which 594 (36.7%) responded. This cross-sectional study was approved by the AAP's Institutional Review Board. This study was not based upon clinical study or patient data and therefore was not brought to an ethics committee. Participants gave consent by completing the survey.

Although the sample reflected the concurrent AAP membership, non-response was considerable. Thus, sample weights were created to minimize potential bias due to differential non-response and to ensure that the respondents were representative of the membership. As previously described (Horwitz et al. 2015), logistic regression was used to estimate the probability of responding to the survey, and auxiliary information available for both responders and non-responders was included to provide predictors (age, sex, and region). The sample weights were rescaled such that the mean was unity and the sum was equal to the analytic sample size of the survey.

Periodic Survey #85

The survey contained largely closed-ended questions, asking about physician characteristics (e.g., age, sex, race/ethnicity, year completed residency, years in practice) and practice characteristics (e.g., region, practice type, number of ambulatory visits per week, patient insurance, patient race/ethnicity). Respondents were also asked what percent of their time they spend in general pediatrics vs. other specialty/subspecialty practices. They were then divided into two groups: those who practiced general pediatrics exclusively and those who did not. Respondents who completed fellowship training in DBP, child psychiatry, adolescent medicine, or behavioral sciences were excluded from the analysis, since they had specific additional training in addressing psychosocial concerns.

Pediatricians were also asked questions about trainings they received in child/adolescent MH. They were asked how many weeks of a DB residency rotation they completed, which was categorized as <4 versus ≥ 4 week, and if they attended a child MH lecture/conference in the past 2 years.

Outcome Measures

Pediatricians were asked about their behaviors in identifying, screening, and referring for 10 psychosocial concerns: bullying, child substance abuse, child physical/sexual abuse, maternal depression, parent alcohol/drug use, parent separation/divorce, incarcerated relative, domestic violence exposure, hostile/rejecting parenting by mothers, and food insecurity. The questions were "How frequently do you inquire about this problem/condition in your practice?" "How frequently do you routinely screen (i.e. use formal instruments) for this problem/condition to other providers?" "How

frequently do you refer those identified with this problem/condition to other providers?" Pediatricians reported their behaviors using a 3-point ordinal scale (never, sometimes, or usually) about how often they inquire or screen (i.e. systematically use a formal instrument), and how often they refer. For the analyses, we combined as positives those who said they usually screened for and those who usually inquired about each of the conditions, assuming that most of those who were screening would have indicated that they were usually inquiring, if they had not had the option of indicating that they were screening. The data supported our assumption: almost everyone who was screening was inquiring (between 78–88%), but not all who inquired reported they were screening (36–52%).

Analyses

Continuous and categorical measures were summarized using weighted means and weighted percentages, respectively. The weighted Rao Scott Chi square test and weighted linear regression analyses were used for bivariate comparisons. Weighted negative binomial regression was used to examine the unadjusted and adjusted association between physician type (generalist or subspecialist) and the number of conditions pediatricians usually inquire/screen and refer (range 0–10). Models were adjusted for physician and practice characteristics that differed between the two groups in bivariate analyses at $p < .05$. Given our theoretical interest in whether physicians completed their training before or after the DB rotation was mandated in 1997, this indicator variable was selected a priori for inclusion in adjusted analyses. Unadjusted and adjusted incidence rate ratios (IRR) and their 95% confidence intervals are reported. Statistical significance was set at $p < .05$.

Results

The analyses in this report were restricted to the 451 pediatricians who provide patient care, completed their residency training and answered survey questions about their practices. Sixty-seven percent ($n = 304$) of physicians reported exclusively practicing general pediatrics (generalists) while 33% did not ($n = 147$). Within the group of 147 pediatricians who did not exclusively practice general pediatrics, 71% reported that they worked in a subspecialty full-time and 88% practiced their subspecialty at least half of the time. AAP data suggest that 19% of this group were neonatologists, 11% emergency room doctors, while the rest were a combination of other types of specialists (e.g., cardiologists, endocrinologists, gastroenterologists). Thus, this group largely represented subspecialists, and henceforth is referred to as subspecialists. Physician and practice characteristics for these two groups are shown in Table 1. Generalists were more likely to be female, to practice in the suburbs, and to be a member in a group practice than subspecialists. Compared with subspecialists, generalists saw more patients per week and were more likely to have attended a lecture or conference on child or adolescent MH in the past 2 years.

