Published in final edited form as:

J Asthma. 2015 March ; 52(2): 176–182. doi:10.3109/02770903.2014.956891.

Caregiver depression and perceptions of primary care predict clinic attendance in head start children with asthma

Josie S. Welkom, PhD¹, Marisa E. Hilliard, PhD², Cynthia S. Rand, PhD¹, Michelle N. Eakin, PhD¹, and Kristin A. Riekert, PhD¹

¹Division of Pulmonary and Critical Care Medicine, Johns Hopkins School of Medicine, Baltimore, MD, USA

²Baylor College of Medicine, Houston, TX, USA

Abstract

Objective—The purpose of this study is to evaluate the mediating role of perceptions of primary care (PC) on the association between depression and PC clinic attendance among caregivers of children with asthma. In adults, depression is associated with lower PC clinic attendance and ~25% of mothers presenting to a pediatric PC clinic will screen positive for depression. Adults' perceptions about their medical care mediate the depression-clinic attendance relation, but this has not been tested in children or in an asthma population.

Methods—This is a secondary prospective data analysis of 141 caregivers of Head Start children diagnosed with asthma, offered an intervention to reduce barriers to PC. Caregivers rated their depressive symptoms and perceptions of PC (access, provider contextual knowledge, and continuity of care) at baseline. PC clinic attendance was tracked prospectively for 6-months.

Results—At baseline, 26% of caregivers screened positive for depression. Within 6-months, 66% of children attended a PC appointment. A positive depression screen was not associated with PC attendance ($p = 0.07$) or continuity of care ($p = 0.98$) but was inversely associated with perceptions of both access ($p = 0.03$) and provider contextual knowledge ($p = 0.02$). Though the total indirect effect was not significant, the specific indirect effect of depression on PC attendance through access was significant (95% CI: 0.01, 0.68).

Conclusions—Providing tangible resources to reduce barriers to PC without addressing perceptions of access may not sufficiently improve PC clinic attendance in pediatric asthma. Screening caregivers for depression may identify families requiring targeted interventions to improve their perceptions of access.

Keywords

Pediatrics; prevention; quality of life History

Correspondence: Josie S. Welkom, Division of Pulmonary and Critical Care Medicine, Johns Hopkins School of Medicine, 5501 Hopkins Bayview Circle 3B.19, Baltimore, MD 21224, USA. Tel: 410-550-5211. jwelkom1@jhmi.edu.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Introduction

Asthma prevalence is higher among African-American children in comparison to other racial/ethnic groups [1,2]. Even more concerning, asthma-related emergency department (ED) visits, hospitalizations, and deaths are three to four times more likely in African-American than Caucasian children [3]. To reduce asthma-related impairment and risk, NHLBI guidelines suggest routine medical monitoring at 1–6 month intervals depending on the level of asthma control and within 1–4 weeks following an exacerbation [4]. However, after a visit to an urban ED, only 16% of young children with asthma follow-up with their primary care provider (PCP) within 7 days and 30% within 30 days [5]. Similarly, African-American children with asthma utilize primary care (PC) services at a 20% lower rate than Caucasian children [3], which may contribute to their higher risk of morbidity and mortality.

Limited access to care may be one contributor to racial and socioeconomic disparities in PC service utilization. Comprised of adequate insurance coverage, a usual source of care, timeliness of the healthcare system, and availability of healthcare providers, access to care is a key component to achieving optimal health outcomes [6]. Socioeconomic factors are often associated with lower access to care. For example, PC clinic attendance is low among adult public assistance recipients, with African-Americans in particular reporting greater difficulty accessing PC services than Caucasians [7–10]. Andersen's Behavioral Model of Health Services Use postulates that access to care is comprised of four components: potential access (insurance), realized access (utilization), equitable access (personal characteristics and need), and inequitable access (systems, beliefs, resources) [11]. Each of these components has different degrees of modifiability; those which have more potential to change (e.g. realized access, equitable access) may be important targets for intervention. Thus, objective indices of access (e.g. insurance, having a regular source of care) must also be distinguished from perceptions of access (i.e. report of timely and convenient access to medical care) [12] and utilization (i.e. accessing medical care when needed) [13]. It is possible that PC services may be objectively accessible yet not perceived as such and subsequently under-utilized. In turn, among caregivers of elementary school-aged children, more positive perceptions of the accessibility of their child's PCP were associated with less underutilization [13].

