Research paper

Primary language spoken at home and disparities in the health and healthcare of US adolescents

May Lau MD MPH
Division of General Pediatrics, Department of Pediatrics, University of Texas, Southwestern Medical Center and Children’s Medical Center Dallas, TX, USA

Hua Lin PhD
Division of General Pediatrics, Department of Pediatrics, University of Texas Southwestern Medical Center, Dallas, TX, USA

Glenn Flores MD
Division of General Pediatrics, Department of Pediatrics, University of Texas Southwestern Medical Center and Children’s Medical Center, Dallas, TX, USA

What is known on this subject
- In the USA, children from non-English primary language homes experience health and healthcare disparities.
- Health and healthcare disparities among US adolescents from non-English primary language homes are an under-researched subject.

What this paper adds
- There are multiple disparities in medical and oral health, access to care, and use of healthcare services for adolescents from non-English primary language homes.
- These disparities differ from those experienced by children from non-English primary language homes.
- Latino and Asian Pacific Islander adolescents from non-English primary language homes experience several specific health and healthcare disparities.

ABSTRACT
We examined disparities in medical and oral health status, access to care, and use of services in a nationally representative sample of adolescents from non-English primary language (NEPL) homes. Bivariate and multivariable analyses were performed on the 2003 National Survey of Children’s Health to identify disparities in 40 measures of health and healthcare for adolescents aged 10–17 years (n = 47 159). Among adolescents from non-English primary language homes, sub-analyses compared Latinos and Asian/Pacific Islanders with white adolescents. Compared with adolescents from English primary language homes, adolescents from NEPL homes experienced many disparities, including being more likely to have suboptimal health (47% vs. 14%), suboptimal dental condition (65% vs. 31%), no health insurance (32% vs. 7%), no personal doctor or nurse (42% vs. 15%), problems obtaining specialty care (44% vs. 22%), never having seen a dentist (5% vs. 1%), and no preventive medical (44% vs. 26%) or dental (17% vs. 6%) visit in the past year. Compared with white adolescents from EPL homes, Latino and Asian/Pacific Islander adolescents from NEPL homes experienced disparities in medical and oral health status, having a personal doctor or nurse, and dental visits. Most disparities persisted in multivariable analyses. Compared with adolescents from EPL homes, adolescents from NEPL homes experienced multiple disparities in health and healthcare. Among adolescents from NEPL homes, Latino and Asian/Pacific Islander adolescents experienced specific disparities.

Keywords: adolescent, healthcare disparities, language, minority groups
Introduction

Approximately 20% of the US population, or over 59 million people, speak a non-English primary language (NEPL) at home (American Community Survey, 2010a). Spanish is the most common NEPL spoken at home (13%), followed by other Indo-European (4%) and Asian/Pacific Islander (API) languages (3%) (see Table 1) (American Community Survey 2010a). Children account for 11.8 million NEPL Americans (American Community Survey, 2010b), with adolescents aged 10–17 years representing almost 50% of the paediatric population (US Census Bureau, 2012). Most research into paediatric disparities has focused on Latino parents, based on language of interview, primary language at home or English proficiency, or on specific health and healthcare indicators, such as prevalence of a medical home, a usual source of care, timeliness of routine and sick care, access to healthcare and insurance, an asthma diagnosis, health status, and dental service utilisation (DeCamp et al, 2011; Flores et al, 1998; Galbraith et al, 2008; Greek et al, 2006; Hahm et al, 2008; Mosnaim et al, 2007; Noyce et al, 2009; Yu et al, 2006). Only one study has comprehensively examined health and healthcare disparities in NEPL children (Flores and Tomany-Korman, 2008).

Previous studies suggest that adolescents experience unique disparities (Adams et al, 2009; Alexandre et al, 2009; Van Wie et al, 2008; Wen, 2007). In a study of US children, adolescents were found to be more likely to have poorer parent-rated health than younger children (Wen, 2007). One Californian study examined disparities in three healthcare indicators for three racial/ethnic minority groups of adolescents, based on language use at home (Hahm et al, 2008), but there are no published studies that have comprehensively examined health and healthcare disparities in NEPL adolescents. The aim of the present study was therefore to comprehensively examine disparities in health and healthcare in a nationally representative sample of NEPL adolescents.