Table 2 shows that pediatricians who practice general pediatrics exclusively were significantly more likely to inquire/screen for four of the ten conditions: bullying, child substance abuse, maternal depression, and parental separation/divorce, although for all but child substance abuse fewer than half usually do so. General pediatricians were also significantly more likely to refer patients for eight of the ten conditions: all except bullying and having an incarcerated relative, for which they did more frequently refer, but the differences did not reach statistical significance.

The average number of psychosocial concerns generalists and subspecialists usually inquired/screened for were 2.9 (Standard deviation [SE] = 0.1) and 2.0 (SE = 0.2), respectively (See Fig. 1). Fewer than 4% of generalists and subspecialists reported usually inquiring/screening for all 10 psychosocial concerns, while 21% of generalists and 41% of subspecialists did not usually inquire/screen any of them. The average number of psychosocial concerns generalists usually referred was 5.3 (SE = 0.2); the average was 3.4 (SE = 0.3) for subspecialists (See Fig. 2). 14% of generalists and 16% of subspecialists reported usually referring for all 10 conditions, while 11% of generalists and 42% of subspecialists did not usually refer any of them.

The unadjusted and adjusted associations of type of physician (generalist vs. subspecialist) with the number of psychosocial concerns usually inquired/screened and referred are shown in Tables 3 and 4, respectively. After adjusting for potential confounders, generalists had a 41% greater rate of usually asking about psychosocial concerns than subspecialists (IRR = 1.41, 95% CI 1.07, 1.86, $p = .02$). Completing residency after the DB rotation was mandated in 1997 was not associated with the number of psychosocial concerns pediatricians usually ask about. The only variable that was significantly associated with the number of psychosocial concerns physicians usually ask about was attending a lecture/conference on child or adolescent MH within the past 2 years; pediatricians who reported attending this type of conference had a rate of usually asking about psychosocial concerns that is 24% greater than those who did not report attending (IRR = 1.24, 95% CI 1.02, 1.52, $p = .03$).

Generalists were also more likely to **refer** more psychosocial concerns compared with specialists (adjusted IRR = 1.59, 95% CI 1.26, 2.01, $p < .001$). Pediatricians who completed their residency after the DBP rotation was mandated in 1997 had a significantly lower rate of usually referring common psychosocial concerns (IRR = 0.80,

Table 1 Physician and practice characteristics of subspecialists and generalists

	Generalists ($n=304$)	Subspecialists ($n=147$)	p-value
Physician characteristics			
Female sex	67.6	50.5	< .001
Age, y; weighted mean (SE)	46.0 (0.6)	45.5 (0.8)	.59
Race/ethnicity			
Caucasian	74.9	66.2	.18
Asian	11.5	18.6	
Other	13.6	15.2	
Years in practice			
1–4	20.8	22.7	.66
5–9	16.4	20.3	
10–19	30.7	26.7	
≥ 20	32.1	30.3	
Completed residency training ≥ 1998	56.8	60.3	.48
Practice characteristics			
Region			
Northeast	22.3	19.8	.84
Midwest	20.6	22.9	
South	38.8	36.8	
West	18.3	20.5	
Location of practice			
Urban	39.5	75.4	< .001
Suburban	49.8	19.4	
Rural	10.7	5.2	
Type of practice			
One or two physicians	8.7	6.5	< .001
Pediatric group practice	52.6	5.3	
Multispecialty group practice	12.0	23.6	
Medical school/parent university	7.5	28.4	
Other	19.2	36.2	
< 100 ambulatory visits per week	63.7	91.4	< .001
Patient insurance			
< 80% have private insurance	61.3	64.7	< .001
≥ 80% have private insurance	25.0	6.6	
Unknown	13.7	28.7	
Non-Hispanic white patients (%)			
≤ 49	41.6	50.0	.06
50–74	36.4	37.3	
≥ 75	22.0	12.7	
Training in MH			
Completed ≥ 4 weeks residency rotation in child/adolescent MH	68.8	70.0	.80
Attended lecture/conference on child or adolescent MH in the past 2 years	49.1	28.5	< .001

95% CI 0.69, 0.93, $p=.004$). Pediatricians who saw fewer than 100 ambulatory patients per week also had a lower rate of usually referring these concerns (IRR = 0.82, 95% CI 0.70, 0.98, $p=.03$).

