

Research paper

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

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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 (EPL) 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^a

Indo-European languages	Asian and Pacific Islander languages
French	Chinese
French Creole	Japanese
Italian	Korean
Portuguese	Cambodian
German	Hmong
Yiddish	Thai
Scandinavian languages	Laotian
Greek	Vietnamese
Russian	Tagalog
Polish	
Slavic languages	
Armenian	
Persian	
Hindi	
Gujarati	
Urdu	

^a Source: US Census (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 in-

surance 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 health-care 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.

Table 2 Sociodemographic characteristics of US adolescents aged 10–17 years by primary language spoken at home

Characteristic ^a	Primary language spoken at home		P
	Non-English (n = 2566)	English (n = 44 593)	
Mean age (\pm standard error) (years) ^b	13.11 \pm 0.08	13.49 \pm 0.02	< 0.001
Race/ethnicity (%)			< 0.001
Latino	84.1	7.2	
Asian/Pacific Islander	9.6	1.7	
White	4.5	70.2	
African-American	1.0	16.8	
Native American	0.7	1.1	
Multiracial	0.0	3.0	
Highest educational attainment in household (%)			< 0.001
Not high-school graduate	36.0	4.0	
High-school graduate	33.2	26.3	
At least some college education	30.8	69.7	
Number of children in household (%)			< 0.001
1	14.9	24.8	
2	28.8	38.7	
≥ 3	56.4	36.5	
Number of adults in household (%)			< 0.001
1	10.7	17.5	
2	58.4	61.1	
≥ 3	35.5	21.4	
Household member employed for ≥ 50 weeks in past year (%)	83.7	90.4	< 0.001
Born in USA (%)			
Mother	7.5	93.3	< 0.001
Father	8.0	92.8	< 0.001
Child	58.4	97.7	< 0.001
Annual combined family income (% of poverty threshold)			< 0.001
< 100%	41.2	11.8	
100–199%	27.1	19.8	
200–299%	7.4	17.2	
300–399%	3.9	15.9	
$\geq 400%$	5.4	27.4	
Unknown	15.0	7.9	

^aNo significant differences between NEPL and EPL adolescents were found for gender.**NEPL, race/ethnicity, and access to medical and dental care**

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

Characteristic	Primary language spoken at home		P
	Non-English (n = 2566)	English (n = 44 593)	
<i>Medical and oral health status^a</i>			
Child's health status (%) ^b			< 0.001
Excellent	32.8	61.6	
Very good	20.0	24.7	
Good	34.5	11.2	
Fair	12.0	2.1	
Poor	0.8	0.3	
Dental condition (%) ^b			< 0.001
Excellent	16.8	40.5	
Very good	18.1	28.8	
Good	36.3	22.9	
Fair	22.9	6.1	
Poor	6.0	1.6	
BMI class (%) ^c			< 0.001
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
<i>Access to medical and dental care^d</i>			
Health insurance coverage at time of survey (%)			< 0.001
None	31.7	7.1	
Public	38.4	22.3	
Private	27.5	69.7	

Table 3 Continued

<i>Access to medical and dental care</i>			
Insured sporadically in last 12 months (%)	18.1	10.0	< 0.001
No dental insurance (%)	43.9	20.3	< 0.001
No PDN (%)	42.2	15.2	< 0.001
PDN never/sometimes spends enough time with child (%) ^c	47.2	19.7	< 0.001
PDN never/sometimes explains things in a way you can understand (%) ^c	21.4	5.0	< 0.001
Never/sometimes able to get needed phone help/advice from PDN (%) ^c	12.8	5.8	0.01
Reason why adolescent did not receive needed medical care (%) ^f			
No insurance	65.5	41.6	0.02
Health plan problem	7.3	21.7	0.03
Any problem accessing specialty care (%)	44.3	22.4	< 0.001
Any problem accessing special therapy (%) ^g	56.1	29.0	0.001
Did not receive all needed dental care (%) ^h	5.8	2.9	0.003
Reason why did not receive needed dental care (%) ^h			
Health plan problem	17.7	8.6	0.03
<i>Use of medical and dental services</i>			
No medical visit in last 12 months (%)	36.6	15.8	< 0.001
No preventive care medical visit in last 12 months (%)	43.6	25.6	< 0.001
No preventive care medical visit with PDN in last 12 months (%) ^c	33.7	27.8	0.01
No preventive care medical visit with PDN in last 24 months (%) ^c	19.7	13.2	0.002
At least one Emergency Department visit in last 12 months (%)	8.9	16.4	0.002
Received mental healthcare in last 12 months (%)	5.1	10.2	< 0.001
Has never seen a dentist (%)	4.8	0.9	< 0.001
More than 1 year since last dental visit (%)	28.0	11.3	< 0.001
No routine preventive dental visit in last 12 months (%)	16.5	6.0	< 0.001
Needs or uses prescription medication (%)	10.1	25.1	< 0.001
Used prescription medication in last 12 months (%)	34.9	41.0	0.001

^a 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.