Table 1 Examples of common Indo-European and Asian and Pacific Islander languages

<table>
<thead>
<tr>
<th>Indo-European languages</th>
<th>Asian and Pacific Islander languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>Chinese</td>
</tr>
<tr>
<td>French Creole</td>
<td>Japanese</td>
</tr>
<tr>
<td>Italian</td>
<td>Korean</td>
</tr>
<tr>
<td>Portuguese</td>
<td>Cambodian</td>
</tr>
<tr>
<td>German</td>
<td>Hmong</td>
</tr>
<tr>
<td>Yiddish</td>
<td>Thai</td>
</tr>
<tr>
<td>Scandinavian languages</td>
<td>Laotian</td>
</tr>
<tr>
<td>Greek</td>
<td>Vietnamese</td>
</tr>
<tr>
<td>Russian</td>
<td>Tagalog</td>
</tr>
<tr>
<td>Polish</td>
<td></td>
</tr>
<tr>
<td>Slavic languages</td>
<td></td>
</tr>
<tr>
<td>Armenian</td>
<td></td>
</tr>
<tr>
<td>Persian</td>
<td></td>
</tr>
<tr>
<td>Hindi</td>
<td></td>
</tr>
<tr>
<td>Gujarati</td>
<td></td>
</tr>
<tr>
<td>Urdu</td>
<td></td>
</tr>
</tbody>
</table>

*Source: US Census ([www.census.gov/hhes/socdemo/language/about/index.html](http://www.census.gov/hhes/socdemo/language/about/index.html)).
Methods

Data source

The 2003 National Survey of Children’s Health (NSCH) was a cross-sectional, random-digit-dial household telephone survey conducted by the National Center for Health Statistics (Blumberg et al., 2005). The NSCH’s purpose was to produce national and state estimates of various physical, emotional and behavioural health indicators for children aged 0–17 years. A total of 102,353 child-level interviews were completed between January 2003 and July 2004. Parents or guardians (hereafter collectively referred to as parents) who were most knowledgeable about the health and healthcare of children in the household were the survey respondents. A child was randomly selected from the household for the survey. The NSCH was only conducted in English or Spanish, so adolescents whose parents had limited English or Spanish proficiency and did not speak either language were not included. After an experienced Spanish translator had translated the English questionnaire into Spanish, the Spanish questionnaire was reviewed for accuracy and cultural appropriateness (Blumberg et al., 2005). Experienced bilingual interviewers administered the Spanish questionnaire. The survey had an overall response rate of 55.3%. NSCH sampling weights adjust for households with multiple telephone lines and provide multiple adjustments for non-response bias, including adjustments for unknown household status and eligibility, households with multiple children, and non-coverage of households without telephones. This was a secondary database analysis without personal identifiers, so the study was exempt from institutional review board approval. To address the possible ethical concerns associated with not including individuals with limited proficiency in English or Spanish, the as yet unreleased 2011 NSCH was conducted in four additional languages (National Opinion Research Center, undated).

Definitions and measures

Adolescents were defined as aged 10 to 17 years, which is consistent with the Society of Adolescent Health and Medicine’s definition of adolescence as beginning at 10 years of age (Society for Adolescent Medicine, 1995).

There were two independent variables of interest, namely household primary language and race/ethnicity. NEPL and EPL households were identified by asking the respondent ‘What is the primary language spoken in your home?’ Children in households where Spanish or another non-English language was the primary language were classified as NEPL. Parents identified the child’s race/ethnicity. Private insurance included any type of non-public health insurance, such as Health Maintenance Organization (HMO), employer-sponsored, or self-purchased health insurance (Centers for Disease Control and Prevention; www.cdc.gov/nchs/data/slaits/NSCH_Questionnaire.pdf). Public insurance included any government-assistance health insurance programme, such as Medicaid (for low-income or disabled individuals), or state health-insurance programmes, such as the Children’s Health Insurance Program (CHIP) (for low-income children not qualifying for Medicaid) (Centers for Disease Control and Prevention; www.cdc.gov/nchs/data/slaits/NSCH_Questionnaire.pdf).

The study outcomes consisted of 40 measures encompassing three domains, namely medical and oral health status, access to care and use of services. Body mass index (BMI) was calculated using parental reports of the adolescent’s height and weight. Responses under the medical and oral health status section reflect parental responses to diagnosed conditions. A personal doctor or nurse (PDN) refers to a regular healthcare provider who knew the child’s health and medical history. For certain health status variables, the NSCH asked about need and use at the same time (see Box 1).

Analyses

All analyses were performed using STATA 10 to account for the complex sample design of NSCH and to produce weighted estimates (StataCorp, 2007). The sample was limited to index adolescent children aged 10–17 years.

The sociodemographic characteristics of NEPL and EPL adolescents and their households were compared, followed by bivariate analyses to identify associations between primary language at home and variables in three different domains, namely medical and oral health status, access to care and use of services. Among NEPL adolescents, associations between race/ethnicity and their outcomes were examined with bivariate analyses.

Box 1 Abbreviations

NEPL: Non-English primary language
EPL: English primary language
NSCH: National Survey of Children’s Health
API: Asian (Chinese, Korean, Japanese and other heritage)/Pacific Islander
PDN: personal doctor or nurse
BMI: body mass index
ADHD: attention deficit hyperactivity disorder
LEP: limited English proficiency
CI: confidence interval
that compared outcomes for Latino and Asian/Pacific Islander (API) adolescents with those for white adolescents. Pearson’s $X^2$ test statistic was used to test for independence between primary language categories or racial/ethnic groups and discrete factors.