Discussion

Despite Haggerty's emphasis on the pediatricians' role in addressing "the new morbidity" dating back to the 1970s,

Table 2 Comparisons of subspecialists and generalists: self-reported behaviors regarding usually inquire or screen and usually referring for common psychosocial concerns

Self-reported usual behaviors	Generalists ($n=304$)	Subspecialists ($n=147$)	p-value
Child			
Bullying			
Inquire or screen	34.8	15.0	.001
Refer	28.3	26.5	.69
Substance abuse			
Inquire or screen	66.8	38.3	< .001
Refer	76.1	45.4	< .001
Physical/sexual abuse			
Inquire or screen	31.5	29.5	.67
Refer	79.9	56.0	< .001
Parent/family			
Maternal depression			
Inquire or screen	45.9	23.5	< .001
Refer	75.7	42.7	< .001
Parent alcohol/drug abuse			
Inquire or screen	17.0	19.1	.60
Refer	62.5	35.1	< .001
Parent separation/divorce			
Inquire or screen	42.2	27.1	.002
Refer	41.9	29.2	.01
Incarcerated relative			
Inquire or screen	9.1	10.8	.56
Refer	32.8	26.9	.23
Domestic violence exposure			
Inquire or screen	25.6	23.7	.68
Refer	62.2	45.8	.002
Hostile/rejecting parenting by mothers			
Inquire or screen	9.8	9.1	.83
Refer	50.3	37.7	.02
Food scarcity			
Inquire or screen	12.1	9.6	.43
Refer	45.7	33.4	.02

the majority of pediatricians, regardless of specialty, do not routinely inquire about or screen for the majority of psychosocial concerns. In addition, pediatricians who exclusively practice general pediatrics were 41% more likely to inquire/screen for and 59% more likely to refer patients for a greater number of psychosocial concerns than subspecialists, even after adjusting for provider and practice characteristics. To our knowledge, this study is the first to examine the practices of pediatric subspecialists with regard to the "new morbidity."

These findings may not be surprising, and possibly many believe that subspecialists do not need to address the psychosocial and MH needs of children as frequently as generalists, perhaps because they assume generalists are addressing these issues. However, given how strongly correlated psychosocial factors are with disease control and quality of life, addressing only the physical aspect of a patient's health may never result in optimal health (Perrin et al. 2012). We also found that subspecialists referred patients when problems were identified infrequently. More subspecialists (compared to generalists) practiced in academic institutes or in multispecialty practices, suggesting they likely had access to resources, making this finding even more surprising.

Unfortunately, the rates of inquiring/screening and referring for all pediatricians were surprisingly low despite published policy statements from the AAP on the role of the pediatrician in addressing almost all of the psychosocial concerns we examined (Hagan et al. 2008). For instance, food insecurity impacts a child's physical health and DB outcomes and screening in the ED setting is feasible. In fact, the AAP statement on promoting food security in children encourages pediatricians to ask two validated questions to increase the recognition of food scarcity, and summarizes the resources available in all communities pediatricians can refer to (American Academy of Pediatrcs Council on Community Pediatrics and Committee on Nutrition 2015). However, only 10% of pediatricians surveyed inquired/screened about food scarcity and fewer than half reported referring families with food insecurity.

Attending a child or adolescent MH lecture/conference in the past 2 years was associated with greater likelihood of usually inquiring/screening for these conditions which is consistent with prior literature and promising (Green et al. 2017). However, this finding may reflect attitude compared to the actual impact of education suggesting the need to recruit medical students into pediatrics who are ready and willing to address psychosocial aspects of care.

The majority of Pediatric Program Directors believe their graduating residents going in to both general pediatrics and subspecialty care should be competent in identifying and referring common DB problems regardless of future careers (McMillan et al. 2017). A restructuring of residency training is needed so that addressing psychosocial concerns is integrated into all aspects of training. Unfortunately, this will be increasingly challenging as the 2016 ACGME guidelines call for 6 months of individualized learning for trainees as a way to focus on the acquisition of skills for their future career (2016) which could mean less time focused on identifying psychosocial risks to child health.