^b By parental report.

^c 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 \geq 95% for age and gender.

^d 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.

^e Only among those with a PDN.

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

^g Includes physical, occupational and speech therapy.

^h 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

Characteristic	Racial/ethnic group: NEPL			P
	White (n = 147)	Latino (n = 2189)	API (n = 168)	
<i>Medical and oral health status^a</i>				
Child's health status (%) ^b				< 0.001
Excellent	51.9	28.1	62.0	
Very good	32.6	18.5	24.7	
Good	15.3	38.4	12.9	
Fair	0.2	14.2	0.4	
Poor	0.0	0.9	0.0	
Dental condition (%)				< 0.001
Excellent	41.8	13.6	29.9	
Very good	21.9	16.1	31.6	
Good	33.3	37.3	28.2	
Fair	2.3	26.6	4.6	
Poor	0.7	6.4	5.7	
Needs more medical care than others (%)	6.9	8.4	0.3	< 0.001
Needs or gets special therapy (%) ^c	3.6	4.7	0.4	0.01
Problems with emotions, concentration, behaviour or interpersonal relationships (%)	14.2	13.4	4.9	< 0.05
Learning disability (%)	9.0	11.5	0.3	< 0.001
Hearing/vision problems that cannot be corrected with hearing aids or with glasses or contact lenses (%)	7.6	3.4	0.4	0.04
ADHD (%)	6.2	1.4	1.3	0.02
Bone, joint or muscle problems (%)	0.4	2.8	0.3	< 0.001
Developmental delay (%)	0.2	0.8	0.0	< 0.001
<i>Access to medical and dental care^d</i>				
Health insurance coverage at time of survey (%)				< 0.001
None	20.0	35.0	13.7	
Public	21.8	42.2	13.2	
Private	54.9	21.2	66.5	
Insured, type unknown	3.3	1.7	6.5	
No dental insurance (%)	33.7	46.6	27.3	0.02
No PDN (%)	12.1	46.2	21.5	< 0.001
Any problem accessing special therapy (%)	3.1	65.3	0.0	< 0.001
Did not obtain all needed prescription medication in last 12 months (%)	0.1	3.1	0.8	0.01

Table 4 Continued*Use of medical and dental services^e*

Never seen dentist (%)	2.0	5.3	0.3	0.002
Interpreter needed to speak with child's healthcare provider (%)	7.9	16.4	0.4	0.003

^aNo significant differences between the three racial/ethnic groups of NEPL adolescents were found for BMI, having limited abilities, having emotional, developmental or behavioural problems that needed treatment or counselling, asthma, depression/anxiety, diabetes, allergies, headaches, speech problems, and three or more ear infections in the last 12 months.

^bBy parental report.

^cIncludes physical, occupational and speech therapy.

^dNo significant differences between the three racial/ethnic groups of NEPL adolescents were found for sporadic insurance, PDN never/sometimes spends enough time with child, PDN never/sometimes explains things in a way you can understand, never/sometimes able to get needed phone help/advice from PDN, did not receive all needed medical care, any problem accessing specialty care, and received all needed dental care.

^eNo significant differences between the three racial/ethnic groups of NEPL adolescents were found for no medical visit in the last 12 months, no preventive care medical visit in the last 12 months, no preventive care medical visit with PDN in the last 12 months or 24 months, at least one Emergency Department visit in the last 12 months, received mental healthcare in the last 12 months, more than 1 year since last dental visit, no routine preventive dental visit in the last 12 months, needs/uses prescription medication, used prescription medication in the last 12 months, and when interpreter was needed to be able to get someone other than a family member to interpret.

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^a

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

^a 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.

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

^c Suboptimal is defined as not rated as excellent or very good.

^d 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.

^e 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.

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

Outcome	Odds ratio (95% CI) vs. white adolescents	
	Latinos	API
<i>Medical and oral health status</i>		
Child's health suboptimal ^b	4.62 (2.01–10.59)	NS
Dental condition suboptimal ^{b,c}	2.64 (1.44–4.86)	NS
Needs or obtains special therapy	NS	0.10 (0.01–0.89)
Learning disability	NS	0.03 (0.01–0.16)
Hearing/vision problems	NS	0.05 (0.01–0.28)
ADHD	0.24 (0.09–0.66)	NS
Bone, joint or muscle problems	7.36 (1.54–35.25)	NS
<i>Access to medical and dental care</i>		
No PDN	4.81 (2.28–10.13)	3.31 (1.89–10.14)
<i>Use of medical and dental services</i>		
No medical visit in last 12 months	NS	2.86 (1.02–8.03)
Child needed interpreter services	NS	0.05 (0.01–0.40)

^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.

