

Parent Health Literacy, Depression, and Risk for Pediatric Injury

Erika R. Cheng, PhD, MPA,^a Nerissa S. Bauer, MD, MPH,^{a,b} Stephen M. Downs, MD, MS,^{a,b} Lee M. Sanders, MD, MPH^c

abstract

BACKGROUND: Population-wide research on the impact of parent health literacy to children's health outcomes is limited. We assessed the relationship of low parent health literacy to a range of pediatric health risks within a large cohort of primary care patients.

METHODS: Data were from 17 845 English- and Spanish-speaking parents of children aged ≤ 7 years presenting for well-child care. We used a 3-item screener to measure health literacy. Outcomes included secondhand smoke exposure, asthma treatment nonadherence, parent depression, child-rearing practices, injury prevention, and parent first-aid knowledge. We summarized study variables with descriptive statistics and then performed multivariable logistic regression to identify associations between low parent literacy and our dependent measures.

RESULTS: Mean child age was 4.8 years (SD 3.7); 36.5% of parent respondents had low health literacy. In models adjusted for child gender, race/ethnicity, insurance, age, and parent language preference, low parent health literacy was related to a range of pediatric health risks, including parent depression (adjusted odds ratio [AOR] 1.32; 95% confidence interval 1.18–1.48), firearm access (AOR 1.68; 1.49–1.89), not having a working smoke detector (AOR 3.54; 2.74–4.58), and lack of first-aid knowledge about choking (AOR 1.67; 1.44–1.93) and burns (AOR 1.45; 1.29–1.63). Children of parents with low health literacy were also more likely to watch >2 hours of television per day (AOR 1.27; 1.17–1.36).

CONCLUSIONS: Low parent health literacy is independently and significantly related to parent depression, child television viewing, and at-risk family behaviors associated with child injury. Use of low-literacy approaches to health-behavior interventions may be essential to address common child morbidities.

^aChildren's Health Services Research, Department of Pediatrics, Indiana University School of Medicine, Indianapolis, Indiana; ^bRegenstrief Institute, Inc., Indianapolis, Indiana; and ^cDivision of General Pediatrics, Center for Policy, Outcomes, and Prevention, Stanford University, Stanford, California

Dr Cheng made substantial contributions to the study design, conducted the primary analyses and interpretation of the data, and wrote the first draft of the manuscript; Drs Bauer and Downs conceptualized and designed the original study; Dr Downs was responsible for obtaining funding that helped support the study; Dr Sanders participated in the study design and made substantial contributions to the interpretation of data; and all authors provided critical input and revisions for all further drafts, provided critical revision of the manuscript for important intellectual content, and approved the final manuscript as submitted.

DOI: 10.1542/peds.2016-0025

Accepted for publication Apr 7, 2016

Address correspondence to Erika R. Cheng PhD, MPA, Department of Pediatrics, Section of Children's Health Services Research, 410 West 10th St, Suite 2000, Indianapolis, IN 46202. E-mail: echeng@iu.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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WHAT'S KNOWN ON THIS SUBJECT: Clinical studies have shown a relationship between parent health literacy and some child health outcomes, but population-wide research on the impact of parent health literacy to children's health risks is limited.

WHAT THIS STUDY ADDS: In this large, population-based cohort, low health literacy is independently and significantly associated with parent depression and with family behaviors related to child injury. Strategies to address parent health literacy are needed when considering pediatric primary care-based interventions.

To cite: Cheng ER, Bauer NS, Downs SM, et al. Parent Health Literacy, Depression, and Risk for Pediatric Injury. *Pediatrics*. 2016;138(1):e20160025

An estimated 80 million adults in the United States have low health literacy,¹ or a limited capacity to “obtain, process, and understand basic health information and services needed to make important health decisions.”² In turn, research shows that adults with lower health literacy have higher rates of hospitalizations and emergency care visits, use fewer preventive health services such as mammography screening, report poorer overall health status, and are at increased risk for mortality.³ This research has drawn national attention to the importance of health literacy⁴ and places an impetus on researchers to evaluate the prevalence and impact of health literacy on patients and their families.