Surprisingly, physicians who completed their residency in or after 1998 were no more likely to inquire/screen than those who completed training earlier, and had a significantly lower rate of usually referring, despite having experienced the DB rotation. Our previous work demonstrates that the DB rotation and education in specific skills in providing MH care is associated with more management of these conditions making it possible that these physicians are managing

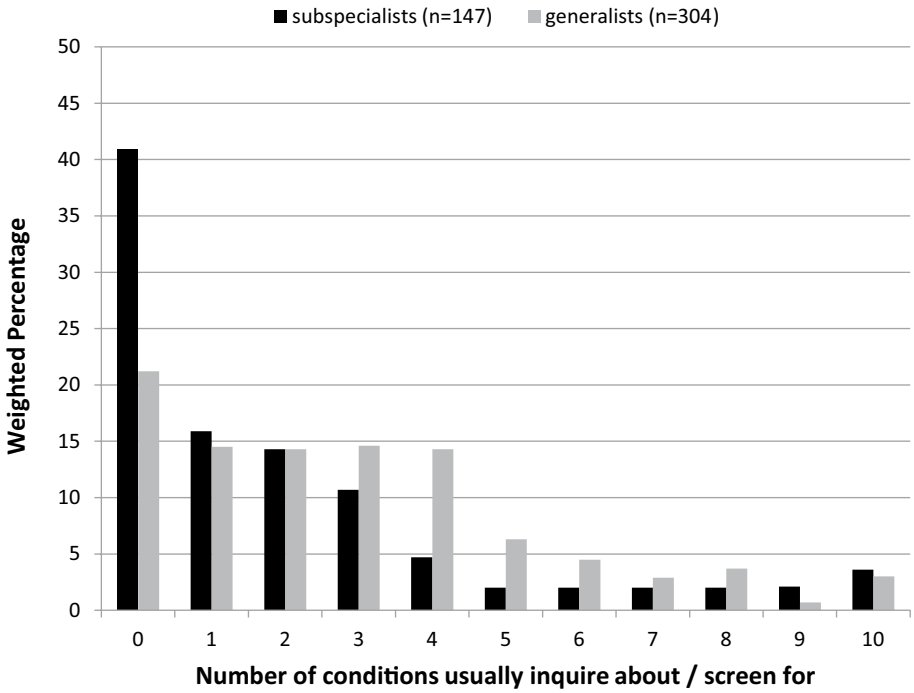

Fig. 1 Number of conditions subspecialists and generalists reported usually inquire/screen. The 10 conditions are: bullying, child substance abuse, child physical/sexual abuse, maternal depression, parent substance abuse, parent separation/ divorce, incarcerated relative, domestic violence exposure, hostile/rejecting parenting by mothers, and food insecurity