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-

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.

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.

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.

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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REFERENCES

- Adams SH, Husting S, Zahnd E *et al* (2009) Adolescent preventive services: rates and disparities in preventive health topics covered during routine medical care in a California sample. *Journal of Adolescent Health* 44:536–45.
- Alexandre PK, Martins SS and Richard P (2009) Disparities in adequate mental health care for past year major depressive episodes among Caucasian and Hispanic youths. *Psychiatric Services* 60:1365–71.
- American Community Survey (2010a). *1-Year Estimates*. www.factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_10_1YR_DP02&prodType=table
- American Community Survey (2010b) *1-Year Estimates*. www.factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_10_1YR_S1603&prodType=table
- Attias M (2009) *Washington Health Policy Week in Review Poll: Americans favor strongest possible, low-cost children's health coverage*. New York: The Commonwealth Fund. www.commonwealthfund.org/Content/Newsletters/Washington-Health-Policy-in-Review/2009/Aug/August-17-2009/Americans-Favor-Strongest-Possible-Low-Cost-Childrens-Health-Coverage.aspx (accessed 8 September 2012).
- Blumberg SJ, Olson L, Frankel MR *et al* (2005) *Design and Operation of the National Survey of Children's Health, 2003*. Vital and Health Statistics, Series 1, Number 43. Washington, DC: Centers for Disease Control and Prevention, US Department of Health and Human Services.
- Crossman KL, Wiener E, Roosevelt G *et al* (2010) Interpreters: telephonic, in-person interpretation and bilingual providers. *Pediatrics* 125:e631–8.
- Cunningham PJ and Nichols LM (2005) The effects of Medicaid reimbursement on the access to care of Medicaid enrollees: a community of perspective. *Medical Care Research and Review* 62:676–96.
- Cunningham PJ and O'Malley AS (2009) Do reimbursement delays discourage Medicaid participation by physicians? *Health Affairs* 28:w17–28.
- DeCamp LR, Choi H and Davis MM (2011) Medical home disparities for Latino children by parental language of interview. *Journal of Health Care for the Poor and Underserved* 22:1151–66.
- Flores G (2005) The impact of medical interpreter services on the quality of health care: a systematic review. *Medical Care Research and Review* 62:255–99.
- Flores G and Tomany-Korman SC (2008) The language spoken at home and disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics* 121:e1703–14.
- Flores G, Abreu M, Olivar MA *et al* (1998) Access barriers to health care for Latino children. *Archives of Pediatrics and Adolescent Medicine* 152:1119–25.
- Flores G, Abreu M and Brown V (2005a) How Medicaid and the State Children's Health Insurance Program can do a better job of insuring uninsured children: the perspectives of parents of uninsured Latino children. *Ambulatory Pediatrics* 5:332–40.
- Flores G, Abreu M and Chaisson CE (2005b) A randomized, controlled trial of the effectiveness of community-based case management in insuring uninsured Latino children. *Pediatrics* 116:1433–41.
- Flores G, Abreu M and Tomany-Korman SC (2005c) Limited English proficiency, primary language at home, and disparities in children's health care: how language barriers are measured matters. *Public Health Reports* 120:418–30.
- Fox HB and McManus MA (2009) *Health Reform and Adolescents*. www.thenationalalliance.org/pdfs/Brief3.%20Health%20Reform%20and%20Adolescents.pdf
- Galbraith AA, Semura JJ, McAninch-Dake RJ *et al* (2008) Language disparities and timely care for children in managed care Medicaid. *American Journal of Managed Care* 14:417–26.
- Greek AA, Kieckhefer GM, Kim H *et al* (2006) Family perceptions of the usual source of care among children with asthma by race/ethnicity, language, and family income. *Journal of Asthma* 43:61–9.
- Hahn HC, Lahiff M, Barreto RM *et al* (2008) Health care disparities and language use at home among Latino, Asian American, and American Indian adolescents: findings from the California Health Interview Survey. *Journal of Community Psychology* 36:20–34.
- Hasnain-Wynia R, Pierce D and Pittman MA (2004) *Who, When and How: the current state of race, ethnicity, and*