Although the relationship of health literacy to adult health is well established, fewer studies have examined the role of health literacy for child health. Nearly 30% of US caregivers are estimated to have below basic or basic health literacy,^{1,5} which has implications for child health. Parents with low health literacy may face more barriers to care⁶ or lack communication and processing skills required to act appropriately on health care information for their children.⁷ It may be difficult for these parents to understand immunization schedules, growth charts, or medical forms, or to follow written instructions and recommendations for their children’s preventive health care.^{5,8} There is also some evidence that low maternal health literacy is independently associated with maternal depression,⁹ a critical determinant of child health.¹⁰

Recent investigations have identified several child health outcomes associated with low parent health literacy, including higher rates of obesogenic infant care practices (eg, formula feeding, television viewing),¹¹ nonadherence to injury prevention guidelines such as car seat position,¹²

errors in dosing child medication,¹³ children’s poor oral health status,¹⁴ and for children with asthma, increased emergency department visits,^{15,16} hospitalizations,¹⁶ and missed school days.¹⁶ Still other studies report null findings.^{17,18} Most of these studies are drawn from small samples and/or narrowly defined patient populations. Therefore, the purpose of this study was to assess the independent association of parent health literacy to a wide range of pediatric health risks by using a more generalizable population of children seen in primary care settings.

METHODS

Data Source

We performed a cross-sectional analysis of data from the Child Health Improvement through Computer Automation (CHICA) system, a computer-based pediatric primary care clinical decision support system that operates in 5 urban community health centers of Eskenazi Health in Indianapolis, Indiana. Since its development in 2004, CHICA has provided real-time clinical decision support for a wide range of pediatric preventive care and disease management services^{19–22} to >45 800 pediatric patients. Most families attending CHICA clinics (72%) are covered by public insurance. A detailed description of CHICA’s functionality is provided elsewhere.²³ Briefly, CHICA screens for potential pediatric health conditions by using a customized 20-item prescreening form (PSF) administered on a tablet²⁴ to parents (or to patients >12 years of age) while in the clinic waiting room. Questions are provided in English or Spanish and are selected using age-appropriate clinical guidelines and existing data from the child’s electronic health record (EHR). Once completed, the PSF is electronically submitted by nursing staff back into the CHICA system, which immediately merges the data

with the child’s existing EHR. By using data from the PSF and EHR, CHICA then generates a separate physician worksheet with up to 6 selected and personalized prompts designed to call the provider’s attention to the child’s specific health risks during the clinical encounter.

For the purposes of this study, we focused on PSF-derived data from English- and Spanish-speaking parents of children aged ≤7 years presenting for well-child care at any of the clinics served by the CHICA system between August 2012 and November 2015. Within this population, we extracted data for all children whose parents completed the PSF questions related to health literacy. We obtained institutional review board approval from the Indiana University School of Medicine.

Measurements

Main Exposure

CHICA has screened for parent literacy since 2012 by using questions adapted from validated instruments developed by Sanders et al,²⁵ Morris et al,²⁶ and Chew et al.²⁷ These questions, which are asked once of every parent attending the clinic visit with a child younger than 12 years, read (1) “Do you sometimes need to have someone help you when you read material from your doctor or pharmacy?” (2) “Are you confident filling out medical forms by yourself?” and (3) “Do you have at least 10 children’s books in your home?” We classified children as having a parent with low health literacy if there was ever a positive response to question (1), and/or ever a negative response to questions (2) or (3).

Outcome Measures

As CHICA contains both preventive and chronic care management guidelines, we were able to assess a wide range of pediatric health risks, including secondhand smoke

TABLE 1 Pediatric Health Risks, CHICA PSF Screening Items, and Corresponding Sample Size Used for Analysis

