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# Predictors Of Emergency Department Use In Urban, Low-Resource Neighborhoods: Opportunities For Prevention

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Predictors of Emergency Department Use in Urban, Low-Resource  
Neighborhoods: Opportunities for Prevention

A Thesis Submitted to the  
Yale University School of Medicine  
in Partial Fulfillment of the Requirements for the  
Degree of Doctor of Medicine

by  
Iris A. Chandler  
Class of 2014

## **Abstract**

PREDICTORS OF EMERGENCY DEPARTMENT USE IN URBAN, LOW-RESOURCE NEIGHBORHOODS: OPPORTUNITIES FOR PREVENTION. Iris A. Chandler; Lisa Rosenthal, PhD; Kathryn Gilstad-Hayden, MS; Jeannette R. Ickovics, PhD. Department of Chronic Disease Epidemiology, Yale University, School of Public Health. New Haven, CT.

To identify health behaviors that may be amenable to brief screening and intervention among children in the Emergency Department, we compared the prevalence of Emergency Department use among middle school children who report health behaviors known to contribute to childhood obesity versus their peers who did not. Participants included 1590 5<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grade students who completed health surveys in 2011. Multivariate logistic regression was used to examine the association between health behaviors and Emergency Department use. Children who reported unhealthy dietary behaviors were more likely to use the Emergency Department. In particular, those who reported consumption of energy-dense foods like fried chicken, french fries and ice cream (OR 1.20, 95% CI 1.06-1.37), fast food (OR 1.07, 95% CI 1.00-1.14) and sugar-sweetened beverages (OR 1.24, 95% CI 1.14-1.35) were more likely to use the Emergency Department. There was no association with fruit and vegetable consumption, physical activity or screen time and Emergency Department use. Unhealthy dietary behaviors are associated with Emergency Department use in a low-resource urban population of middle school students. Further research should evaluate the effectiveness of brief diet screenings and interventions in the Emergency Department.

To identify depressive symptoms that may be amenable to brief screening and referral to treatment among adults in the Emergency Department, we compared the prevalence of Emergency Department use among adults who screened positive for depressive symptoms versus their peers who did not. Participants included 1094 adults age 18-64 who completed health surveys in 2013. Multivariate logistic regression was used to examine the association between depressive symptoms and Emergency Department use. Adults who screened positive for depressive symptoms were more likely to use the Emergency Department (OR 1.70), even after controlling for various sociodemographic and health measures. In addition, the absolute number of Emergency Department visits was associated with the prevalence of positive screening for depressive symptoms. Among those who reported no ED visits, 8.5% screened positive for depressive symptoms, but this percentage rose to 29% for participants reporting more than five ED visits. The Cochran-Armitage Trend Test revealed a significant linear trend between number of ED visits and % screening positive for depression (Z Statistic=-4.83,  $p < 0.001$ ). Depressive symptoms are associated with Emergency Department use in a low-resource urban population of adults. Further research should evaluate the effectiveness of brief depression screenings and interventions in the Emergency Department.

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## **Introduction**

Preventive health services are widely regarded as crucial to prevent morbidity and mortality associated with a wide spectrum of physical and mental illness. In recognition of this fact, a special government agency, the U.S. Preventive Services Task Force (USPSTF) was created in 1984 with a mandate to review evidence for and effectiveness of clinical preventive health interventions. However, despite this agency's clout and the depth and breadth of their recommendations, abysmally few patients are offered preventive care, even in the primary care setting. A 2007 report from the Robert Wood Johnson Foundation estimates that for most preventive services, less than half of the people who should be using them are being offered them, and that racial and ethnic minorities are getting even less preventive care than the general population.<sup>1</sup> Perhaps because of these dismal statistics, the federal government continues to make efforts to ensure access to evidence-based preventive care today. In 2010, the Affordable Care Act required most health plans to cover all USPSTF-recommended preventive health care services without copays or cost-sharing. Thoughtfully and carefully increasing access to and utilization of preventive care has the potential to enable millions of people to live longer, healthier lives, and to save the US health care system money by avoiding premature death and illness.<sup>2,3</sup>

In any discussion of preventive care services, it is important to define the terms used. Here, I use the term "preventive care" to encompass both disease prevention and health promotion efforts. Preventive care includes screening efforts that attempt to identify either the potential for disease development or diseases in their nascent stages. Michael O'Donnell has defined health promotion as the practice of helping people

change their lifestyle through a combination of counseling, behavior change, and environmental modifications.<sup>4</sup>

While this investigation does not attempt to evaluate the cost-effectiveness of preventive care services, it operates under the general philosophy that preventive care provides a high value to society because lives are improved at relatively low cost.<sup>5</sup> Is it not said that “an ounce of prevention is worth a pound of cure”? In 2006, the US spent more than two trillion dollars on health care, with three-quarters of the spending directed at treatment of chronic diseases. The epidemic rise in obesity, in particular, has contributed to the growth of this spending.<sup>6</sup> Discussions about preventive care are especially relevant today, as the Affordable Care Act and related policies look to align health care, public health, and social services in order to control costs.<sup>7</sup> Increasingly, health economists, health care providers, and even health insurance companies, are looking to population health methods and services for solutions to our health care system’s problems.<sup>8</sup>

Primary care offices are traditionally viewed as the appropriate milieu for the delivery of preventive care services, but emerging literature suggests that the Emergency Department (ED) may also be an effective setting for preventive care delivery, especially for vulnerable populations. In 1998, in response to growing controversy about whether recommendations for providing preventive care applied to the ED setting, the Society for Academic Emergency Medicine’s Board of Directors called for a task force to develop recommendations for preventive health screening in the Emergency Department.<sup>9</sup> The task force had two goals: 1) to discuss the rationale for providing preventive care services in the ED, and 2) to conduct an evidence-based review of preventive care services that

could be implemented in the ED and provide recommendations for areas for further study.

In response to the first goal, the task force determined that, given that many of the most vulnerable populations turn to the ED frequently, and sometimes exclusively, for health care, an evidence-based approach was necessary for evaluating and recommending the implementation of preventive care services in the ED. The second phase identified 17 candidate interventions, with all but one selected from the USPSTF's list of recommended preventive care services, and offered recommendations to clinicians based on evidence of each intervention's effectiveness, time-intensiveness, and cost-effectiveness.<sup>10</sup> Specific results of the second phase study are discussed in Part II in regards to efforts to screen for depression in the ED.