Multivariable logistic regression analyses were performed to examine adjusted associations between the primary language spoken at home and variables within the three domains, as well as racial/ethnic disparities among NEPL adolescents in the identical outcomes. Covariates in each model included the adolescent’s age, race/ethnicity (except in analyses of racial/ethnic disparities) and insurance coverage (except when this was the outcome), employment status and highest adult educational attainment in the household, the number of adults and children in the household, and the household poverty status (using the federal poverty threshold for a family of four at the time of the survey). All multivariable analyses employed stepwise procedures followed by forced entry of the above-mentioned eight covariates. The initial alpha-to-enter was 0.15, and the final alpha-to-enter was 0.05.

Results

Sociodemographic data

NEPL adolescents were slightly younger than EPL adolescents and significantly more likely to be Latino or API (see Table 2). NEPL parents were nine times less likely to be high-school graduates. NEPL household members were less likely to have been consistently employed in the past year. NEPL parents and adolescents were substantially more likely to be foreign-born. Higher proportions of NEPL households had an annual combined family income that was less than 100% of the federal poverty threshold. There was no association between household primary language and gender.

Medical and oral health status

Compared with EPL adolescents, higher proportions of NEPL adolescents had suboptimal (neither excellent nor very good) health status and dental condition, and were overweight or obese (see Table 3). Parents of NEPL adolescents reported a lower prevalence of 12 physical, emotional and behavioural conditions or concerns, but there were no associations between household primary language and the remaining eight conditions.

Access to medical and dental care

Higher proportions of NEPL adolescents than of EPL adolescents were uninsured, had sporadic health insurance coverage, and had no dental insurance (see Table 3). Over 40% of NEPL adolescents had no personal doctor or nurse (PDN). Among adolescents with a PDN, NEPL parents were more likely than EPL parents to report that the PDN never/sometimes spends enough time with the adolescent, clearly explains things or provides needed telephone help/advice. The reason for unmet medical needs was significantly more likely to be lack of insurance for NEPL adolescents and health-plan problems for EPL adolescents. About 50% of NEPL adolescents had problems obtaining specialty care and accessing special therapy. NEPL adolescents were more likely not to receive all of the dental care they required and to have unmet dental needs due to health-plan problems. No other significant differences were noted for the other five indicators.

Use of medical and dental services

NEPL adolescents were significantly more likely than EPL adolescents to have made no medical or preventive medical visits in the past year (see Table 3). For those with a PDN, NEPL adolescents were more likely to have made no preventive visit in the past 2 years. In contrast, EPL adolescents were more likely to have made an Emergency Department visit, a mental healthcare visit, to need or use prescription medications, and of those who needed or used prescription medications to have used prescription medications in the past year. NEPL adolescents were significantly more likely to have never seen a dentist, to have gone for more than 1 year since the last dental visit, and to have had no routine preventive dental care in the past year.

NEPL, race/ethnicity, and medical and oral health

For Latino NEPL adolescents, over 50% had suboptimal health, almost 75% had suboptimal dental health, and nearly 50% were overweight or obese (see Table 4). Compared with white and Latino NEPL adolescents, lower proportions of API NEPL adolescents needing more medical care than others, requiring special therapy, more difficulty with emotions, concentration, behaviour or interpersonal relationships, or had a learning disability. Latino NEPL adolescents more often had bone, joint or muscle problems and developmental delay more often than white and API NEPL adolescents. NEPL white adolescents had a higher prevalence than NEPL Latinos and APIs of hearing or vision problems and attention deficit hyperactivity disorder (ADHD). No other disparities were noted among NEPL adolescents for the other ten conditions.
Compared with white and API NEPL adolescents, higher proportions of Latino NEPL adolescents were uninsured, had no dental insurance and had no PDN (see Table 4). Higher rates of NEPL Latinos than NEPL white and APIs had difficulty accessing special therapy and had not received all of the prescription medications that they needed in the past year. No other significant access differences were noted for the other seven access indicators.
Table 3  Association of primary language spoken at home with health and healthcare among US adolescents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Primary language spoken at home</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-English (n = 2566)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>English (n = 44 593)</td>
<td>P</td>
</tr>
</tbody>
</table>

**Medical and oral health status**

Child’s health status (%)<sup>b</sup>  
Excellent  32.8  61.6  < 0.001  
Very good  20.0  24.7  
Good  34.5  11.2  
Fair  12.0  2.1  
Poor  0.8  0.3  
Dental condition (%)<sup>b</sup>  
Excellent  16.8  40.5  < 0.001  
Very good  18.1  28.8  
Good  36.3  22.9  
Fair  22.9  6.1  
Poor  6.0  1.6  
BMI class (%)<sup>c</sup>  
Underweight  5.8  4.8  
Normal  54.9  65.4  
Overweight  19.0  15.5  
Obese  20.3  14.4  
Needs or uses more medical care than others (%)  7.5  13.3  < 0.001  
Has limited abilities (%)  4.9  7.0  0.03  
Problems with emotions, concentration, behaviour or interpersonal relationships (%)  12.7  21.0  < 0.001  
Learning disability (%)  10.2  13.3  0.004  
Asthma (%)  9.1  15.2  < 0.001  
ADHD (%)  1.6  10.8  < 0.001  
Depression/anxiety (%)  3.3  7.0  < 0.001  
Behaviour problems (%)  4.9  6.6  0.004  
Bone, joint or muscle problems (%)  2.4  5.0  < 0.001  
Developmental delay (%)  0.7  3.8  < 0.001  
Allergies in last 12 months (%)  
Respiratory  8.3  18.5  < 0.001  
Skin  5.6  8.6  0.007  
Access to medical and dental care<sup>d</sup>  
Health insurance coverage at time of survey (%)  31.7  7.1  < 0.001  
None  38.4  22.3  
Private  27.5  69.7  