Closely linked to access to care, continuity of care is defined as the extent to which there is a longitudinal relationship between a patient and a provider. This longitudinal relationship is necessary for the development of an ongoing relationship where the provider can develop knowledge about the patient. The majority of young children in the United States have a regular source of care which has been associated with greater use of PC services [14]. However, after controlling for health care factors and sociodemographic factors, children who are publicly insured are 70% less likely to have an identified PCP than privately insured children [15]. Among children with asthma, lower continuity of care is associated with a significant increase in ED visits and hospitalizations [16], especially among Medicaid recipients [17]. However, the extent to which continuity of care impacts PC clinic attendance in children with asthma is not clear.

Interpersonal factors may also play an important role in PC utilization. With longevity, providers accumulate contextual knowledge defined as knowledge regarding the overall health of the patient, their family values, and personal beliefs [12]. Patient perceptions of provider contextual knowledge are a reflection of one's personal experiences of care, not an objective indicator of the provider's knowledge. Caregivers who perceived their child's PCP as having greater contextual knowledge are less likely to forgo medical care for their child when needed [13] but this has not been examined in pediatric asthma.

Identifying factors that shape caregiver perceptions about PC will allow for earlier identification of the families of children with asthma most at risk for clinic appointment nonattendance. One possible factor is caregiver depression, as nearly one-quarter of all mothers presenting to an urban, pediatric PC clinic screen positive for depression [18,19]. Children of depressed caregivers present to the ED more frequently, including children with asthma [20,21]. The impact of caregiver depression on the frequency of PC utilization is less clear with some studies reporting no differences and others reporting under- or over-utilization [22–24]. Among adults, depression has been shown to impact clinic attendance through poor patient–provider communication and negative perceptions of the availability of services [25,26]. However, we do not know if these patterns are generalizable to caregivers of children with asthma.

The purpose of this study is to evaluate caregiver perceptions of continuity of care, access, and provider contextual knowledge as potential mechanisms linking depression with PC clinic attendance in urban African-American preschoolers with asthma receiving public assistance. We hypothesized that caregivers who screened positive for depression would be less likely to attend a PC clinic appointment. We anticipated that caregivers with a positive depression screen would report perceptions of less continuity of care, decreased access, and reduced provider contextual knowledge which in turn would predict lower rates of PC clinic attendance.

Methods

Participants

The data for this study came from 160 families randomized to the PC intervention arm of a clinical trial (described below) which aimed to reduce barriers to accessing healthcare and provide additional support to caregivers in an effort to improve PC clinic attendance among preschool children with asthma enrolled in an urban Head Start system [27]. Children aged 2 to 6 years were screened using a caregiver questionnaire distributed through 66 Head Start sites in Baltimore. Eligibility criteria for the larger study included caregiver-reported asthma diagnosis or reactive airways disease and at least one of the following: (1) use of shortacting β -agonist in the past 4 weeks, (2) asthma symptoms in the past 4 weeks, or (3) treatment in the ED for asthma in the past 6 months. Participants deemed eligible were contacted by phone to confirm eligibility and further describe the study. Families interested in participating were mailed a consent form and asked to return a signed copy to the research team. In total, 429 children were deemed eligible, 336 (78%) were consented, and 322 (96%) were randomized to one of the four conditions, of which 160 (50%) were placed in the PC intervention arm [27]. For the purposes of this study, the sample was restricted to

African-American caregivers receiving public assistance which represents a population with the highest pediatric asthma morbidity [28]. This excluded four non-African-Americans and 14 children with private health insurance. One additional participant was excluded from analyses due to missing data, resulting in a final sample of 141 participants.