| Pediatric Health Risks | CHICA Screener | Age Range Administered | Sample Size for Analysis | |
|--|--|--|--------------------------|--------|
| Secondhand smoke exposure | Does anyone in (child)'s home smoke? | 0–7 y | 17 845 | |
| Asthma treatment adherence | Does (child) use his/her "controller" medication (eg, steroid inhaler or puffer, NOT Albuterol) every day? | 3–7 y | 607 | |
| Parent depression | 3-item Edinburgh Postnatal Depression Scale | 0–15 mo | 9707 | |
| Child rearing practices | Is (child) breastfed? | 0–6 mo | 3477 | |
| | Do you always place (child) on his/her back or side to sleep? | 0–7 mo | 6744 | |
| | Has (child) ever slept on stomach? | 0–7 mo | 6762 | |
| | Has (child) ever laid on a bean bag, water bed, or other soft surface? | 0–12 mo | 3917 | |
| | Does (child) watch some television most days? | 0–24 mo | 6906 | |
| | Does (child) have a television in his/her room? | 2–7 y | 14 408 | |
| | Does (child) usually watch television or computer more than 2 h a day? | 2–7 y | 14 360 | |
| | Injury prevention | Are any firearms or guns kept in (child)'s home? | 1–7 y | 10 849 |
| | | Are there are firearms or guns in homes where (child) visits or is cared for? | 1–7 y | 10 024 |
| | | Are all firearms or guns in (child)'s home kept unloaded and in a locked place separate from ammunition? | 1–7 y | 3102 |
| | | Have you talked to (child) about guns at school or on the streets? | 6–7 y | 5269 |
| | | Does (child)'s car seat face forward? | 0–24 mo | 7480 |
| | | Does (child) always wear a helmet when riding his/her bike or tricycle? | 2–7 y | 14 323 |
| | | Has (child) ever been alone in or near a bathtub, swimming or wading pool, or other body of water? | 6–24 mo | 6671 |
| | | Are there gates at the top and bottom of all stairways in (child)'s house? | 6 mo–5 y | 4618 |
| | | Are all household products (medicines, cleaning supplies, other chemicals) being securely placed out of (child)'s reach? | 0–6 y | 7795 |
| Are all matches and lighters kept out of (child)'s reach? | | 6 mo–7 y | 9073 | |
| Does (child) have a safe place to play while the adult is cooking? | | 6 mo–5 y | 3705 | |
| Have you set your hot water heater to less than 120°F or 49°C? | | 0–3 y | 8609 | |
| Do you have a working smoke detector in your home or apartment? | | 0–7 y | 17 835 | |
| Do you test your smoke detector's batteries monthly? | | 0–7 y | 11 844 | |
| Does (child) know what to do if the smoke alarm rings? | | 3–7 y | 7006 | |
| Parent first-aid knowledge | | Do you know what to do if (child) is choking? | 0–4 y | 10 257 |
| | Do you know what to do if (child) is burned? | 6 mo–7 y | 8764 | |
| | Does (child) know the escape plan in case of a fire in his/her house? | 6–7 y | 4640 | |

exposure, asthma treatment nonadherence, parent depression, and parent behaviors related to child rearing, injury prevention, and knowledge of child first-aid. Table 1 presents the specific CHICA questions we used to assess these outcomes, the age range in which CHICA queried about these health risks, and the resulting sample size included in our analyses.

Secondhand smoke exposure. Parents of children ages 0 through 7 years were asked whether any household member smoked. A positive response during any visit resulted in the child being classified in the CHICA system as having had secondhand smoke exposure. Likewise, if no affirmative responses were ever captured for any visit, the child was categorized as having no secondhand smoke exposure.

Asthma treatment nonadherence. CHICA added an asthma module in 2005²⁸ to identify children with asthma symptoms and to query children with persistent asthma about their daily use of prescribed asthma controller medications. We compared children with persistent asthma who were prescribed a controller medication but determined to not use it (hereafter "persistent asthma, nonadherent") with children with persistent asthma who reported adherence to care advice.

Parent depression. Parent depressive symptoms were assessed by a 3-item version of the Edinburgh Postnatal Depression Scale,²⁹ administered via the PSF every 90 days during the child's first 15 months of life. Items on the scale include the following: "In the past 7 days, have you blamed yourself unnecessarily when things

went wrong?" "In the past 7 days, have you felt scared or panicky for not a very good reason?" and "In the past 7 days, have you been anxious or worried for no good reason?" As in our previous analyses,³⁰ we created a flag to denote probable depression if a parent endorsed any item at any visit. Previous reports indicate that this 3-item subscale of the Edinburgh Postnatal Depression Scale reliably detects postpartum depression in primary pediatric care settings.³¹

Child rearing practices. We examined current breastfeeding (no versus yes), infant sleep practices (whether the infant was put to sleep in the supine or prone position, or on unsafe surfaces like beanbags or waterbeds), and television viewing (whether the child watched some television on most days, had a television in his or her room, and

watched more than 2 hours of television per day).