### **Screening and Preventive Care in the ED**

One technique for preventive care service delivery has since gained popularity among Emergency Medicine physicians. First described in 1962 by Chafetz and colleagues,<sup>11</sup> The Screening, Brief Intervention, and Referral to Treatment (SBIRT) model was originally developed for intervention in the fields of alcohol and substance abuse, but has also been applied with some success to the fields of injury prevention, domestic violence, and smoking cessation.<sup>12,13</sup> This model usually utilizes ancillary support staff who are trained to deliver brief (5-60 minute) screening and counseling sessions, and refer patients to appropriate resources within their community for follow-up care. This model has become so integral to the practice of emergency medicine that many residency training programs now incorporate these techniques into their curriculum, and 17 programs have been funded by the Substance Abuse Mental Health Service

Administration to do so.<sup>14</sup> SBIRT takes into account the special challenges associated with providing preventive care in an Emergency Department setting, such as time constraints, ethical and legal issues, and concerns regarding insurance coverage, though it is undoubtedly a resource-intensive strategy.

Other, less resource-intensive screening strategies have been widely accepted into the practice of emergency medicine. For example, the four-item CAGE questionnaire screens for alcohol abuse, and has been validated and deemed feasible for ED use.<sup>15</sup> Regardless of the method used, it is clear that efforts at providing screening, brief interventions, and referral to treatment for conditions ranging from alcohol and tobacco use to domestic violence are worthy of study, and that practitioners are eager to incorporate evidence-based preventive care services into their practice.<sup>16</sup>

### **Characteristics of ED Users**

Before deciding which preventive care screenings and interventions, if any, to offer in the Emergency Department, it is useful to review some characteristics of people who use the ED as a source of care in order to understand those who could benefit most from these services. Because of the intense interest in the health care community over rising costs and attempts to identify characteristics of frequent users of the emergency department, in particular, there is a rich body of literature describing characteristics of users of the ED. These studies tend to focus on demographic and health characteristics, and are typically conducted based on chart reviews and other hospital-based records.

Data published by the Centers for Disease Control (CDC) provides a broad overview of characteristics of ED users. In 2010, approximately 20% of U.S. adults reported ED use in the last year.<sup>17</sup> About one-quarter (26.7%) of those visits resulted in a

hospital admission. For the purposes of this study, particular interest will be paid to those who have the potential to participate in screening and other preventive care interventions, i.e. those whose visits did not result in a hospital admission, and who were presumably less ill. According to the CDC report, of those whose visits did not result in a hospital admission, 79.7% visited the ED due to lack of access to other provider, and 48% visited because their doctor's office was not open.

Those who use the ED frequently are often the subject of research, as the 8% of users with 4 or more visits in a year account for 28% of all adult ED visits.<sup>18</sup> These frequent users, contrary to popular belief, are often insured and have a usual source of care, but are significantly more likely than less frequent users to be in poor physical and mental health and to have incomes below the poverty line.<sup>19</sup> In the Veteran's Administration (VA) health system, frequent use is associated with homelessness, specific medical and psychiatric diagnoses, opioid prescription use, and increased use of outpatient services.<sup>20</sup> Each study that attempts to identify characteristics of ED users presents a slightly different picture of the patient population, underscoring the importance of local context and investigation when designing interventions for ED users.

### **Study Description and Aims**

The investigations that follow take a unique approach to identifying characteristics of ED users by looking to the community, rather than the ED itself, for data. By collecting data in this manner, we are able to compare those who report ED use to those who do not, giving a relative perspective that is lacking in the literature. By employing the principles of community-based participatory research, we take a focused, local approach that strives to integrate the knowledge acquired with opportunities for

intervention and change that can improve the health and quality of life of members of our community.<sup>21</sup>

This study consists of two parts, each focusing on potential interventions in two distinct, though demographically similar populations. In both cases, the SBIRT model provides a potential next step in implementing preventive care in the Emergency Department. In the first case, we examined the dietary and physical activity behaviors of middle-school students in order to identify areas for intervention to prevent childhood obesity. In the second, I focused on whether or not a population of low-income urban adults screened positive for depression using a two-item questionnaire, and whether those who screened positive were more likely to report ED use in the last year. While each investigation had a different hypothesis, set of aims, and study sample, the goal of improving preventive care in the Emergency Department by identifying high-yield areas for intervention was notably similar. Results from these studies can be used to inform future clinical guidelines for screening and preventive interventions in the Emergency Department.

# **Part I: Unhealthy Dietary Behaviors are Associated with Pediatric Emergency Department Use**

## **Introduction**

As more children and their parents turn to the Emergency Department (ED) as a source of care, often for non-emergent conditions, clinicians are exploring creative methods to intervene to improve the health of children during these “teachable moments.”<sup>22,23</sup> The rise in utilization of ED services by adults and children of all ages<sup>24,25</sup> has been concurrent with the rapid growth trajectory of childhood obesity. Given the enormous health burden posed by obesity, emerging literature encourages ED clinicians to consider brief, focused interventions to take place in the ED aimed at preventing childhood obesity.<sup>26,27</sup> The purpose of the current investigation was to identify obesogenic behaviors prevalent in pediatric consumers of ED services in a low-resource urban population to inform the use of brief obesity-related behavioral interventions among children in the ED.

## **Behaviors Associated with Obesity**

In response to the growing body of evidence suggesting that child behavior shapes adult health, including the association between childhood obesity and premature death in adulthood,<sup>28</sup> the American Academy of Pediatrics has made recommendations for actions to prevent childhood obesity and its long-term consequences.<sup>29</sup> The Academy recommends that clinicians encourage specific behavior changes based on evidence that certain behaviors contribute to the prevention of childhood obesity: (1) adequate fruit and vegetable consumption;<sup>30</sup> (2) fewer fast foods and energy-dense foods; (3) fewer sugar-sweetened beverages;<sup>31</sup> (4) less screen time; and (5) at least 60 minutes of exercise

daily.<sup>9,32</sup> This investigation uses these recommendations as the basis for identifying prevalent behaviors among children who report use of ED services.