Procedures

Caregivers were administered a baseline survey via phone assessing demographics, psychosocial functioning, and child asthma symptoms. All participants in the PC intervention (all participants in this analysis) were offered two home sessions with an asthma educator (AE) which included: (1) asthma education regarding symptoms reporting and the importance of regular asthma care, (2) goal-setting around PCP communication and asthma management, and (3) help scheduling the next PC visit. The AE offered to attend a PC visit with the family and provide feedback on strategies to improve communication with the PCP. In addition, cab vouchers were offered to reduce transportation barriers. If a PC clinic visit was not scheduled at the end of the home session, the AE was in regular phone contact to encourage and facilitate the scheduling of a clinic visit. The Johns Hopkins Medical Institution and University of Maryland School of Medicine Institutional Review Boards approved the study and written informed consent was provided by all participants.

Measures

Primary care attendance—PC clinic attendance was measured objectively by either the AE attending a medical visit or clinic confirmation of visit attendance within 6 months of the baseline. For the purposes of the current study, PC attendance was dichotomized (i.e. zero versus one or more visits).

Perceptions of primary care—The Parent's Perceptions of Primary Care measure (P3C) [29] is a self-report measure assessing caregiver's experiences with their child's PC. The *Longitudinal Continuity* (2-items) subscale asks caregivers to report on the length of time they have been bringing their child to a certain clinic or provider (i.e. continuity of care) with the following response choices: 0 = Frequently visits other doctors or nurses, 20 = 6 months, 40 = 6 months to 1 year, 60 = 1 to 2 years, 80 = 3 to 5 year, and 100 = 5 years). The *Access* (4-items) subscale assesses the caregiver's perceptions of timely and convenient access to PC services [e.g. "If your child is sick, can you see (doctor's name) or someone else in the office within one day?"]. The *Contextual Knowledge* (4-items) subscale assesses caregiver perceptions of the provider's knowledge regarding his or her values and preferences about medical issues, child's health needs, and medical history [e.g. "Do you feel (doctor's name) knows your values and beliefs about health?"]. The *Access* and *Contextual Knowledge* subscales were rated on a 5-point Likert scale (i.e. 0 = *Never*, 25 = *Sometimes*, 50 = *Often*, 75 = *Almost Always*, and 100 = *Always*). All three subscales are scored on a 0 to 100 range and averaged by the number of items [29]. For the purposes of the larger RCT, the three most relevant subscales of the P3C were administered and thus a total P3C score was unable to be computed. Though the subscales are related, previous research has determined that there is no significant collinearity [13]. Alphas ranged from 0.71 to 0.94 indicating acceptable to excellent internal consistency.

Caregiver depression—The Center for Epidemiologic Studies Depression Scale (CES-D) [30] is a 20-item self-report depression screening measure. The cut-off score of 16 is suggestive of clinically significant levels of depression and was used in the analyses. The alpha coefficient for the current sample was 0.84 indicating good reliability.

Symptom-free days and nights—Caregivers reported on the number of days and nights their child has experienced asthma symptoms (i.e. cough, wheeze, and shortness of breath) over the previous month. This reflected a proxy measure for disease severity. The number of symptom days and nights were each subtracted from 30 and then summed for a total score (i.e. 30 minus symptom days plus 30 minus symptom nights). Scores could therefore range from 0 to 60 with higher scores suggesting more days and nights without asthma symptoms.

Data analysis plan

Paired samples *t*-tests compared perceptions of access, provider contextual knowledge, and continuity of care among people with depressive symptoms above versus below the clinical cut-off. The three perceptions of PC subscales were then simultaneously examined using a multiple mediation model [31]. Given that maternal depression is associated with an increase in reported asthma symptoms [32] and children with higher disease severity attend clinic more frequently, [33] asthma symptom-free days and nights were controlled for in mediation analyses. Multiple mediation (Figure 1) allows one to determine the extent to which a set of mediators (i.e. access, provider contextual knowledge, and continuity of care) operating in parallel and each individual mediator indirectly explains the relation between the independent (i.e. depression) and dependent variable (i.e. clinic attendance). While controlling for disease severity, we examined: (a) the direct effects of caregiver depressive symptoms on clinic attendance and each mediator, (b) the direct effect of each mediator on clinic attendance, partialling out the effect of caregiver depressive symptoms, (c) the total indirect effect of caregiver depressive symptoms on clinic attendance through all mediators together, and (d) the extent to which each mediator indirectly explained the relation between caregiver depressive symptoms and clinic attendance, accounting for the other variables in the model. The SPSS macro, PROCESS [31] was used to test the size and significance of the indirect effects using 10 000 bootstrapped samples, a non-parametric resampling procedure with a 95% confidence interval (CI). Indirect effects are deemed significant when CIs for the unstandardized path coefficients do not contain zero [34–36].