Injury prevention. We examined 15 common risk factors related to injury prevention for the following: (1) firearm safety (whether the child had access to firearms at home or where the child visits, whether any guns in the home were kept unloaded and locked in a place separate from ammunition, and whether the parent discussed firearms with child); (2) safety measures outside of the home (whether the child's car seat faces forward, whether the child "always" wears a bike helmet, and whether the child was ever left alone in or near a body of water); and (3) household safety. Household safety measures included parent report of using gates at the top and bottom of stairways, keeping harmful household products (eg, medicines, cleaning supplies, and other chemicals) and matches/lighters securely out of the child's reach, and having a safe place for the child to play while the adult is cooking. We also assessed hot water safety ("Have you set your hot water heater to <120°F or 49°C?"), and 3 items related to fire safety ("Do you have a working smoke detector in your home or apartment?" "Do you test your smoke detector's batteries monthly?" and "Does (child) know what to do if the smoke alarm rings?").

Parent first-aid knowledge. We created flags to indicate when the parent reported not knowing what to do if his or her child was choking or burned, and if the family did not have a fire escape plan.

Other Measures

We measured child gender, age, race/ethnicity (white, black, Hispanic, or other), insurance type (commercial/private, Medicaid/public, or uninsured/self-pay), and parent language preference (English or Spanish).

Statistical Analysis

We first summarized the sample characteristics and examined bivariate relationships of low parent health literacy with covariates and our main outcome measures. We then used unadjusted and multivariable adjusted logistic regression models to assess the independent effect of low parent health literacy on our dependent measures. The first model estimated the unadjusted associations. The second model adjusted for the child's gender, age, race/ethnicity, insurance type, parent language preference, and, because race/ethnicity and language preference were moderately correlated ($r = 0.67$), a race/ethnicity \times language preference interaction term. We calculated unadjusted and adjusted (AOR) odds ratios and 95% confidence intervals (CI) for each model, performing all data analyses with SAS v9.3 (SAS Institute, Cary, NC).

RESULTS

Table 2 shows characteristics of the 17 845 families from CHICA that were screened for health literacy during the period of interest. Mean child age was 4.8 years (SD 3.7); 50.7% of the children were boys. Children were mostly publicly insured (91.4%) and of black race/ethnicity (50.5%). Parents of 6516 (36.5%) children reported low health literacy. Children of parents with low health literacy were slightly younger (4.4 vs 5.1 years; $P < .0001$), less likely to be white (5.9% vs 11.6%; overall $P < .0001$), and more likely to be publicly insured (92.5% vs 90.7%; overall $P < .0001$) and have Spanish-speaking parents (44.4% vs 19.8%; $P < .0001$) than children of parents with adequate health literacy.

Of the parents queried, 21.4% indicated that someone in the child's home smoked, 36.6% reported not adhering to their children's asthma treatment, 17.7%

reported symptoms consistent with depression, 53.4% were not breastfeeding, and 51.8% indicated improper car seat placement. Parent reports of safe sleeping practices varied: 7.1% reported not placing the infant to sleep in the supine position, 34.6% reported placing the child to sleep in the prone position, and 5.0% reported laying the children on soft surfaces. In terms of television viewing, 61.3% of children watched television daily, more than half (59.5%) of parents reported having a television in their child's bedroom, and 44.2% of children watched ≥ 2 hours of television per day. When asked about firearm safety, 3.1% of parents reported firearms in the child's home and 10.8% did not keep firearms unloaded and locked in a safe location. Reports of other injury prevention practices ranged from 31.4% for no bike helmet use to <1% who did not provide the child a safe place to play when adults cook.

In unadjusted analyses, we observed significant differences by parent health literacy in almost every pediatric health risk examined (Table 3). Adjusting for child sociodemographic factors in Model 2 slightly altered our observed crude estimates for most outcomes, and completely attenuated others, including not breastfeeding, placing the infant to sleep in the prone position, daily television viewing, having firearms in the home, car seat position, use of safety gates, and reporting that the child does not know what to do if the smoke alarm rings.