### **ED Use and Potential for Brief Interventions in the ED**

Between 1997 and 2007 the total annual increase in ED utilization was almost twice what could be expected based on US population growth alone, with EDs increasingly serving as safety nets for the medically underserved and uninsured.<sup>5</sup> During this decade, ED visits for children ages 5-14 increased to more than 13 million visits annually,<sup>33</sup> and more children have come to rely on the ED as a source of care – especially low income, publicly insured and African American children.<sup>34</sup> Further, wait times in EDs are increasing; therefore, there are more opportunities for clinicians and hospital educators to take advantage of “down-time” for counseling.<sup>35</sup>

Interest has grown in ensuring that those who present to the ED are provided with basic primary care preventive health screenings.<sup>36,15</sup> Brief screenings and interventions for smoking cessation, injury prevention, substance abuse, and domestic violence are all well-described in the emergency medicine literature with some positive results for both the pediatric and adult populations. For example, brief interventions in the ED have been effective at reducing adolescent peer aggression;<sup>37</sup> and even low-intensity screening in the ED without intervention may prompt adult smokers to quit or attempt to quit.<sup>38</sup> Although brief screenings and interventions can produce lasting results, few studies have focused on interventions for pediatric behaviors relating to diet, screen time, or physical activity, which are the target areas identified by the American Academy of Pediatrics for the prevention of childhood obesity. In a recent study in an urban pediatric ED, parents

were generally receptive to screening and counseling for obesity, irrespective of the child's current weight status.<sup>6</sup>

Despite these findings and the American Academy of Pediatrics' recommendations that physicians participate in efforts to prevent childhood obesity, momentum for screenings and interventions for specific health behaviors has yet to build, perhaps in part due to a lack of knowledge about which modifiable behaviors are most prevalent in the pediatric ED population. Likewise, health promotion has traditionally been relegated to the realm of the primary care physician, and little is known about the role that emergency care providers can play in screening and prevention.<sup>7</sup>

Following the American Academy of Pediatrics' recommendations for the prevention of childhood obesity, the objective of this investigation is to identify obesity-related behaviors in an urban low-resource population of children, and to determine if these behaviors predict reported recent use of the ED for care. Leveraging both the obesity and the emergency medicine literatures, we can begin to form a coherent strategy for obesity prevention efforts in the ED. Results can potentially inform the development and implementation of evidence-based brief screening and intervention initiatives for this population.

## **Methods**

### **Procedure**

Data are drawn from a study conducted by the Yale School of Public Health's Community Alliance for Research and Engagement in partnership with the New Haven Public Schools. Study sites included 12 K-8 schools that were randomly selected from the 27 K-8 schools in the district. Students completed online health surveys

(SurveyMonkey.com, LLC; Palo Alto, CA) in the fall of 2011 during their computer class time. Trained research staff read the survey aloud to account for varied literacy levels. Surveys took approximately 30 minutes, and a small gift (i.e. water bottle) was given to each child who participated.

Additionally, trained research assistants took physical measurements of student participants. Measures were taken privately and recorded with only school-assigned identification numbers to enable linkage to survey data. Measurements were based on the World Health Organization Expanded STEPS protocol.<sup>39</sup> A standardized stadiometer (Charder Electronic Co.) and digital scale (Seca) were used to measure height and weight. Body mass index (BMI) was calculated based on height and weight, and adjusted for age and sex.<sup>40</sup>

All procedures were approved by the Yale University Human Subjects Committee and the local Board of Education. Parental consent and child assent were obtained for all participants in English or Spanish.

### **Medical Student Contribution**

For this study, the medical student (author) was not involved with the data collection for the year that this study's data were drawn from (2011). However, the student did participate in follow-up data collection in 2013, including administration of surveys and collection of physical measures. Follow-up data collection was conducted with the same group of children who participated in the study in 2011, and the methods and measures used were nearly identical. The concept for this analysis of the data was the student's, and took place after the larger study's data collection was complete. Data analysis was conducted in consultation with the faculty mentor (Jeannette Ickovics, PhD)

and the research group's Post-Doctoral Fellow, Lisa Rosenthal, PhD. Finally, the manuscript was written primarily by the student and edited by the faculty mentor and other contributors to the study, including Amy Carroll-Scott, PhD. The tables and figures were prepared by the medical student and edited by Drs. Ickovics and Rosenthal.

## **Participants**

All students from grades 5, 7 and 8 from the twelve selected schools were invited to participate in the survey. Participants included 1727 students, representing an 87.8% participation rate. Students with missing data on the variables of interest (N=137) were excluded from this investigation, therefore 1590 students were included in the analytic sample.

## **Measures**

### *Outcome: ED Use*

The outcome of interest was ED use, assessed by the question: "Since the start of school, did you have to go to a hospital emergency room because you got sick or hurt? (Yes/No)"

### *Obesity-related Behaviors*

When choosing behaviors that may be amenable to brief intervention in the ED, we identified factors articulated by the American Academy of Pediatrics Recommendations for Prevention of Childhood Obesity: 1) adequate fruit and vegetable consumption; (2) fewer fast foods and energy-dense foods; (3) fewer sugar-sweetened beverages; (4) less screen time; and (5) at least 60 minutes of exercise daily.<sup>9</sup>

Participants were asked whether they ate certain food items the previous day. Mirroring the AAP Recommendations, dietary items were grouped into "fruit and

vegetable” and “energy-dense” categories, creating a 3-item sum for each ranging from 0 to 3 items in each category that was consumed on the previous day. “Fruit and vegetable” items were green salad, fruits, and other vegetables. “Energy-dense” items were fried chicken, french fries, and ice cream. Participants also reported the number of days in the prior week that they ate fast food (range of 0-7 days). Finally, participants reported the number of different types of sugar-sweetened beverages they drank the previous day, and a sum was created ranging from 0 to 6 types of sugar-sweetened beverages having been consumed the previous day (diet drinks, regular soda, sports drinks, energy drinks, flavored fruit drinks, sweetened coffee drinks).<sup>41</sup>

Participants reported the number of days in a typical week that they did physical activity for 60 minutes or more (range of 0-7 days).<sup>42</sup> In addition, they reported the number of hours of screen time they typically engaged in on a school day (0-6 hours) and on a weekend day (0-6 hours).

### *Participant Characteristics*

Several demographic and clinical control variables were used in these analyses. Demographic controls included race/ethnicity, gender and age. These data were obtained directly from the school district. Data from the school district on students’ eligibility for the free and reduced-price school lunch program was used as an indicator of socioeconomic status. We also controlled for BMI percentile, adjusted for sex and age per guidelines from the US Centers for Disease Control and Prevention,<sup>40</sup> and whether participants reported having been told by a doctor that they had asthma or diabetes, as these are well-known reasons for increased visits to the ED.<sup>43,44</sup>

## **Data Analysis**

Descriptive statistics were calculated for the study sample. A multivariate logistic regression analysis was used to test the associations of dietary behaviors, physical activity, and screen time with ED use, while controlling for demographic and clinical factors. To adjust for the school-stratified sampling design and any confounding by school, we controlled for school clustering in all analytic models. Analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC).

## **Results**

### **Study Sample**

Descriptive results are shown in Table 1. Nearly one-fifth (18.2%) of our sample reported ED use since the start of the school year, and 13.5% reported that the ED was their usual source of care. Only half (52.3%) reported a primary doctor as their usual source of care. Slightly over one-half of the sample was female, and most were Latino or Black reflecting school district demographic characteristics. Participants were on average 12 years old. More than 80% of students were eligible for free or reduced-price lunch. When asked whether a doctor or other health provider had ever told them they had various health conditions: 2% reported diabetes and 24% reported asthma. The average BMI percentile of the middle school students in our sample was 72% (SD = 28.3).