Results

Descriptive statistics

Of the 141 participants, the majority of caregivers were mothers (86%) and two-thirds of families reported an annual family income below \$20 000 (Table 1). Within the 6-month period following baseline, 66% (*N* = 93) attended a PC clinic appointment, and 85% of these visits (*N* = 79) were accompanied by an AE. The majority of caregivers completed AE home sessions with 89% (*N* = 125) having one visit and 65% (*N* = 92) having two visits. Twenty-six percent of caregivers (*N* = 37) screened positive for depression. Caregivers reported that asthma symptoms were absent on most days and nights during the previous 30 days (*M* = 46.86, *SD* = 11.35).

Depressed caregivers were 2.27 times (95% CI: 0.94, 5.45) less likely to attend a pediatric PC clinic appointment and this trended towards significance ($p = 0.07$). Compared to caregivers who screened negative for depression, those who screened positive perceived significantly lower access, $t(139) = 2.51$, $p = 0.03$, and provider contextual knowledge, $t(139) = 2.92$, $p = 0.02$, but not continuity of care, $t(139) = 0.03$, $p = 0.98$ (Table 1).

Multiple mediation analysis

Direct effects—After controlling for asthma symptom-free days and nights (Figure 1), the direct effect path of caregiver depressive symptoms on clinic attendance was not significant ($p = 0.16$). Though there was a significant direct effect path of caregiver depressive symptoms on the mediators, access ($p = 0.01$) and provider contextual knowledge ($p < 0.01$), the direct effect path for continuity of care was not significant ($p = 0.98$). Further, the direct effect paths of each mediator on clinic attendance, partialling out the influence of caregiver depressive symptoms and controlling for asthma symptoms, were not significant (access, $p = 0.06$; provider contextual knowledge, $p = 0.99$; continuity of care, $p = 0.35$).

Total indirect effect—The total indirect effect, comprised of all mediators operating in parallel [*depression* → *sum of the mediators* (access + provider contextual knowledge + continuity of care) → *attendance*], was not significant (95% CI: -0.11, 0.68).

Specific indirect effects—We then examined the specific indirect effects of each mediator (i.e. *depression* → *access*, *depression* → *provider contextual knowledge*, and *depression* → *continuity of care*) exploring their unique indirect effects on clinic attendance while controlling for asthma symptoms and the other variables in the model [37]. A significant mediation effect for perceptions of access (*depression* → *access* → *attendance*) was found (95% CI: 0.01, 0.68) such that caregivers who screened positive for depression were more likely to perceive less timely and convenient access to PC services, which in turn was associated with decreased clinic attendance. However, neither continuity of care (95% CI: -0.11, 0.15) nor provider contextual knowledge (95% CI: -0.36, 0.68) mediated the relation between depressive symptoms and clinic attendance.

Discussion

This study examined the relations between caregiver depressive symptoms, perceptions of PC, and PC clinic attendance of African-American children who attend Head Start. While depression was not directly associated with clinic attendance, perceptions about limited access to PC were an indirect pathway between depression and attendance even after accounting for disease severity. Caregivers who screened positive for depression were more likely to hold negative perceptions of the timeliness and convenience of PC services, which was associated with clinic non-attendance. Contrary to our hypothesis, neither perceptions of continuity of care nor perceptions of provider contextual knowledge regarding the child and family's values and preferences accounted for the association between caregiver depressive symptoms and clinic attendance.