In fully adjusted models, we observed several differences between children of parents with low compared with adequate health literacy in a range of pediatric health risks. These included higher rates of parent depression (AOR 1.32; CI 1.18–1.48) and firearm access (AOR 1.68; CI 1.49–1.89). Parents with low health literacy were also more likely to report nonadherence with firearm

TABLE 2 Sample Characteristics and Pediatric Health Risks, Overall and by Parent Health Literacy Status

| | Health Literacy | | | P |
|--|-----------------|-------------|---------------|--------|
| | Total | Low | Adequate | |
| Total | 17 845 (100) | 6516 (36.5) | 11 329 (63.5) | |
| Child characteristics, % | | | | |
| Age, y, mean (SD) | 4.8 (3.7) | 4.4 (3.9) | 5.1 (3.7) | <.0001 |
| Gender | | | | |
| Boy | 9046 (50.7) | 51.1 | 50.4 | .38 |
| Girl | 8799 (49.31) | 48.9 | 49.6 | |
| Race | | | | |
| White | 1691 (6.5) | 5.9 | 11.6 | <.0001 |
| Black | 9006 (50.5) | 37.4 | 58.0 | |
| Other | 2042 (11.4) | 15.7 | 9.0 | |
| Hispanic | 5106 (28.6) | 41.1 | 21.5 | |
| Insurance | | | | |
| Private | 1006 (5.6) | 3.6 | 6.8 | <.0001 |
| Medicaid/Public | 16 303 (91.4) | 92.5 | 90.7 | |
| Other | 536 (3.0) | 3.9 | 2.5 | |
| Parent language preference | | | | |
| English | 12 713 (71.2) | 55.6 | 80.3 | <.0001 |
| Spanish | 5132 (28.8) | 44.4 | 19.8 | |
| Pediatric health risks, % | | | | |
| Exposed to secondhand smoke | 3814 (21.4) | 17.4 | 23.7 | <.0001 |
| Nonadherent to asthma treatment | 222 (36.6) | 32.9 | 37.8 | .27 |
| Parent depression | 1720 (17.7) | 19.0 | 16.7 | .01 |
| Child Rearing Practices | | | | |
| Not breastfeeding | 1857 (53.4) | 45.6 | 58.8 | <.0001 |
| Infant does not sleep in supine position | 481 (7.1) | 6.5 | 7.6 | .08 |
| Infant sleeps in prone position | 2338 (34.6) | 31.0 | 37.2 | <.0001 |
| Infant laid on soft surface | 197 (5.0) | 4.3 | 5.6 | .08 |
| Daily television viewing | 4235 (61.3) | 59.8 | 62.5 | .03 |
| Television in room | 8570 (59.5) | 53.8 | 62.5 | <.0001 |
| >2 h of television viewing per day | 6344 (44.2) | 44.0 | 44.3 | .75 |
| Injury prevention | | | | |
| Firearms at home | 339 (3.1) | 2.5 | 3.5 | .01 |
| Firearms where child visits | 1496 (14.9) | 20.0 | 12.2 | <.0001 |
| Firearms not kept unloaded or locked in a safe place | 336 (10.8) | 13.1 | 9.7 | .004 |
| No discussion with child about guns | 784 (14.9) | 18.1 | 13.3 | <.0001 |
| Car seat faces forward | 3875 (51.8) | 49.1 | 53.8 | <.0001 |
| Child does not wear bike helmet | 4502 (31.4) | 30.9 | 31.7 | .34 |
| Child plays alone near water | 509 (5.4) | 7.6 | 4.3 | <.0001 |
| No safety gates | 1955 (42.3) | 39.6 | 44.0 | .004 |
| Harmful household products not out of reach | 157 (2.0) | 2.8 | 1.5 | .0002 |
| Matches/lighters not out of reach | 279 (3.1) | 3.9 | 2.6 | .0003 |
| Child does not have place to play while adult is cooking | 341 (0.92) | 1.5 | 0.56 | .003 |
| Hot water heater not set to <120°F | 1447 (16.8) | 17.7 | 16.2 | .07 |
| No working smoke detector | 278 (1.6) | 2.8 | 0.87 | <.0001 |
| Parent does not check smoke detector batteries | 714 (6.0) | 6.3 | 5.9 | .35 |
| Child does not know what to do if smoke alarm rings | 827 (11.8) | 14.2 | 10.6 | <.0001 |
| Parent first-aid knowledge | | | | |
| Does not know what to do if child is choking | 957 (9.3) | 13.5 | 6.7 | <.0001 |
| Does not know what to do if child is burned | 1581 (18.0) | 25.3 | 13.9 | <.0001 |
| Child does not know about fire escape plan | 397 (8.6) | 10.5 | 7.6 | .001 |

safety recommendations (AOR 1.38; CI 1.08–1.76) and not discussing guns with their children (AOR 1.31;