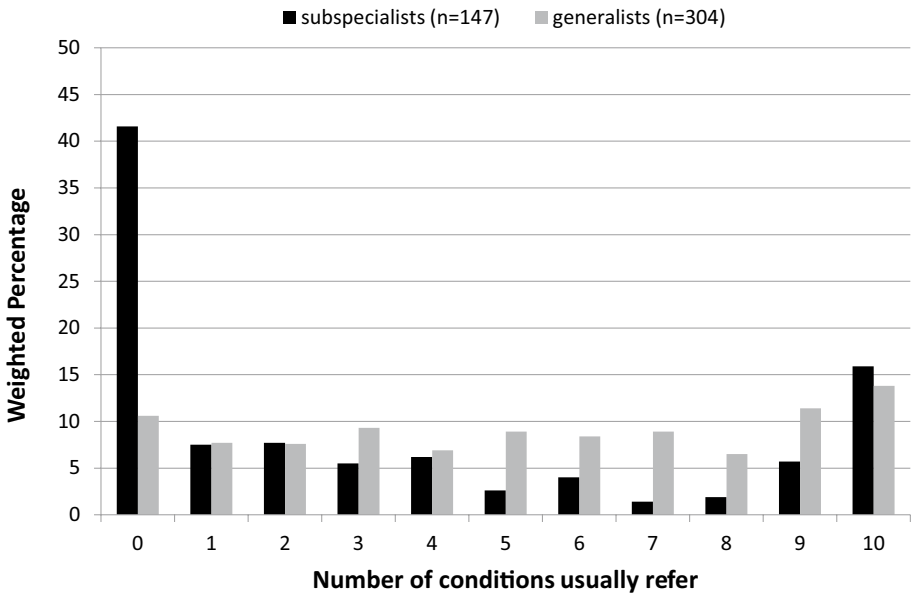

Fig. 2 Number of conditions subspecialists and generalists reported usually referring For. The 10 conditions are: bullying, child substance abuse, child physical/sexual abuse, maternal depression, parent substance abuse, parent separation/ divorce, incarcerated relative, domestic violence exposure, hostile/rejecting parenting by mothers, and food insecurity

these psychosocial concerns (Green et al. 2017; Stein et al. 2017, 2016). However, this is likely to be outside the scope of the expertise of most pediatricians. The AAP's policy statements encourage referrals to community resources when psychosocial concerns are identified, specifically for violence, ACEs, and food insecurity (Hagan et al. 2008; American Academy of Pediatrcs Council on Community Pediatrics and Committee on Nutrition 2015).

Pediatricians are often unaware of resources developed by the AAP, and, if aware, do not always integrate them into practice (Garner et al. 2016). While some of these screening tools and statements have only recently been endorsed, there needs to be wider dissemination and instruction on how to implement guidelines and to utilize resources. In addition, the number of policy statements and recommendations for what pediatricians should include in well child visits continues to increase making it impossible to fit everything in to a visit (Belamarich et al. 2006). Lastly, time is often cited as a barrier, and, as visit times continue to decrease, education alone will not

Table 3 Unadjusted and adjusted negative binomial regression models of the number of psychosocial concerns usually inquire/screen

	Unadjusted			Adjusted		
	IRR	95% CI	*p*-value	IRR[+]	95% CI	*p*-value
Type of physician						
Subspecialist	Reference			Reference		
Generalist	1.44	1.14, 1.82	.002	1.41	1.07, 1.86	.02
Year completed residency training						
Before DB mandate				Reference		
After DB mandate				0.99	0.81, 1.20	.88
Physician sex						
Female				Reference		
Male				0.89	0.72, 1.10	.27
Practice location						
Urban				Reference		
Suburban				0.89	0.71, 1.11	.58
Rural				0.96	0.67, 1.36	
Practice type						
Pediatric group				Reference		
1–2 physician				0.76	0.51, 1.14	.54
Multispecialty group				1.09	0.81, 1.46	
Medical school/parent univ				0.91	0.63, 1.31	
Other				1.06	0.81, 1.38	
Ambulatory visits per week						
≥ 100				Reference		
< 100				0.84	0.68, 1.05	.13
% of patients with private insurance						
< 80%				Reference		
≥ 80%				1.02	0.81, 1.28	.87
Attended child or adolescent MH lecture/conference in past 2 years						
No				Reference		
Yes				1.24	1.02, 1.52	.03

[+]Incident rate ratio

address how pediatricians can fit psychosocial screening into their visits (Horwitz et al. 2015).

However, as the epidemiology of pediatrics continues to change with social, environmental, and behavioral health concerns on the rise and physical health conditions decreasing (Houtrow et al. 2014), addressing psychosocial aspects of care need to be prioritized. Screening for psychosocial concerns using validated tools has been shown to be feasible, increase recognition, and increase access to services in primary care settings (Garg et al. 2015), EDs (Chun et al. 2013), and in outpatient oncology centers (Kazak et al. 2018). In addition, integrated models of care where onsite MH professionals work alongside pediatric primary care pediatricians and subspecialists have been developed and show promise in creating systems where addressing psychosocial concerns is more feasible (Adler et al. 2015; Samsel et al. 2017). More research is needed to study the impact integrated models have on patient care and health care utilization in order to create financial structures to support them.

As in any secondary analysis, limitations to the conclusions that can be drawn exist. The response rates were suboptimal. We found no differences in responses between early and late responders to the survey. To adjust for the suboptimal response rate, we weighted the sample as described in the methods. Low response rates for both physician and mailed surveys are common (Kellerman and Herold 2001). Additionally, we cannot infer causality because of the cross-sectional nature of the data.