- primary language data collection in hospital. New York: The Commonwealth Fund. www.commonwealthfund.org/Content/Publications/Fund-Reports/2004/May/Who-When-and-How-The-Current-State-of-Race-Ethnicity-and-Primary-Language-Data-Collection-in-Ho.aspx
- Jacobs EA, Shepard DS, Suaya JA *et al* (2004) Overcoming language barriers in health care: costs and benefits of interpreter services. *American Journal of Public Health* 94:866–9.
- Kramer EJ, Kwong K, Lee E *et al* (2002) Cultural factors influencing the mental health of Asian Americans. *Western Journal of Medicine* 176:227–31.
- Ku L (2007) Improving health insurance and access to care for children in immigrant families. *Ambulatory Pediatrics* 7:412–20.
- McEvoy M, Santos MT, Marzan M *et al* (2009) Teaching medical students how to use interpreters: a three-year experience. *Medical Education Online* 14:1–7. www.ncbi.nlm.nih.gov/pmc/articles/PMC2779621/?tool=pubmed
- Mosnaim GS, Sadowski LS, Durazo-Arvizu RA *et al* (2007) Parental language and asthma among urban Hispanic children. *Journal of Allergy and Clinical Immunology* 120:1160–5.
- National Opinion Research Center (undated) *2011 National Survey of Children's Health*. www.norc.org/Research/Projects/Pages/2011-national-survey-of-childrens-health.aspx
- Ngo-Metzger Q, Legedza ATR and Phillips RS (2004) Asian American reports of their health care experiences. *Journal of General Internal Medicine* 19:111–19.
- Noyce M, Szabo A, Pajewski NM *et al* (2009) Primary language spoken at home and children's dental service utilization in the United States. *Journal of Public Health Dentistry* 69:276–83.
- Paradise J (2009) *Children and Oral Health: assessing needs, coverage, and access*. Washington, DC: The Henry J. Kaiser Family Foundation. www.kff.org/medicaid/upload/7681-04.pdf
- Pathman DE, Konrad TR, King TS *et al* (2004) Outcomes of states' scholarship, loan repayment, and related programs for physicians. *Medical Care* 42:560–8.
- Pfefferle S (2007) Pediatrician perspectives on children's access to mental health services: consequences and potential solutions. *Administration and Policy in Mental Health* 34:425–34.
- Regenstein M and Sickler D (2006) *Race, Ethnicity, and Language of Patients: hospital practices regarding collection of information to address disparities in health care*. Princeton, NJ, and Washington, DC: Robert Wood Johnson Foundation and the National Public Health and Hospital Institute. www.naph.org/Main-Menu-Category/Our-Work/Health-Care-Disparities/raceethnicityandlanguageofpatients.aspx
- Rhee Y, Belmonte F and Weiner SJ (2009) An urban school based comparative study of experiences and perceptions differentiating public health insurance eligible immigrant families with and without coverage for their children. *Journal of Immigrant and Minority Health* 11:222–8.
- Sentell T, Shumway M and Snowden L (2007) Access to mental health treatment by English language proficiency and race/ethnicity. *Journal of General Internal Medicine* 22:289–93.
- Society for Adolescent Medicine (1995) A position statement of the Society for Adolescent Medicine. *Journal of Adolescent Health* 16:413.
- StataCorp (2007) *Stata Statistical Software: Release 10*. College Station, TX: StataCorp LP.
- US Census Bureau (2012) *Population Estimates. Resident Population. National population estimates for the 2010s: monthly postcensal resident population, by single year of age, sex, race, and Hispanic origin*. www.census.gov/popest/data/national/asrh/2011/2011-nat-res.html
- Van Wie A, Ziegenfuss J, Blewett LA *et al* (2008) Persistent disparities in health insurance coverage: Hispanic children, 1996 to 2005. *Journal of Health Care for the Poor and Underserved* 19:1181–91.
- Wen M (2007) Racial and ethnic differences in general health status and limiting health conditions among American children: parental reports in the 1999 National Survey of America's Families. *Ethnicity and Health* 12:401–22.
- Yeh M, McCabe K, Hough RL *et al* (2003) Racial/ethnic differences in parental endorsement of barriers to mental health services for youth. *Mental Health Services Research* 5:65–77.
- Yoon J, Grumbach K and Bindman AB (2004) Access to Spanish-speaking physicians in California: supply, insurance, or both. *Journal of the American Board of Family Practice* 17:165–72.
- Yu SM, Huang A and Singh G (2004) Health status and health services utilization among US Chinese, Asian Indian, Filipino, and other Asian/Pacific Islander children. *Pediatrics* 113:101–7.
- Yu SM, Huang J, Schwalberg RH *et al* (2006) Parental English proficiency and children's health services access. *American Journal of Public Health* 96:1449–55.

CONFLICTS OF INTEREST

None.

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