### **Behaviors Associated with ED Use**

Results of the logistic regression analysis are in Table 2. Children who engaged in more unhealthy eating behaviors were significantly more likely to have visited the ED since the start of school. The strongest association was with sugar-sweetened beverage consumption, with more types of sugar-sweetened beverages consumed the previous day

significantly associated with greater odds of visiting the ED since the start of school (OR 1.24, 95% CI 1.14-1.35). Eating more energy-dense foods the previous day (OR 1.20, 95% CI 1.06-1.37) and consuming fast food more times in the prior week were also associated with greater odds of ED use (OR 1.07, 95% CI 1.00-1.14). Neither physical activity nor weekday and weekend screen time were significantly associated with odds of ED use in our sample.

### **Discussion**

Drawing on the recommendations of the American Academy of Pediatrics for the prevention of childhood obesity, we have identified specific dietary behaviors that are widely accepted to contribute to childhood obesity and that may be amenable to brief intervention in the ED because of their prevalence among children visiting the ED. Children who reported unhealthy eating behaviors in general were more likely to have visited the ED since the start of the school year. These behaviors included consumption of energy-dense foods, fast food, and sugar-sweetened beverages.

However, we found that differences in fruit and vegetable consumption, screen time and physical activity did not correlate with self-reported ED use. Still, our study sample as a whole reported an average of 3.5 hours per day of school-day screen time, nearly double the American Academy of Pediatrics recommendation of no more than 2 hours per day. Additionally, the students averaged only 3.7 days per week of 60 minutes of physical activity or more, versus the American Academy of Pediatrics recommendations for 60 minutes every day of moderate-to-vigorous physical activity. Despite the fact that the children who engaged in these behaviors were no more likely to

visit the ED, they nonetheless could likely benefit from counseling about the adverse effects of sedentary behavior as recommended by the American Academy of Pediatrics.

The current study was conducted in a small city with substantial socioeconomic inequalities. Therefore, our sample is likely representative of some of the most low-resource, vulnerable populations of urban students.<sup>45</sup> A 2009 report noted that the rate of ED utilization in this city was 2-3 times the state average and was increasing.<sup>46</sup> Nearly one in five middle school students in our sample reported having been to the ED since the start of the school year (i.e., in the past 2-3 months); this is on track to surpass national trends by the year's end. Nationwide ED use among children has increased 30% in the past two decades.<sup>47</sup> Further, 13.5% of participants reported that the ED is the place they usually go when they get sick, and only slightly more than half reported that they usually go to their own doctor when they get sick. Thus, although not all children have had contact with the ED in the prior 2-3 months, there are a substantial number of children do not appear to have or be aware of a primary care doctor that is their usual source of care. This further adds to the argument that it is important for clinicians in the ED to consider screening and prevention of obesity as part of their job, as they are effectively serving as the primary care providers for a great number of children. Because we focus on the prevention of childhood obesity, and argue that brief screening and counseling should be applied to all children, regardless of current BMI, it would not be necessary to conduct additional physical measurements or even calculate a child's BMI in the ED. In addition, when applied broadly, issues of parents' limited ability to accurately assess their child's weight status can be pushed aside.<sup>48</sup>

Prior studies have focused on obesity screening and the factors that predict obesity in a sample of children drawn from the ED; the effectiveness of brief screenings and interventions in the ED; and the receptiveness of parents to these screening and intervention efforts. This study adds to the literature by looking outside of a patient population to the general population of pre-adolescent children to understand their ED use and the prevalence of obesogenic behaviors that, when modified, may prevent the development of obesity and its consequences. Our findings that middle-school children who have engaged in unhealthy eating behaviors are more likely to report ED use than their peers to is a novel finding. These unhealthy dietary behaviors were associated with use of the ED even after controlling for important clinical and sociodemographic factors. Further, by concentrating on evidence-based behavior modification strategies as recommended by the American Academy of Pediatrics, we are able to expose specific behaviors that are more prevalent in the population of children who visit urban EDs, making brief, behavior-directed interventions rather than broad screenings more feasible for busy clinicians. In particular, focusing on reducing the consumption of energy-dense foods, fast food, and sugar-sweetened beverages has the potential to reduce the development and progression of childhood obesity in the population of children who use the ED.

### **Limitations and Strengths**

As with all cross-sectional studies, we are unable to make any statements about causality, though our primary aim was not to determine what brought children to the ED or make claims about the direction of effects, but rather to characterize those who presented to the ED in order to identify modifiable behaviors that may be more prevalent

among ED users. We also have no data to document reasons for ED use. Presumably, children who have been to the ED with a serious condition may not be an appropriate target audience for counseling regarding fast food intake, for example. Finally, results may not be generalizable to the population at large because this was an urban, mostly Black and Latino, low-resource population with higher than national-average rates of ED utilization.

In contrast, this study has several strengths. It was conducted in an urban setting with children who are representative of a low-income population – a population known both to use ED services disproportionately and to have higher rates of obesity. Our findings among a population-based sample of middle-school children are novel, as previous studies have focused solely on ED patients and not the general public, and therefore have been unable to compare ED users to their non-ED user peers. Even after controlling for important clinical and demographic risk factors, ED use was associated with unhealthy dietary behaviors. Further, by focusing on evidence-based behavior modification strategies as recommended by the American Academy of Pediatrics, we expose specific behaviors that are more prevalent in the population of children who visit urban EDs, making brief, behavior-directed interventions rather than broad screenings more feasible for busy clinicians.

### **Future Directions**

Clinical investigators should develop and implement brief interventions for pediatric ED users that focus on specific behaviors known to be both more prevalent in this population and correlated with adverse health outcomes. We can make recommendations for further study into ED-based brief interventions, but cannot predict

whether these potential interventions will be effective at improving health behaviors or whether they will be cost effective. However, the results from the current investigation suggest that ED use is more prevalent among children who report unhealthy eating behaviors, and therefore unhealthy eating behaviors may be a particularly important area for targeted interventions in the ED.

## **Part II: Self-Report of Depressive Symptoms is Associated with Incidence and Frequency of Adult Emergency Department Use**

### **Introduction**

Depression is widely accepted as a cause of significant morbidity and mortality, functional impairment, and cost to the healthcare system.<sup>49,50,51,52</sup> Nationally, estimates suggest that the prevalence of major depressive disorder is as high as 16%. Despite availability of effective treatment, 40-50% of those with depression never receive treatment.<sup>53</sup> According to the World Health Organization, depression is the leading cause of disability worldwide.<sup>54</sup>

In 2009, the US Preventive Services Task Force (USPSTF) issued recommendations for depression screening. In their statement, they issued a Grade B Recommendation for screening adults for depression in contexts where accurate diagnosis, effective treatment, and follow-up are in place.<sup>55</sup> A Grade B Recommendation is based on high certainty that the net benefit is moderate or moderate certainty that the net benefit is moderate to substantial.