We also cannot be certain that all of the pediatricians who were not practicing general pediatrics exclusively were practicing subspecialists, and not engaged in other non-clinical roles. They all indicated they were practicing clinicians and if some were in fact practicing general pediatrics, it would be likely to skew their answers to be more like those of generalists. Lastly, our subspecialty group was quite diverse with 30% of the respondents mainly caring for patients in an inpatient setting. However, CSHCN are high resource utilizers and often have emergent needs

Table 4 Unadjusted and adjusted negative binomial regression models of the number of psychosocial concerns usually refer

	Unadjusted			Adjusted		
	IRR	95% CI	*p*-value	IRR	95% CI	*p*-value
Type of physician						
Subspecialist	Reference			Reference		
Generalist	1.57	1.28, 1.92	< .001	1.59	1.26, 2.01	< .001
Year completed residency training						
Before DB mandate				Reference		
After DB mandate				0.80	0.69, 0.93	.004
Physician sex						
Female				Reference		
Male				1.04	0.88, 1.22	.66
Practice location						
Urban				Reference		
Suburban				0.90	0.75, 1.08	.42
Rural				0.86	0.63, 1.16	
Practice type						
Pediatric group				Reference		
1–2 physician				1.20	0.94, 1.52	.53
Multispecialty group				0.96	0.76, 1.21	
Medical school/parent univ				1.12	0.82, 1.54	
Other				1.10	0.87, 1.39	
Ambulatory visits per week						
≥ 100				Reference		
< 100				0.82	0.70, 0.98	.03
% of patients with private insurance						
< 80%				Reference		
≥ 80%				1.16	0.97, 1.38	.10
Attended child or adolescent MH lecture/conference in past 2 years						
No				Reference		
Yes				0.98	0.84, 1.15	0.83

bringing them to ED and inpatient units (Perrin et al. 2014).

Another limitation includes the possibility of under-reporting of referrals. Referral to an on-site social worker may not have been considered a formal referral. Also, other interventions could have been made (i.e. food stamps for food insecurities, calling the school for bullying) that did not include a referral to another provider, but would appropriately address the psychosocial concern identified. Lastly, there are many confounding variables in assessing the impact of the DB rotation mandate, such as changes in the workforce with more women practicing pediatrics than before 1998 (American Academy of Pediatrics Department of Research 2017). In addition, addressing psychosocial concerns and seeing pediatric care through a biopsychosocial framework is on aspect of the rotation, but DBP specialists have increasingly become responsible for caring for more complicated children, such as autism, which may alter the focus of the rotation at many places (Stein 2015).

Nevertheless, the associations that we found are concerning: pediatric clinicians of all persuasions need to understand the environment in which children are being raised. These data serve as a baseline for further studies about the degree to which subspecialists serving as a medical home are providing comprehensive care to their patients. Systematic screening for psychosocial concerns and sustaining models of integrated care can create systems changes that will enhance pediatricians' of all disciplines ability to care for the entire patient, not just their physical health.

Conclusions

Pediatricians are infrequently inquiring/screening and referring psychosocial concerns that are known to adversely impact children's lifelong outcomes. Subspecialists address these psychosocial concerns even less frequently than generalists. All pediatricians need receive adequate preparation

to address the psychosocial aspects of children's health since the prevalence of children living with chronic conditions continues to increase. Systems changes are also needed to support pediatricians who are prepared to address these aspects of care.

Author Contributions CG drafted sections of this article, interpreted analyses of the data, and critically reviewed all drafts and is accountable for all aspects of the work. REKS participated in the development of the survey, drafted sections of this article, interpreted analyses of the data, critically reviewed all drafts and is accountable for all aspects of the work. AS-I conducted the analyses, drafted sections of the manuscript, critically reviewed all drafts and is accountable for all aspects of the work. ASG developed a portion of the survey, critically reviewed all drafts and is accountable for all aspects of the work. BDK critically reviewed all drafts and is accountable for all aspects of the work. MS developed a portion of the survey, critically reviewed all drafts and is accountable for all aspects of the work. KEH critically reviewed all drafts and is accountable for all aspects of the work. SMH participated in the development of the survey, interpreted analyses of the data, drafted sections of the article, critically reviewed all drafts, and is accountable for all aspects of the work.

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