<sup>a</sup>Medical and oral health status:  
<sup>b</sup>Child’s health status:  
<sup>c</sup>BMI class:  
<sup>d</sup>Access to medical and dental care:
### Table 3 Continued

**Access to medical and dental care**

<table>
<thead>
<tr>
<th>Description</th>
<th>NEPL (%)</th>
<th>EPL (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insured sporadically in last 12 months (%)</td>
<td>18.1</td>
<td>10.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No dental insurance (%)</td>
<td>43.9</td>
<td>20.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No PDN (%)</td>
<td>42.2</td>
<td>15.2</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>PDN never/sometimes spends enough time with child (%)</td>
<td>47.2</td>
<td>19.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>PDN never/sometimes explains things in a way you can understand (%)</td>
<td>21.4</td>
<td>5.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Never/sometimes able to get needed phone help/advice from PDN (%)</td>
<td>12.8</td>
<td>5.8</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Reason why adolescent did not receive needed medical care (%)

<table>
<thead>
<tr>
<th>Description</th>
<th>NEPL (%)</th>
<th>EPL (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No insurance</td>
<td>65.5</td>
<td>41.6</td>
<td>0.02</td>
</tr>
<tr>
<td>Health plan problem</td>
<td>7.3</td>
<td>21.7</td>
<td>0.03</td>
</tr>
<tr>
<td>Any problem accessing specialty care (%)</td>
<td>44.3</td>
<td>22.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Any problem accessing special therapy (%)</td>
<td>56.1</td>
<td>29.0</td>
<td>0.001</td>
</tr>
<tr>
<td>Did not receive all needed dental care (%)</td>
<td>5.8</td>
<td>2.9</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Reason why did not receive needed dental care (%)

<table>
<thead>
<tr>
<th>Description</th>
<th>NEPL (%)</th>
<th>EPL (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health plan problem</td>
<td>17.7</td>
<td>8.6</td>
<td>0.03</td>
</tr>
</tbody>
</table>

**Use of medical and dental services**

<table>
<thead>
<tr>
<th>Description</th>
<th>NEPL (%)</th>
<th>EPL (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No medical visit in last 12 months (%)</td>
<td>36.6</td>
<td>15.8</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No preventive care medical visit in last 12 months (%)</td>
<td>43.6</td>
<td>25.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No preventive care medical visit with PDN in last 12 months (%)</td>
<td>33.7</td>
<td>27.8</td>
<td>0.01</td>
</tr>
<tr>
<td>No preventive care medical visit with PDN in last 24 months (%)</td>
<td>19.7</td>
<td>13.2</td>
<td>0.002</td>
</tr>
<tr>
<td>At least one Emergency Department visit in last 12 months (%)</td>
<td>8.9</td>
<td>16.4</td>
<td>0.002</td>
</tr>
<tr>
<td>Received mental healthcare in last 12 months (%)</td>
<td>5.1</td>
<td>10.2</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Has never seen a dentist (%)</td>
<td>4.8</td>
<td>0.9</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>More than 1 year since last dental visit (%)</td>
<td>28.0</td>
<td>11.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>No routine preventive dental visit in last 12 months (%)</td>
<td>16.5</td>
<td>6.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Needs or uses prescription medication (%)</td>
<td>10.1</td>
<td>25.1</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Used prescription medication in last 12 months (%)</td>
<td>34.9</td>
<td>41.0</td>
<td>0.001</td>
</tr>
</tbody>
</table>

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*No significant differences between NEPL and EPL subjects were found for 'needs or gets special (physical, occupational or speech) therapy', emotional developmental, behavioural problems, needing treatment or counseling, hearing or vision problems that cannot be corrected with hearing aids or glasses or contact lenses, food or digestive allergies, headaches, speech problems, and more than three ear infections in the last 12 months.*

*By parental report.*

*BMI = body mass index; overweight was defined as a BMI of 85–94% for age and gender, and obesity was defined as a BMI of ≥ 95% for age and gender.*

*No significant differences between NEPL and EPL subjects were found for not receiving all needed medical care, cost as a reason for not receiving all needed medical care, not receiving all needed prescription medication in the last 12 months, not knowing where to go for treatment, and dentist not knowing how to treat or provide care as a reason for not receiving all needed dental care.*