The influence of caregiver perceptions of access on clinic attendance is consistent with Andersen's Behavioral Model of Health Services Use, which distinguishes between the

presence of resources to support access to care (e.g. health insurance) and use of those resources [11]. Despite offering barrier-reduction resources such as appointment reminders, assistance with scheduling, transportation vouchers, and patient-PCP communication training, nearly one-third of caregivers did not attend a pediatric PC clinic visit. Thus, to promote PC attendance and ultimately reduce children's asthma-related health risks, it is critical to understand what remaining barriers kept some caregivers from attending a clinic visit despite the resources provided.

Over one-quarter of participating caregivers in our study screened positive for depression. This is double of what would be expected in the general population (i.e. 10%), [38] yet approaches depression rates of up to 34% of innercity parents [39] and 47% of those with a child diagnosed with asthma [40]. Consistent with some prior research, [19] but not others [20,21], we did not find a direct association between depression and PC attendance. However, we further examined whether there was an indirect relationship through perceptions of PC. Consistent with prior research in older adults with a chronic illness [26], depression was associated with perceptions of timely and convenient access to health care, which subsequently impacted PC use. The magnitude of the association in our sample was small. However, all families in this sample were offered services designed to reduce barriers to PC which may have mitigated the effect and in a general population, the association may be stronger. Although caregivers who screened positive for depression perceived their child's provider as less knowledgeable about both their own values and preferences and about their child's health needs and medical history, perceptions of provider contextual knowledge were not associated with clinic attendance. Provider contextual knowledge, which also did not predict clinic attendance in our sample, is largely confounded by continuity of care. Because contextual knowledge, as defined in the current study reflects PCP knowledge about the child and family, developing this familiarity may increase as a function of continuity. The length of time a preschooler has seen a particular provider or clinic is naturally limited due to their age. It is possible that as the opportunity for continuity of care increases with age, variation in perceived provider contextual knowledge may play a larger role.

These results suggest several opportunities to improve clinic attendance for children with asthma. Routine screening of caregiver depressive symptoms [41] may help identify families in need of additional supportive services to ensure that their child with asthma, regardless of symptom severity, receives necessary medical care. From an individual perspective, depressed caregivers may require more intensive follow-up and outreach to alter their perceptions of limited access and to best meet their access needs. Objective and perceived access barriers may need to be more specifically addressed in asthma education programs. Especially among low-income families, more flexible services (e.g. walk-in appointments, extended hours, weekend availability, and transportation assistance) should be offered in addition to anticipating and addressing barriers to scheduling and transportation.

There are limitations which may have impacted the findings of the current study. Services to reduce tangible access barriers were offered to all families, which may have limited our ability to detect any naturally occurring associations among depression, perceptions of PC, and clinic attendance. Even with additional services, however, we were able to identify these associations, suggesting that perceptions of PC are particularly challenging to address. In

addition, the study spanned 6-months of prospective data, which may not have captured those children who scheduled and/or attended PC visits in the second half of the year following baseline. It is also possible that some families utilized the ED as their primary source of care; however, this was not directly assessed in the current study. Furthermore, it is unknown if families were following the PCPs recommended follow-up schedule which may differ from guideline recommendations [4]. If so, interventions to improve clinic attendance among children with asthma should also target PCPs to recommend more frequent appointments. Age at asthma diagnosis was not collected in this study, yet may relate to outcomes; families with longer duration of asthma may have had more experiences with accessing health care and thus different perceptions about access to care. It is also possible that other unmeasured factors, such as caregiver responsiveness to child healthcare needs [42] and caregiver relationship stressors, may also have impacted clinic attendance [43]. Thus, future studies examining clinic attendance should assess other relevant psychosocial factors as they have been supported as influential to clinic attendance in the current and in previous research. Measurement limitations include self-report bias through which participants may have responded in a socially desirable manner. Shared variance among the all self-report variables may also be a limitation as the constructs can influence one another; however, the outcome variable, clinic attendance, was an objective measure. Furthermore, though the racial and socioeconomic composition of the study participants is the strength of this study, it may also limit its generalizability to other groups. Whereas restricting the sample to children on public assistance decreased the financial barrier that some families may face because of copays, it is possible that privately insured families may experience this as an additional barrier to clinic attendance. Thus, it will be important for future research to evaluate how the relationships identified in this sample generalize to other samples with different socioeconomic resources.