Traditionally, efforts to validate screening tools and evaluate treatment options have been focused in the primary care setting.<sup>56</sup> However newer models of preventive care practice have begun to include the Emergency Department as an innovative setting for providing preventive care.<sup>57</sup> For example, programs such as Project ASSERT, which systematized screening and referral to treatment for patients with alcohol abuse problems in the ED, have paved the way for further preventive care interventions in this setting.<sup>58</sup>

Despite USPSTF guidelines, these have not been adopted by the American College of Emergency Physicians. This professional organization publishes Clinical

Policy Statements that guide clinical emergency care, has no recommendation for screening for depression, or even for suicidality in the Emergency Department. Their mental health policies are limited to the use of restraints, civil commitment of acutely mentally ill persons, and pediatric mental health emergencies.<sup>59</sup> Given the time constraints and complex medical issues that Emergency Department clinicians face, before implementation of additional screening or preventive health services can be recommended, we must first address whether these services are a worthwhile use of time and resources.

Groups that are at increased risk for depression include “persons with other psychiatric disorders, including substance misuse; persons with a family history of depression; persons with chronic medical diseases; and persons who are unemployed or of lower socioeconomic status.”<sup>55</sup> Historically, these groups are also more likely to use the ED as a source of care.<sup>20</sup> From the perspective of the ED itself, there is some evidence to suggest that those who use the ED are more likely to carry a diagnosis of depression, in particular.<sup>60</sup> Previous studies focusing on characteristics of frequent ED users have demonstrated a higher prevalence of mental health diagnoses. For example, among ED users in the VA health system, patients with one or more ED visits were up to 28% more likely to carry a formal, chart diagnosis of major depression than those with no ED visits.<sup>20</sup> Despite the significantly higher prevalence of diagnosed depression among those who turn to the ED for health care, there is scant research aimed at evaluation of efforts to screen for depression or refer to appropriate outpatient care.

The two objectives of this investigation were to: (1) identify whether adults in an urban low-resource population who screen positive for depressive symptoms using a

simple, two-question tool use the ED more than those who do not; and (2) determine whether screening positive for depressive symptoms is associated with the absolute number of ED visits reported. By drawing from both the depression and the emergency medicine literature, we can begin make a case for depression screening efforts in the ED. Results can inform the development and implementation of evidence-based brief screening and intervention initiatives for this urban, low-resource population.

## **Methods**

### **Procedure**

Data are from a cross-sectional community health needs assessment conducted in Fall 2012 in six low-income neighborhoods in New Haven, Connecticut. The survey, which took 30-40 minutes to complete, included questions about various health topics, including, but not limited to: depressive symptoms, health services utilization, chronic disease, health risk behaviors (e.g., diet, exercise, tobacco) and sociodemographic characteristics. Trained interviewers from the community administered the survey in English and Spanish, and recorded the responses on handheld computers. Households were randomly selected from complete address lists of the six neighborhoods provided by the City of New Haven, and interviewers went door-to-door. Each selected address was approached three times until: an eligible adult resident answered and consented to be surveyed, an eligible resident answered and refused, or no one answered and another address was randomly selected. Participants received a \$10 gift card to a local grocery store and were entered into a \$500 cash raffle. All procedures were approved by the Yale University Institutional Review Board. Consent was obtained for all participants in English or Spanish.

## **Medical Student Contribution**

For this study, the medical student (author) was involved with the data collection, and spent approximately 8 weeks conducting surveys in the community. Daily data management, including downloading of the data from handheld computers and random quality assurance checks of other surveyors, was also the responsibility of the medical student. Once data collection was complete, the concept for this analysis of the data collected was the student's. Data analysis was conducted in consultation with the faculty mentor (Jeannette Ickovics, PhD) and the research group's Data Analyst, Kathryn Gilstad-Hayden, MS. Finally, the manuscript was written primarily by the student and edited by the faculty mentor, while Ms. Gilstad-Hayden prepared the tables and figures.

## **Participants**

Surveys were conducted with 1300 adult participants. The overall response rate to the survey was 73%, with rates varying from 60-78% among the neighborhoods. Participants with missing responses to the variables of interest (N=206) were excluded from the analysis, leaving a final analytical sample of 1094 participants. Participant characteristics are described in the Results section.

## **Measures**

### *Outcome: ED Use*

The outcome of interest was ED use, assessed with the following question: "In the past 12 months, how many times did you receive care in a hospital emergency department." Participants were placed into one of two categories based on their response: no ED visits, or 1 or more ED visits.

### *Depressive Symptoms*

Participants were surveyed using the two-item Patient Health Questionnaire (PHQ-2) screening tool. This particular tool has been extensively studied as an initial screening tool for the recognition of people at higher risk for depression, and has been validated in settings including primary care and specialist medical services. In the primary care setting, the USPSTF reviewed all available screening tools for depression, and concluded that the Patient Health Questionnaire-2 (PHQ-2) tool was acceptable, and that there was no evidence to recommend the use of one screening tool over another.<sup>55</sup> Responses were scored according to the following rubric, with each participant receiving a score from 0-6:<sup>61</sup>

- *During the last month, how often have you been bothered by little interest or pleasure in doing things?*

Not at all (0)/Several days (1)/More than half the days (2)/Nearly every day (3)

- *During the last month, how often have you been bothered by feeling down, depressed, or hopeless?*

Not at all (0)/Several days (1)/More than half the days (2)/Nearly every day (3)

Following the standard cut-off used in validation studies of the tool, a cumulative score of  $\geq 3$  or more was considered to be a positive screen for depression.<sup>62</sup>

### *Health Characteristics*

Three additional health measures were included in our analyses: (1) Self-reported health: Overall health status was assessed by the question: “How would you rate your overall health? (Excellent/Very Good/Good/Fair/Poor).” (2) Chronic diseases: Participants reported whether a health care provider had ever told them that they have

high cholesterol, diabetes, heart disease/heart attack, asthma, and/or chronic bronchitis/emphysema/COPD. A summary score of number of chronic conditions was used in these analyses. (3) Smoking status: Participants reported whether they currently smoke every day, some days, or not at all, and were considered to be smokers if they currently smoke every day or some days.

#### *Sociodemographic characteristics*

Several sociodemographic controls were used in these analyses, as they are known to be associated with ED use. Participants reported age, race/ethnicity, gender, nativity, highest level of educational attainment, total annual household income, employment status, and health insurance status.