CI 1.11–1.55), not keeping harmful household products (including matches and lighters) out of their

child's reach, not providing their children a safe place to play when adults cook (AOR 2.58; CI 1.23–5.39), and not setting their water heaters to a safe temperature (AOR 1.34; CI 1.19–1.52). Children of parents with low health literacy were also more likely to watch >2 hours of television per day (AOR 1.27; CI 1.17–1.36). Parents with low health literacy were also 3.5 times more likely to report not having a working smoke detector at home (AOR 3.54; CI 2.74–4.58) and 24% more likely to not check smoke detector batteries (AOR 1.24; CI 1.05–1.46). Finally, parents with low health literacy had increased odds of limited first-aid knowledge; the AOR for not knowing what to do if a child is choking was 1.67 (CI 1.44–1.93), for not knowing what to do if a child is burned was 1.45 (CI 1.29–1.63), and for not having a fire escape plan was 1.25 (CI 1.01–1.57).

DISCUSSION

In this cross-sectional study of 17 845 children, we found differences in many pediatric health risks by parent health literacy status. Although adjustment for sociodemographic factors attenuated some of the observed relationships, low parent health literacy was significantly and independently related to parent depression, child television viewing, and several at-risk family behaviors associated with child injury.

Our findings are largely consistent with previous studies showing associations of low parent health literacy with pediatric^{9,11–17,32} and adult³ health outcomes. Similar to a clinic-based study by Heerman et al,¹² parents with low health literacy in our sample were less likely than parents with adequate health literacy to adhere to certain injury prevention practices, such as having their hot water heaters set to <120°F or ensuring the home had a working smoke detector. Consistent with Yin et al,¹¹ we also found that parents

TABLE 3 Unadjusted and Multivariable Adjusted Association of Low Parent Health Literacy With Pediatric Health Risks

| Pediatric Health Risks | UOR | 95% CI | AOR | 95% CI |
|--|------|-------------|-------------------|--------------------------|
| Exposed to secondhand smoke | 0.68 | (0.63–0.73) | 1.04 | (0.96–1.14) |
| Nonadherent to asthma treatment | 0.81 | (0.55–1.19) | 0.81 | (0.55–1.21) |
| Parent depression | 1.16 | (1.04–1.28) | 1.32 ^a | (1.18–1.48) ^a |
| Child rearing practices | | | | |
| Not breastfeeding | 0.59 | (0.51–0.67) | 0.88 | (0.75–1.02) |
| Infant does not sleep in supine position | 0.84 | (0.70–1.02) | 1.11 | (0.91–1.35) |
| Infant sleeps in prone position | 0.76 | (0.69–0.84) | 1.09 | (0.98–1.22) |
| Infant laid on soft surface | 0.76 | (0.57–1.03) | 1.00 | (0.73–1.36) |
| Daily television viewing | 0.90 | (0.81–0.99) | 1.09 | (0.98–1.21) |
| Television in room | 0.70 | (0.65–0.75) | 0.91 | (0.85–0.98) |
| >2 h of television viewing per day | 0.99 | (0.92–1.06) | 1.27 ^a | (1.17–1.36) ^a |
| Injury prevention | | | | |
| Firearms at home | 0.71 | (0.56–0.91) | 0.89 | (0.69–1.15) |
| Firearms where child visits | 1.81 | (1.62–2.02) | 1.68 ^a | (1.49–1.89) ^a |
| Firearms not kept unloaded or locked in a safe place | 1.40 | (1.11–1.77) | 1.38 ^a | (1.08–1.76) ^a |
| No discussion with child about guns | 1.45 | (1.24–1.70) | 1.31 ^a | (1.11–1.55) ^a |
| Car seat faces forward | 0.83 | (0.76–0.91) | 0.96 | (0.87–1.06) |
| Child does not wear bike helmet | 0.96 | (0.90–1.04) | 1.07 | (0.99–1.16) |
| Child plays alone near water | 1.83 | (1.53–2.20) | 1.26 ^a | (1.04–1.52) ^a |
| No safety gates | 0.84 | (0.74–0.95) | 1.01 | (0.88–1.15) |
| Harmful household products not out of reach | 1.81 | (1.32–2.48) | 1.86 ^a | (1.33–2.60) ^a |
| Matches/lighters not out of reach | 1.54 | (1.21–1.96) | 1.62 ^a | (1.26–2.09) ^a |
| Child does not have place to play while adult is cooking | 2.74 | (1.36–5.48) | 2.58 ^a | (1.23–5.39) ^a |
| Hot water heater not set to <120 degrees F | 1.11 | (0.99–1.25) | 1.34 ^a | (1.19–1.52) ^a |
| No working smoke detector | 3.26 | (2.54–4.17) | 3.54 ^a | (2.74–4.58) ^a |
| Parent does not check smoke detector batteries | 1.08 | (0.92–1.26) | 1.24 ^a | (1.05–1.46) ^a |
| Child does not know what to do if smoke alarm rings | 1.39 | (1.20–1.61) | 1.15 | (0.97–1.36) |
| Parent first-aid knowledge | | | | |
| Does not know what to do if child is choking | 2.17 | (1.90–2.48) | 1.67 ^a | (1.44–1.93) ^a |
| Does not know what to do if child is burned | 2.10 | (1.88–2.34) | 1.45 ^a | (1.29–1.63) ^a |
| Child does not know about fire escape plan | 1.44 | (1.17–1.77) | 1.25 ^a | (1.01–1.57) ^a |