*Only among those with a PDN.*

*Only if a physician visit was made in the last 12 months.*

*Includes physical, occupational and speech therapy.*

*Only if a dental visit was made in the last 12 months.*
Table 4 Association of race/ethnicity with health and healthcare among US NEPL adolescents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Racial/ethnic group: NEPL</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Latino</td>
</tr>
<tr>
<td></td>
<td>(n = 147)</td>
<td>(n = 2189)</td>
</tr>
<tr>
<td>Medical and oral health status(^a)</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Child’s health status (%)(^b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>51.9</td>
<td>28.1</td>
</tr>
<tr>
<td>Very good</td>
<td>32.6</td>
<td>18.5</td>
</tr>
<tr>
<td>Good</td>
<td>15.3</td>
<td>38.4</td>
</tr>
<tr>
<td>Fair</td>
<td>0.2</td>
<td>14.2</td>
</tr>
<tr>
<td>Poor</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td>Dental condition (%)</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Excellent</td>
<td>41.8</td>
<td>13.6</td>
</tr>
<tr>
<td>Very good</td>
<td>21.9</td>
<td>16.1</td>
</tr>
<tr>
<td>Good</td>
<td>33.3</td>
<td>37.3</td>
</tr>
<tr>
<td>Fair</td>
<td>2.3</td>
<td>26.6</td>
</tr>
<tr>
<td>Poor</td>
<td>0.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Needs more medical care than others (%)</td>
<td>6.9</td>
<td>8.4</td>
</tr>
<tr>
<td>Needs or gets special therapy (%)(^c)</td>
<td>3.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Problems with emotions, concentration, behaviour or interpersonal relationships (%)</td>
<td>14.2</td>
<td>13.4</td>
</tr>
<tr>
<td>Learning disability (%)</td>
<td>9.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Hearing/vision problems that cannot be corrected with hearing aids or with glasses or contact lenses (%)</td>
<td>7.6</td>
<td>3.4</td>
</tr>
<tr>
<td>ADHD (%)</td>
<td>6.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Bone, joint or muscle problems (%)</td>
<td>0.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Developmental delay (%)</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Access to medical and dental care(^d)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health insurance coverage at time of survey (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>20.0</td>
<td>35.0</td>
</tr>
<tr>
<td>Public</td>
<td>21.8</td>
<td>42.2</td>
</tr>
<tr>
<td>Private</td>
<td>54.9</td>
<td>21.2</td>
</tr>
<tr>
<td>Insured, type unknown</td>
<td>3.3</td>
<td>1.7</td>
</tr>
<tr>
<td>No dental insurance (%)</td>
<td>33.7</td>
<td>46.6</td>
</tr>
<tr>
<td>No PDN</td>
<td>12.1</td>
<td>46.2</td>
</tr>
<tr>
<td>Any problem accessing special therapy (%)</td>
<td>3.1</td>
<td>65.3</td>
</tr>
<tr>
<td>Did not obtain all needed prescription medication in last 12 months (%)</td>
<td>0.1</td>
<td>3.1</td>
</tr>
</tbody>
</table>
NEPL, race/ethnicity, and use of medical and dental services

More NEPL Latinos than white adolescents had never seen a dentist (see Table 4). NEPL Latinos were substantially more likely than NEPL white and APIs to require an interpreter to speak with the adolescent’s healthcare provider. No other disparities were found for the other 11 indicators.

Multivariable analyses

Compared with EPL adolescents, NEPL adolescents were twice as likely not to have excellent or very good medical or dental health status (see Table 5). However, NEPL adolescents were less likely than EPL adolescents to have 13 different physical, emotional and behavioural conditions or concerns.

NEPL adolescents experience multiple disparities in barriers to accessing medical and dental care (see Table 5). Compared with EPL adolescents, NEPL adolescents are more likely to have no health insurance, sporadic health insurance and no dental insurance. NEPL adolescents are about twice as likely to have no PDN, and parents of NEPL adolescents report that the PDN does not spend enough time with the adolescent and does not explain things clearly. NEPL adolescents were also substantially more likely to have unmet medical needs due to difficulty in finding a doctor who accepted their insurance, and due to being dissatisfied with the doctor. NEPL adolescents were more likely to have problems in accessing specialty care. For only one access-to-care indicator, namely needing but not receiving prescriptions in the past year, did NEPL adolescents have lower odds compared with EPL adolescents. Compared with EPL adolescents, NEPL adolescents were more likely to have had no medical, dental or mental healthcare visit in the past year, but less likely to have had Emergency Department visits and to have needed or used prescription medications.