#### **Data Analysis**

Pearson's chi-square and student's t-statistics were calculated to test the bivariate association between depression along with the other variables in the model and ED use. The Cochran-Armitage Trend Test was conducted to test for a linear trend between number of ED visits and percent screening positive for depression. A multivariate logistic regression analysis was used to test the association ED use with depressive symptoms, adjusting for socio-demographic and other known associates of ED use. Analyses were conducted using SAS 9.3 (SAS Institute, Cary, NC).

#### **Results**

##### **Study Participants**

Participant characteristics are described in Table 3. Our sample was racially diverse, and over half of the sample identified as black (62.7%), with 17.9% identifying as Hispanic, 9.5% as White, and 9.9% as some other racial group. The majority of

respondents were female (65.5%). Half (49.1%) had completed at least some college. Participants tended to report low incomes, with 62.7% reporting a total household annual income of less than \$30,000. 12.5% were uninsured at the time of the survey. Almost three quarters of the sample rated their health as good, very good, or excellent (72.3%). Finally, 11.9% of participants screened positive for depressive symptoms.

Results of the logistic regression analysis are in Table 4. Older participants were only slightly less likely to report ED use (OR 0.97, 95% CI 0.96-0.98). Participants who reported a total annual household income of  $\geq$ \$30,000 were less likely to report ED use than those whose total annual household income was  $<$ \$30,000 (OR 0.66, 95% CI 0.49-0.89). There were no significant associations between race, gender, insurance status, highest level of education attained, employment status and ED use.

### **Health Characteristics**

Participants who self-rated their health as “good, very good, or excellent” were half as likely to report ED use than those who self-rated their health as “fair or poor” (OR 0.55, 95% CI 0.4-0.75). For each additional chronic disease reported by a participant, the odds of reporting ED use rose by approximately 50% (OR 1.52, 95% CI 1.34-1.73). Finally, current smoking was not significantly associated with ED use.

### **Depressive Symptoms**

The variable of interest for this study, a positive screening for depressive symptoms using a modified PHQ-2 tool, was significantly associated with self-reported ED use in the last year (OR 1.70, 95% CI 1.13-2.56). Those who screened positive were 1.7 times more likely to have used the ED in the preceding year, even after controlling for other sociodemographic and health variables in the model.

Figure 1 shows the percentage of respondents screening positive for depression by number of ED visits in the past year. Among those who reported no ED visits, 8.5% screened positive for depressive symptoms, but this percentage rose to 29% for participants reporting more than five ED visits. The Cochran-Armitage Trend Test revealed a significant linear trend between number of ED visits and % screening positive for depression (Z Statistic=-4.83,  $p < 0.001$ ).

### **Discussion**

These data add to previous findings that those who use the ED have higher rates of depression than the general population by directly comparing rates of positive screening for depressive symptoms within a community. Our results indicate that adults who screen positive for depressive symptoms using a modified PHQ-2 screening tool were 70% more likely to visit the ED than those who did not screen positive, even after controlling for other important health, social and demographic characteristics that may also increase risk of ED use. Depressive symptoms reported included anhedonia (feeling little interest or pleasure in doing things) and feeling down, depressed or hopeless. This study is not an endorsement of a particular screening tool, nor is it an attempt to diagnose participants with depression, major or otherwise. Rather, it is an inquiry into the whether or not screening positive for depressive symptoms, using a widely accepted tool, is predictive of ED use.

Furthermore, depressive symptoms is associated with an increased number of ED visits in the past year. Only 8.5% of respondents screened positive for depression among those with no ED visits – this rate is slightly lower than national prevalence rates for depression.<sup>63</sup> In contrast, the rate of depression more than triples to 29.0% among those

with six or more ED visits in the past year. This may be particularly important given the intense interest in interventions aimed specifically at frequent users of the ED. These results closely mirror findings by Doran and colleagues, who also reported an increasing percentage of people with diagnoses of depression as the number of ED visits in the last year increased.<sup>20</sup> This study extends the aforementioned results by demonstrating a similar trend in a population of urban adults who are not all necessarily plugged in to an organized system of health care.

This study was conducted in a small city with substantial socioeconomic inequalities. Therefore, our sample is likely representative of some of the most low-resource, vulnerable populations of urban adults. In a review of the literature, Fryers and colleagues reported that mental disorders, including depression, were more common in socially disadvantaged populations, such as the one from which this study draws.<sup>64</sup> A 2009 report noted that the rate of ED utilization in this city was 2-3 times the state average and was increasing.<sup>46</sup> Therefore it is not surprising that half of the adults in our sample reported at least one ED visit in the last year. This is more than double the national average. The U.S. Centers for Disease Control and Prevention reports that nationally, approximately 20% of adults 18-65 years old visit the ED in a given year, with 80% citing lack of access to other providers as the reason for visiting the ED.<sup>65</sup> In our community, then, it is imperative to identify characteristics of those who use the ED in order to provide preventive care that they may not otherwise have access to.

Given that depression is the leading cause of disability worldwide, and that our community in particular reports high rates of depressive symptoms, we have attempted to identify a novel location where screening efforts may be implemented. In 1998, in

response to the growing conversation about whether the ED was an appropriate place to administer preventive care services, the Society for Academic Emergency Medicine's Board of Directors called for a task force to develop recommendations for preventive health screening in the Emergency Department. Their task was to determine whether preventive care was even relevant to the practice of emergency medicine, and if so, which interventions should be considered for further study. This task force evaluated the evidence available at the time (study published in 2000) and concluded that there was insufficient evidence to recommend or discourage screening for depression in the ED, and that research into the primary efficacy of this intervention was needed.<sup>10</sup> This study is an attempt to provide preliminary evidence in favor of depression screening in the ED.

While our study was conducted in a community setting, and not in the Emergency Department itself, it is nonetheless useful to review the current status of efforts to screen for depression in the Emergency Department, as this represents the next step in this line of investigation. To our knowledge, efforts to screen patients for depression in the Emergency Department have been extremely limited to date. The literature focuses primarily on the acceptability of and attitudes toward screening among patients and their family members.<sup>66,67</sup> These studies have been conducted in the pediatric and adolescent populations, and generally conclude that both patients and their family members are overwhelmingly receptive to screening for both depression and suicidality in the ED. One study attempted to identify the prevalence of depression in a subset of ED patients – women in a specialized chest pain observation unit – and to determine the acceptability of referral to behavioral health treatment.<sup>68</sup> They found that 34% of participants screened positive for depression, and of those, 71% agreed to be referred for additional treatment.

Several studies have addressed preventive care in the Emergency Department more broadly. For example, a recent study reported on the availability of preventive health services in Emergency Departments, but did not include depression screening on their list of potential services offered.<sup>57</sup> Therefore, there are no data on the prevalence of depression screening nationally across Emergency Departments.