Conclusions/key findings

Findings of the current study support the need to comprehensively assess and address caregiver perceptions of access to pediatric PC to improve clinic attendance rates in pediatric asthma. Given the links between depression, negative perceptions of access, and lower PC clinic attendance, after controlling for asthma symptoms, it may be important for interventions that aim to promote access to PC target caregivers with elevated depressive symptoms. Providing tangible support to improve access in isolation without concurrently assessing and addressing caregiver perceptions of the accessibility of those resources will not sufficiently improve PC clinic attendance in pediatric asthma.

References

1. Centers for Disease Control and Prevention. [last accessed 9 Jan 2014] CDC vital signs; Asthma in the US. May 3. 2011 Available from: <http://www.cdc.gov/vitalsigns/asthma/>
2. Flores G, Tomany-Korman SC. Racial and ethnic disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics*. 2008; 121:e286–e298. [PubMed: 18195000]
3. Akinbami LJ, Moorman JE, Garbe PL, Sondik EJ. Status of childhood asthma in the United States, 1980–2007. *Pediatrics*. 2009; 123:S131–S145. [PubMed: 19221156]

4. National Heart, Lung, and Blood Institute. [last accessed 9 Jan 2014] Expert panel report 3: guidelines for the diagnosis and management of asthma. Aug 28. 2007 Available from: <https://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>
5. Liberman DB, Shelef DQ, He J, McCarter R, Teach SJ. Low rates of follow-up with primary care providers after pediatric emergency department visits for respiratory tract illnesses. *Pediatr Emerg Care*. 2012; 28:956–961. [PubMed: 23023461]
6. U.S. Department of Health and Human Services. [last accessed 9 Jan 2014] Access to health services. 2013 Nov 13. Available from: <http://www.healthy-people.gov/2020/topics/objectives/2020/overview.aspx?topicid=1>
7. Devoe JE, Baez A, Angier H, Krois L, Edlund C, Carney PA. Insurance + access not equal health care: typology of barriers to health care access for low-income families. *Ann Fam Med*. 2007; 5:511–518. [PubMed: 18025488]
8. Olson LM, Tang SF, Newacheck PW. Children in the United States with discontinuous health insurance coverage. *N Engl J Med*. 2005; 353:382–391. [PubMed: 16049210]
9. Phillips RL Jr, Bazemore AW, Dadoo MS, Shipman SA, Green LA. Family physicians in the child health care workforce: opportunities for collaboration in improving the health of children. *Pediatrics*. 2006; 118:1200–1206. [PubMed: 16951016]
10. Centers for Medicare & Medicaid Services. [last accessed 27 Aug 2013] Medicare current beneficiary survey. Jul 18. 2013 Available from: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Research/MCBS/index.html?redirect=MCBS>
11. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 1995; 36:1–10. [PubMed: 7738325]
12. Seid M, Varni JW, Bermudez LO, Zivkovic M, Far MD, Nelson M, Kurtin PS. Parents' perceptions of primary care: measuring parents' experiences of pediatric primary care quality. *Pediatrics*. 2001; 108:264–270. [PubMed: 11483786]
13. Seid M, Stevens GD. Access to care and children's primary care experiences: results from a prospective cohort study. *Health Serv Res*. 2005; 40:1758–1780. [PubMed: 16336547]
14. Cabana MD, Jee SH. Does continuity of care improve patient outcomes? *J Fam Pract*. 2004; 53:974–980. [PubMed: 15581440]
15. Inkelas M, Schuster MA, Olson LM, Park CH, Halfon N. Continuity of primary care clinician in early childhood. *Pediatrics*. 2004; 113:1917–1925. [PubMed: 15173462]
16. Cree M, Bell NR, Johnson D, Carriere KC. Increased continuity of care associated with decreased hospital care and emergency department visits for patients with asthma. *Dis Manag*. 2006; 9:63–71. [PubMed: 16466343]
17. Christakis DA, Mell L, Koepsell TD, Zimmerman FJ, Connell FA. Association of lower continuity of care with greater risk of emergency department use and hospitalization in children. *Pediatrics*. 2001; 107:524–529. [PubMed: 11230593]
18. Olson AL, Dietrich AJ, Prazar G, Hurley J, Tuddenham A, Hedberg V, Naspinsky DA. Two approaches to maternal depression screening during well child visits. *J Dev Behav Pediatr*. 2005; 26:169–176. [PubMed: 15956865]
19. Sia JH, Leventhal JM, Northrup VS, Arunyanart W, Weitzman CC. Markers of maternal depressive symptoms in an urban pediatric clinic. *J Pediatr*. 2013; 162:189–194. [PubMed: 22871489]
20. Bartlett SJ, Kolodner K, Butz AM, Eggleston P, Malveaux FJ, Rand CS. Maternal depressive symptoms and emergency department use among inner-city children with asthma. *Arch Pediatr Adolesc Med*. 2001; 155:347–353. [PubMed: 11231800]
21. Flynn HA, Davis M, Marcus SM, Cunningham R, Blow FC. Rates of maternal depression in pediatric emergency department and relationship to child service utilization. *Gen Hosp Psychiatr*. 2004; 26:316–322.
22. Minkovitz CS, Strobino D, Scharfstein D, Hou W, Miller T, Mistry KB, Swartz K. Maternal depressive symptoms and children's receipt of health care in the first 3 years of life. *Pediatrics*. 2005; 115:306–314. [PubMed: 15687437]
23. Sills MR, Shetterly S, Xu S, Magid D, Kempe A. Association between parental depression and children's health care use. *Pediatrics*. 2007; 119:e829–e836. [PubMed: 17403826]