Among NEPL adolescents, certain disparities were noted for Latinos and APIs, compared with white adolescents (see Table 6). NEPL Latinos had higher odds of not having excellent or very good health, bone, joint or muscle problems, and dental health. NEPL Latinos were less likely to have ADHD, whereas NEPL APIs were less likely to need or receive special therapy, and to have a learning disability and hearing or vision problems. Both NEPL Latino and API adolescents were substantially more likely than white adolescents not to have a PDN (see Table 6). NEPL API adolescents were about three times more likely than white adolescents to have made no medical visit in the past year, but substantially less likely to need interpreter services.

Discussion

The NSCH is the largest national data set containing information on the primary language spoken at home. To our knowledge, this study is the first to comprehensively examine the association of NEPL with health and healthcare in a nationally representative sample of US adolescents. It reinforces the importance of examining adolescents separately from children, as the type of health and healthcare disparities that NEPL adolescents experience differ from those experienced...
Table 5  Multivariable analysis of the association of primary language spoken at home with health and healthcare among US adolescents

<table>
<thead>
<tr>
<th>Outcome</th>
<th>NEPL vs. EPL adolescents, odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical and oral health status</strong></td>
<td></td>
</tr>
<tr>
<td>Child’s health suboptimal</td>
<td>2.48 (2.02–3.05)</td>
</tr>
<tr>
<td>Dental condition suboptimal</td>
<td>2.21 (1.81–2.70)</td>
</tr>
<tr>
<td>Needs more medical care than others</td>
<td>0.46 (0.34–0.62)</td>
</tr>
<tr>
<td>Has limited abilities</td>
<td>0.58 (0.37–0.90)</td>
</tr>
<tr>
<td>Needs/receives special therapy</td>
<td>0.60 (0.39–0.93)</td>
</tr>
<tr>
<td>Difficulty with emotions, concentration, behaviour or interpersonal relationships</td>
<td>0.47 (0.36–0.60)</td>
</tr>
<tr>
<td>Emotional, developmental or behavioural problems needing treatment or counselling</td>
<td>0.67 (0.48–0.93)</td>
</tr>
<tr>
<td>Learning disability</td>
<td>0.53 (0.40–0.70)</td>
</tr>
<tr>
<td>Asthma</td>
<td>0.54 (0.41–0.72)</td>
</tr>
<tr>
<td>ADHD</td>
<td>0.16 (0.10–0.26)</td>
</tr>
<tr>
<td>Depression/anxiety</td>
<td>0.45 (0.30–0.67)</td>
</tr>
<tr>
<td>Behaviour problems</td>
<td>0.63 (0.40–0.98)</td>
</tr>
<tr>
<td>Bone, joint or muscle problems</td>
<td>0.56 (0.36–0.86)</td>
</tr>
<tr>
<td>Developmental delay</td>
<td>0.20 (0.11–0.37)</td>
</tr>
<tr>
<td>Respiratory allergy</td>
<td>0.55 (0.41–0.73)</td>
</tr>
<tr>
<td><strong>Access to medical and dental care</strong></td>
<td></td>
</tr>
<tr>
<td>No health insurance</td>
<td>3.48 (2.75–4.40)</td>
</tr>
<tr>
<td>Sporadic health insurance</td>
<td>1.48 (1.25–1.75)</td>
</tr>
<tr>
<td>No dental insurance</td>
<td>2.53 (2.06–3.10)</td>
</tr>
<tr>
<td>No PDN</td>
<td>1.94 (1.57–2.42)</td>
</tr>
<tr>
<td>PDN never/only sometimes spends enough time with child</td>
<td>1.97 (1.53–2.51)</td>
</tr>
<tr>
<td>PDN never/only sometimes explains things in way you can understand</td>
<td>2.25 (1.55–3.28)</td>
</tr>
<tr>
<td>Unmet medical care needs because cannot find doctor who accepts child’s insurance</td>
<td>14.29 (2.74–74.41)</td>
</tr>
<tr>
<td>Unmet medical care needs due to dissatisfaction with doctor</td>
<td>13.44 (2.29–78.87)</td>
</tr>
<tr>
<td>Any problem accessing specialty care</td>
<td>1.66 (1.03–2.67)</td>
</tr>
<tr>
<td>Child needed but not given prescription medications in last 12 months</td>
<td>0.39 (0.22–0.70)</td>
</tr>
<tr>
<td><strong>Use of medical and dental services</strong></td>
<td></td>
</tr>
<tr>
<td>No medical visit in last 12 months</td>
<td>1.74 (1.38–2.20)</td>
</tr>
<tr>
<td>At least one Emergency Department visit in last 12 months</td>
<td>0.51 (0.39–0.67)</td>
</tr>
<tr>
<td>No mental healthcare in last 12 months</td>
<td>1.79 (1.23–2.62)</td>
</tr>
<tr>
<td>More than 1 year since last dental visit</td>
<td>1.45 (1.11–1.89)</td>
</tr>
<tr>
<td>Needs/uses prescription medications</td>
<td>0.41 (0.31–0.54)</td>
</tr>
</tbody>
</table>

* Adjusted for child’s age, race/ethnicity and medical insurance coverage, highest adult educational attainment and employment status, number of children and adults in the household, and poverty status.