This study moves beyond a patient population to the general population of adults to understand their ED use and the prevalence of depressive symptoms that, when identified, may allow for referral to appropriate mental health treatment. Our findings that adults who screen positive for depressive symptoms are more likely than their peers to visit the ED is a novel finding. These depressive symptoms were associated with use of the ED even after controlling for important clinical and sociodemographic factors.

### **Limitations and Strengths**

As with all cross-sectional studies, we are unable to make any statements about causality. Our primary aim was not to determine what caused participants to visit the ED or to make claims about the direction of effects, but rather to characterize those who reported ED use in order to identify characteristics that may be more prevalent among ED users. We also have no data to document reasons for ED use. Presumably, adults who present to the ED with a serious condition may not be an appropriate target audience for screening for depression. Additionally, the measure we used to report a positive screen for depressive symptoms (a modified PHQ-2 tool) has not been validated in the context in which we have applied it, and may not accurately predict clinical diagnoses of depression in this particular population. Finally, results may not be generalizable to the population at

large because this was an urban, mostly Black and Latino, low-resource population with higher than average rates of chronic disease.

In contrast, this study has several strengths. It was conducted in an urban setting with adults who are representative of a low-income population – a population known both to use ED services disproportionately and to have higher rates of depression. Our findings among a population-based sample of urban adults are novel, as previous studies have focused solely on ED patients and not the general public, and therefore have been unable to compare ED users to their non-ED user peers. Even after controlling for important clinical and demographic risk factors, ED use was associated with positive screening for depressive symptoms. Further, by focusing on evidence-based screening strategies as recommended by the U.S. Preventive Services Task Force, we expose specific characteristics that are more prevalent in the population of adults who visit urban EDs, making brief screenings more attractive for busy clinicians.

### **Future Directions**

This study provides an important framework and basis for future inquiries into screening for depression in the ED. Most of the work that has been done to this point, including the present study, hinges on defining the epidemiological scope of the problem. In the next phase, clinical investigators should develop and implement screening, brief interventions, and referral to treatment for adult ED users. Depression is known to be correlated with adverse health outcomes and increased health services utilization. We can make recommendations for further study into ED-based brief screenings, but cannot predict whether these potential interventions will be effective at improving health outcomes or whether they will be cost effective. However, the results from the current

investigation suggest that depressive symptoms are more prevalent among adults using the ED, and therefore depression screening may be a particularly fruitful area for targeted interventions in the ED.

## **Conclusion**

In summary, the purpose of these two distinct, yet thematically linked inquiries was to identify health characteristics that preventive care services could target, and to determine if these characteristics were present with greater frequency in children and adults who reported ED use.

In the first study, we identified children who reported specific, unhealthy dietary behaviors, and found that those children reported ED use with greater frequency than their peers who did not. In light of these results and the immense public health concern over the prevention of childhood obesity, we suggested that the ED may serve as an appropriate location for dietary screening and counseling.

In the second, we found that those who screened positive for depressive symptoms were almost twice as likely (OR 1.7) to report visiting the ED for health care in the last year. These results suggest that the ED may be a fruitful location for targeting people for depression screening.

The U.S. health care system has evolved to prioritize payment for treatment of disease, rather than efforts at preventing the same diseases. An essential piece of the solution to our broken, cost-inefficient system, is to continue to shift our focus to efforts at providing disease prevention and health promotion services. These investigations are aimed at initiating conversation and spurring future research into specific, goal-directed methods of providing key preventive care services in the Emergency Department.

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## **Tables and Figures**

**TABLE 1** Characteristics of Study Sample (N=1,590 middle school students)

	% (N) or Mean (SD)
<b>Demographic Characteristics</b>	
Emergency Department Visit	
Yes	18.2% (289)
No	81.8% (1301)
Usual Source of Care	
Emergency Department	13.5% (215)
Primary Care Doctor	52.3% (833)
School Clinic or Nurse	18.2% (289)
Walk-in Clinic	4.5% (72)
Unknown	11.4% (181)
Gender	
Male	46.5% (739)
Female	53.5% (851)
Race/Ethnicity	
Hispanic	46.5% (740)
Black	37.2% (591)
White/other	16.3% (259)
Age (years)	12.4 (1.4)
Lunch Eligibility	
Free or Reduced Price	83.5% (1327)
Full pay	16.5% (263)
Diagnoses	
Asthma	24% (382)
Diabetes	2% (32)
BMI Percentile	71.9 (28.2)
<b>AAP Recommended Behaviors</b>	
<b>Mean (SD)</b>	
1. Fruits and Vegetables Yesterday Sum (0-3 scale)*	1.7 (1.0)
2a. Energy Dense Foods Yesterday Sum (0-3 scale)**	2.0 (1.5)
2b. Fast Foods (# days/week)	1.6 (1.7)
3. Sugar-Sweetened Beverages Yesterday (0-6 Scale)***	1.9 (1.6)
4a. Screen Time Hours on School Days	3.5 (1.3)
4b. Screen Time Hours on Weekend Days	4.0 (1.4)
5. Physical Activity at Least 60 Minutes (# days/week)	3.7 (1.3)

\*Fruits and Vegetables Yesterday Sum = green salad, fruits, vegetables

\*\*Energy Dense Foods Yesterday = ice cream, french fries, fried chicken

\*\*\*Sugar-Sweetened Beverages Yesterday = number of types of SSB consumed yesterday

**TABLE 2** Predictors of Pediatric ED Use, Adjusting for control characteristics and school clustering (N=1590)

	Odds Ratio (95% CI)
<b>Control Characteristics</b>	
Gender	1.11 (0.86-1.45)
Race/Ethnicity	
Hispanic	1.67 (0.99-2.82)
Black	1.82 (1.00-3.31)*
Age (years)	0.98 (0.87-1.11)
Lunch Eligibility	1.31 (0.94-1.83)
Diagnoses	
Asthma	1.74 (1.39-2.19)*
Diabetes	4.23 (2.02-8.45)*
BMI Percentile	1.0 (1.0-1.0)
<b>AAP Recommended Behaviors</b>	
1. Fruits and Vegetables Yesterday Sum (0-3 scale)**	0.96 (0.85-1.08)
2a. Energy Dense Foods Yesterday Sum (0-3 scale)***	1.20 (1.06-1.37)*
2b. Fast Foods (# days/week)	1.07 (1.00-1.14)*
3. Sugar-Sweetened Beverages Yesterday (0-6 Scale)****	1.24 (1.14-1.35)*
4a. Screen Time Hours on School Days	1.09 (0.94-1.28)
4b. Screen Time Hours on Weekend Days	0.94 (0.84-1.06)
5. Physical Activity at Least 60 Minutes (# days/week)	0.99 (0.92-1.07)