24. Watson JM, Kemper KJ. Maternal factors and child's health-care use. *Soc Sci Med*. 1995; 40:623–628. [PubMed: 7747197]
25. Schenker Y, Stewart A, Na B, Whooley MA. Depressive symptoms and perceived doctor-patient communication in the Heart and Soul study. *J Gen Intern Med*. 2009; 24:550–556. [PubMed: 19274477]
26. Thorpe JM, Thorpe CT, Kennelty KA, Chewning BA. Depressive symptoms and reduced preventive care use in older adults: the mediating role of perceived access. *Med Care*. 2012; 50:302–310. [PubMed: 21577167]
27. Eakin MN, Rand CS, Bilderback A, Bollinger ME, Butz A, Kandasamy V, Riekert KA. Asthma in Head Start children: effects of the Breathmobile program and family communication on asthma outcomes. *J Allergy Clin Immunol*. 2012; 129:664–670. [PubMed: 22104603]
28. Akinbami LJ, Moorman JE, Liu X. Asthma prevalence, health care use, and mortality: United States, 2005–2009. *Natl Health Stat Report*. 2011; 32:1–14.
29. Seid M, Stevens GD, Varni JW. Parents' perceptions of pediatric primary care quality: effects of race/ethnicity, language, and access. *Health Serv Res*. 2003; 38:1009–1031. [PubMed: 12968814]
30. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Measure*. 1977; 1:385–401.
31. Hayes, AF. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach. New York (NY): The Guilford Press; 2013.
32. Otsuki M, Eakin MN, Arceneaux LL, Rand CS, Butz AM, Riekert KA. Prospective relationship between maternal depressive symptoms and asthma morbidity among inner-city African American children. *J Pediatr Psychol*. 2010; 35:758–767. [PubMed: 19850709]
33. Yee AB, Fagnano M, Halterman JS. Preventive asthma care delivery in the primary care office: missed opportunities for children with persistent asthma symptoms. *Acad Pediatr*. 2013; 13:98–104. [PubMed: 23294977]
34. MacKinnon DP, Fairchild AJ. Current directions in mediation analysis. *Curr Direct Psychol Sci*. 2009; 18:16–20.
35. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav Res Meth Instru Comput*. 2004; 36:717–731.
36. Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: new procedures and recommendations. *Psychol Meth*. 2002; 7:422–445.
37. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Method*. 2008; 40:879–891.
38. Centers for Disease Control and Prevention. [last accessed 18 Mar 2014] Current depression among adults—United States, 2006–2008 morbidity and mortality weekly report. Oct 1. 2010 Available from: <http://www.cdc.gov/features/dsdepression/>
39. Siefert K, Finlayson TL, Williams DR, Delva J, Ismail AI. Modifiable risk and protective factors for depressive symptoms in low-income African American mothers. *Am J Orthopsychiatr*. 2007; 77:113–123.
40. Bartlett SJ, Krishnan JA, Riekert KA, Butz AM, Malveaux FJ, Rand CS. Maternal depressive symptoms and adherence to therapy in inner-city children with asthma. *Pediatrics*. 2004; 113:229–237. [PubMed: 14754931]
41. U.S. Preventative Services Task Force. Screening for Depression in Adults; U.S. Preventative Services Task Force Recommendation Statement. *Ann Intern Med*. 2009; 151:784–792. [PubMed: 19949144]
42. Holland ML, Yoo BK, Kitzman H, Chaudron L, Szilagyi PG, Temkin-Greener H. Mother-child interactions and the associations with child healthcare utilization in low-income urban families. *Matern Child Health J*. 2012; 16:83–91. [PubMed: 21127953]
43. Rivara FP, Anderson ML, Fishman P, Bonomi AE, Reid RJ, Carrell D, Thompson RS. Intimate partner violence and health care costs and utilization for children living in the home. *Pediatrics*. 2007; 120:1270–1277. [PubMed: 18055676]