* No significant associations between NEPL and EPL adolescents were found for digestive and skin allergies.

* Suboptimal is defined as not rated as excellent or very good.

* Adjusted for dental insurance coverage, child’s age and race/ethnicity, highest adult educational attainment and employment status, number of children and adults in the household, and poverty status.

* No significant associations between NEPL and EPL adolescents were found for never/only sometimes able to get needed phone help/advice from PDN, unmet dental care needs, unmet dental care needs due to dentist not knowing how to treat or provide care, no preventive care medical visit in the last 12 months, and no preventive care medical visit with usual source of care in the last 24 months.
by children. Compared with EPL children, NEPL children had higher risks of not receiving preventive medical care and of having unmet dental needs, whereas these measures for NEPL and EPL adolescents did not differ (Flores and Tomany-Korman, 2008). Adolescents require less frequent preventive medical visits for immunisations and health maintenance than children, which may partially account for the differences between NEPL children and adolescents. With regard to dental care, NEPL and EPL adolescents experience the same difficulties in obtaining dental care due to lack of insurance, restricted dental benefits for those with public insurance, and the limited number of paediatric dentists, and also of paediatric dentists who accept public insurance (Paradise, 2009).

The study findings reveal that NEPL adolescents are at particularly high risk of being uninsured. Previous research documents the finding that adolescents are significantly more likely to be uninsured than younger children (Fox and McManus, 2009). For children of all ages, parental language barriers have been shown to be a major risk factor for being uninsured (Flores and Tomany-Korman, 2008; Yu et al, 2006). In addition, research demonstrates that many NEPL children who are eligible for insurance are not enrolled due to parental misperceptions about insurance and healthcare (Flores et al, 2005a; Rhee et al, 2009). There is national support for enhancing insurance coverage of NEPL children, with almost 75% of Americans believing that documented immigrant children should be provided with health insurance coverage (Attias, 2009). Increasing NEPL adolescents’ access to insurance may require community outreach and enrolment and also interventions by community health workers (Flores et al, 2005b).

The findings demonstrated that NEPL adolescents are more likely to have unmet medical care needs because they cannot find a physician who accepts their insurance or because of dissatisfaction with physicians, which (to our knowledge) have not been reported elsewhere. Insurance coverage may explain NEPL adolescents’ limited access to physicians. In California, many Spanish-speaking Medicaid patients with limited English proficiency (LEP) could not obtain care from bilingual physicians due to the limited number of Medicaid patients for whom physicians were willing to provide care (Yoon et al, 2004). Reimbursement rates and delays can affect the number of providers accepting public insurance, such as Medicaid (Cunningham and Nichols, 2005; Cunningham and O’Malley, 2009).

Language barriers aside, reasons for parental dissatisfaction with physician care include lack of involve-

### Table 6 Multivariable analysis of the association of race/ethnicity with health and healthcare among NEPL US adolescents a

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Odds ratio (95% CI) vs. white adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latinos</td>
</tr>
<tr>
<td><strong>Medical and oral health status</strong></td>
<td></td>
</tr>
<tr>
<td>Child’s health suboptimal b</td>
<td>4.62 (2.01–10.59)</td>
</tr>
<tr>
<td>Dental condition suboptimal b,c</td>
<td>2.64 (1.44–4.86)</td>
</tr>
<tr>
<td>Needs or obtains special therapy</td>
<td>NS</td>
</tr>
<tr>
<td>Learning disability</td>
<td>NS</td>
</tr>
<tr>
<td>Hearing/vision problems</td>
<td>NS</td>
</tr>
<tr>
<td>ADHD</td>
<td>0.24 (0.09–0.66)</td>
</tr>
<tr>
<td>Bone, joint or muscle problems</td>
<td>7.36 (1.54–35.25)</td>
</tr>
<tr>
<td><strong>Access to medical and dental care</strong></td>
<td></td>
</tr>
<tr>
<td>No PDN</td>
<td>4.81 (2.28–10.13)</td>
</tr>
<tr>
<td><strong>Use of medical and dental services</strong></td>
<td></td>
</tr>
<tr>
<td>No medical visit in last 12 months</td>
<td>NS</td>
</tr>
<tr>
<td>Child needed interpreter services</td>
<td>NS</td>
</tr>
</tbody>
</table>

a Adjusted for child’s age and medical insurance coverage, highest adult educational attainment and employment status, number of children and adults in the household, and poverty status.
b Suboptimal is defined as not rated as excellent or very good.
c Adjusted for dental insurance coverage, child’s age, highest adult educational attainment and employment status, number of children and adults in the household, and poverty status.
NS, not statistically significant.
ment in healthcare decisions, not understanding the culture, physician waiting times, insufficient time spent with the physician, and delays in receiving sick and preventive care (Flores et al., 1998; Galbraith et al., 2008; Greek et al., 2006; Ngo-Metzger et al., 2004). Loan repayment programmes can increase the number of physicians who accept public insurance and work in medically underserved areas (Pathman et al., 2004). In addition, professional medical interpreters, telephone interpreters and bilingual providers have been reported to reduce language barriers and enhance communication and patient satisfaction for NEPL patients and families (Crossman et al., 2010; Flores, 2005).