\* $p \leq .05$

\*\*Fruits and Vegetables Yesterday Sum = green salad, fruits, vegetables

\*\*\*Energy Dense Foods Yesterday = ice cream, french fries, fried chicken

\*\*\*\*Sugar-Sweetened Beverages Yesterday = number of types of SSB consumed yesterday

**TABLE 3** Description of sample by Emergency Department (ED) Use (N= 1094)

Variable	Total % (N)	Visited ED in past year		p- value**
		No (N=622)	Yes (N=472)	
Sociodemographic Characteristics				
Age (years)	1094	42.3 (13.2)	39.3 (13.0)	<0.001*
Race/ethnicity				
Hispanic	17.9 (196)	56.1(110)	43.9 (86)	0.793
Black, not Hispanic	62.7 (686)	56.4 (387)	43.6 (299)	
White, not Hispanic	9.5 (104)	61.5 (64)	38.5 (40)	
Other, not Hispanic	9.9 (108)	56.5 (61)	43.5 (47)	
Gender				
Female	65.5 (717)	54.7 (392)	45.3 (325)	0.044*
Male	34.5 (377)	61.0 (230)	39.0 (147)	
Nativity				
United States	91.0 (995)	55.0 (547)	45.0 (448)	<0.001*
Other country	9.0 (99)	75.8 (75)	24.2 (24)	
Education				
No College	51.0 (557)	54.0 (301)	46.0 (256)	0.055
At least some college	49.1 (537)	59.8 (321)	40.2 (216)	
Annual Income				
< \$30,000	62.7 (686)	51.8 (355)	48.3 (331)	<0.001*
> \$30,000	37.3 (408)	65.4 (267)	34.6 (141)	
Unemployed				
No	83.0 (908)	56.9 (517)	43.1 (391)	0.903
Yes	17.0 (186)	56.5 (105)	43.6 (81)	
Has health Insurance				
No	12.5 (137)	59.9 (82)	40.1 (55)	0.449
Yes	87.5 (957)	56.4 (540)	43.6 (417)	
Health Characteristics				
Self-Rated Health				
Fair or poor	27.7 (303)	41.9 (127)	58.1 (176)	<0.001*
Good, very good or excellent	72.3 (791)	62.6 (495)	37.4 (296)	
Number of chronic diseases	1094	1.0 (0.9)	1.2 (1.3)	<0.001*
Current smoker				
No	69.3 (758)	59.2 (449)	40.8 (309)	0.017*
Yes	30.7 (336)	51.5 (173)	48.5 (163)	
Depression Screening				
Positive Depression Screening				
No	88.1 (964)	59.0 (569)	41.0 (395)	<0.001*
Yes	11.9 (130)	40.8 (53)	59.2 (77)	

Percentages may not add to 100 due to rounding

\* $p \leq .05$

\*\*p-value based upon Pearson's chi-square for categorical variables or t-test for continuous variables

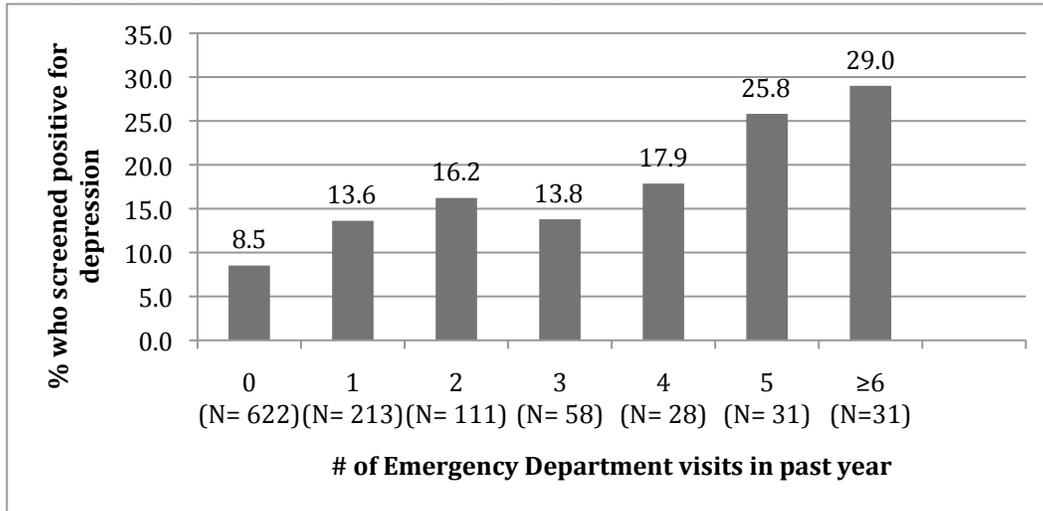
**TABLE 4** Predictors of emergency department use from a multivariate logistic regression model (N=1094)

	Adjusted OR <sup>†</sup>	95% CI	p-value
<b>Sociodemographic Characteristics</b>			
Age (years)	0.97	0.96, 0.98	<0.001*
Race/ethnicity			
White, not Hispanic	1.00	---	
Black, not Hispanic	1.19	0.75, 1.87	0.464
Hispanic	0.93	0.54, 1.59	0.790
Other, not Hispanic	1.10	0.60, 2.00	0.766
Gender			
Male	1.00	---	
Female	1.10	0.83, 1.44	0.535
Nativity			
Other country	1.00	---	
United States	1.98	1.18, 3.33	0.010*
Education			
No College	1.00	---	
At least some college	0.94	0.71, 1.24	0.653
Annual Income			
< \$30,000	1.00	---	
> \$30,000	0.66	0.49, 0.89	0.006*
Unemployed			
No	1.00	---	
Yes	0.79	0.55, 1.13	0.195
Health Insurance Status			
Insured	1.00	---	
Uninsured	0.74	0.50, 1.11	0.149
<b>Health Characteristics</b>			
Self-Rated Health			
Fair or poor	1.00	---	
Good, very good or excellent	0.55	0.41, 0.75	<0.001*
Number of chronic diseases	1.52	1.34, 1.73	<0.001*
Current smoker			
No	1.00	---	
Yes	1.13	0.84, 1.50	0.426
<b>Depression Screening</b>			
Positive Depression Screening			
No	1.00	---	
Yes	1.70	1.13, 2.56	0.011*

\* $p \leq .05$

OR= odds ratio, CI= confidence interval, ED= emergency department

**Figure 1** Percentage of respondents screening positive for depression by number of Emergency Department (ED) visits in past year



Cochran-Armitage Trend Test: Z Statistic=-4.83,  $p < 0.001$ , signifying significant linear trend between number of ED visits and % screening positive for depression