Note. Numbers represent path coefficients of the direct effects. Disease Severity (i.e. symptom-free days and nights) was controlled for as a covariate in this model. * $p < .05$. ** $p < .01$.

Figure 1.

Path coefficients for the mediating effects of caregiver depression on clinic attendance through perceptions of access, provider contextual knowledge, and continuity of care after controlling for asthma symptoms.

Table 1

Participant demographics.

Demographic variables	Total sample (N = 141)	Positive depression screen (N = 37)	Negative depression screen (N = 104)	p Value
Caregiver age (year), M ± SD	30.80 ± 9.35	31.70 ± 10.72	29.21 ± 10.35	0.22
Child age (year), M ± SD	3.94 ± 0.69	3.92 ± 0.72	3.94 ± 0.68	0.90
Child gender – female, n (%)	59 (41.8)	16 (43.2%)	43 (41.3%)	0.84
Relation to child, n (%)				0.11
Mother	121 (85.8)	31 (83.8%)	90 (86.5%)	
Father	6 (4.3)	0	6 (5.8%)	
Other	14 (9.9)	6 (16.2)	8 (7.7)	
Household income, n (%)				0.48
<\$10 000	60 (42.6)	19 (51.4%)	41 (39.4%)	
\$10 000–\$29 999	62 (67.4)	15 (40.5%)	47 (45.2%)	
>\$30 000	17 (12.0)	2 (5.4%)	15 (14.4%)	
Missing	2 (1.4)	1 (2.7%)	1 (1.0%)	
Caregiver education, n (%)				0.11
<High school graduate	30 (21.3)	12 (32.4%)	18 (17.3%)	
High school graduate/GED	64 (45.4)	15 (40.5%)	49 (47.1%)	
>High school graduate	47 (33.4)	10 (27.0%)	37 (35.5%)	
Symptom-free days & nights (previous 30 d), M ± SD	46.86 ± 11.35	46.32 ± 12.21	47.05 ± 11.09	0.74
Attended Primary Care Visit, M ± SD	93 (66.0%)	29 (78.4%)	64 (61.5%)	0.06
P3C Longitudinal Continuity, M ± SD	70.08 ± 16.32	70.00 ± 15.63	70.10 ± 16.63	0.98
P3C Access, M ± SD	78.06 ± 23.34	69.93 ± 26.18	80.95 ± 21.66	0.03
P3C Contextual Knowledge, M ± SD	83.11 ± 25.29	72.97 ± 30.44	86.72 ± 22.25	0.02

A score = 16 indicates a positive depression screen on the CES-D.