Our results indicate that NEPL adolescents are significantly more likely than EPL adolescents not to have had a mental healthcare visit. NEPL adolescents were also less likely to have an emotional, developmental or behavioural problem that required treatment or counselling. Cultural influences, such as the social stigma attached to mental illness that has been observed in several Asian cultures, could account for the lower likelihood of parents reporting a mental health problem (Kramer et al., 2002). Furthermore, Asians are more likely to express mental health problems as physical complaints, which could further account for the lack of mental healthcare use (Kramer et al., 2002). Language difficulties, long waits for appointments with mental health providers who accept Medicaid, frequent high out-of-pocket costs for mental health visits, and limited availability of services after school and at weekends may contribute to the lower rates of mental healthcare visits by NEPL adolescents (Pfefferle, 2007; Yeh et al., 2003). In addition, LEP in adults has been associated with lower rates of mental healthcare use (Sentell et al., 2007). Educating adolescent providers about the identification and treatment of mental health disorders in different races/ethnicities, and increasing the number and availability of bilingual Medicaid mental health providers, may increase the identification of mental health problems and mental healthcare access for NEPL adolescents.

Parents who spoke a language other than English or Spanish and had either limited English or Spanish proficiency were not included. As a result, it is likely that a larger proportion of NEPL LEP parents of Latino adolescents were included in the NSCH, compared with NEPL LEP parents of API adolescents, which may have affected the study findings. Therefore it may not be possible to generalise the findings to the entire NEPL adolescent population in the USA, and they may underestimate disparities in API and non-Latino NEPL adolescents. In a previous study of NEPL children in the USA, calculations using US census data suggested that NSCH data should generalise to 93.5% of NEPL US households with children (aged 0–17 years) (Flores and Tomany-Korman, 2008).

Certain disparities might be influenced by racial/ethnic, language and LEP or cultural differences in identifying and assessing medical and dental health status and unmet healthcare needs (Alexandre et al., 2009; Crossman et al., 2010; Kramer et al., 2002; Mosnaim et al., 2007). Given that all estimates were derived from parental reports, and not from adolescent or healthcare provider reports or laboratory data, response bias may also affect the NSCH data. Adolescents might have responded differently to questions on health status and access to care, depending on acculturation level and parental presence during the interview. The sample size of NEPL API adolescents (n = 168) was relatively small, making it difficult to produce statistically reliable estimates; over-sampling of NEPL API adolescents in larger data sets and confirmation of study findings are essential.

The NSCH did not collect information on the citizenship status of adolescents and parents. Nativity status, immigration status and date of immigration were not included in the analysis. Non-citizen immigrant children and citizen children with immigrant parents are more likely to be uninsured and to have poorer access to care (Ku, 2007; Yu et al., 2004). Additional studies are needed to determine the impact of NEPL, LEP, and adolescent and parent citizenship status on adolescent health and healthcare.

Limitations

Certain study limitations should be noted. The NSCH measured only the primary language spoken at home, not the primary language spoken by the adolescent. In addition, there was no assessment of parents’ or adolescents’ proficiency in English. LEP is a better indicator of language barriers than the primary language spoken at home, when examining health and healthcare outcomes (Flores et al., 2005c). Thus the magnitude of the health and healthcare disparities documented in this NSCH analysis may be even greater for adolescents who are LEP or who have LEP parents.

Conclusions

The study findings have several potential implications for research, practice and policy. Insurance coverage and health policy changes that increase healthcare provider access may help to eliminate the barriers experienced by NEPL adolescents. Identifying, monitoring and eliminating NEPL adolescent disparities will require healthcare systems and national and state agencies to routinely document the primary language spoken at home and LEP status for patients. A recent national survey reported that only around 50% of the
hospitals collect information on language preference (Regenstein and Sickler, 2006). Many hospitals do not have a standard protocol for the collection or documentation of language preferences and English proficiency, resulting in incorrect or incomplete information (Hasnain-Wynia et al, 2004). Use and reimbursement of professional medical interpreters, educating health-care providers about working with interpreters, and increasing the number of bilingual providers, all have the potential to improve access, use of services and the quality of care for NEPL and LEP adolescents and their families (Crossman et al, 2010; Flores, 2005; Jacobs et al, 2004; McEvoy et al, 2009).

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CONFLICTS OF INTEREST
None.

ADDRESS FOR CORRESPONDENCE
May Lau, Assistant Professor of Pediatrics, Division of General Pediatrics, Department of Pediatrics, University of Texas Southwestern Medical Center and Children’s Medical Center Dallas, 5323 Harry Hines Boulevard, Dallas, Texas 75390-9063, USA. Tel: 214–648–2842; fax: 214–648–3220; email: may.lau@utsouthwestern.edu

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