Adjusted models control for child gender, age, race/ethnicity, insurance type, parent language preference, and the interaction of race/ethnicity and language preference.

UOR, unadjusted odds ratio.

^a Associations are statistically significant at $P < .05$.

with low health literacy were more likely to report television watching of >2 hours per day by their children, an obesogenic risk factor in preschool and young adult populations.³³ In contrast to other studies, however, parents with low health literacy were not more likely to report improper car seat placement,¹² and unexpectedly, they were also less likely to report having a television in the child's bedroom. We believe some of our other results, including the finding that parents with low health literacy report less first-aid knowledge related to choking and burns, have not been previously reported in pediatric populations.

Low health literacy was also significantly and independently

associated with parent depression, consistent with findings from the adult medical literature in the context of perinatal mood disorders and chronic disease states.³⁴ This has implications for practice, as pediatricians provide anticipatory guidance and support for families to optimize child outcomes.

Although we could not discern the directionality of these relations with our data, parents with depression may have lower self-efficacy,³⁵ which, in turn, could prohibit help-seeking or lead to nonadherent health behaviors. Therefore, when counseling parents with depressive symptoms, pediatricians may need to screen for low health literacy and use additional strategies, such as

the Teach-back method,³⁶ to ensure understanding of medical advice.^{37,38}

Our finding that many parents, especially those with low health literacy, do not adhere to standard injury prevention behaviors and have limited knowledge of child first aid is concerning because unintentional injury is the leading source of pediatric morbidity and mortality in the United States.³⁹ Addressing low parent health literacy may be an important approach for future child injury prevention efforts. Several communication techniques and educational tools that have been shown to improve health outcomes for patients with low literacy^{9,40,41} and their children^{42–45} could be tested in this context. For example, providing literacy education to adults with both depression symptoms and limited literacy improves their self-efficacy and decreases the severity of depression symptoms.⁴⁶ Pictographic instructions and color-coding helps caregivers improve the accuracy of their child's medication dosing⁴⁴ and own understanding of BMI charting.⁴³ Pediatricians may need to use such approaches when providing anticipatory guidance for parents of young children related to home and firearm safety, including how to respond to acute childhood injuries or common household emergencies.⁴⁷ Our finding that parents with low health literacy were more likely to be Hispanic, Spanish-speaking, and publicly insured is consistent with national data⁵ and suggests these families may be targeted for intervention.

Strengths of our study include having population-based data on a wide range of pediatric outcomes and the ability to adjust for several important confounding factors, including parent language preference. We also note several limitations. First, our data were cross-sectional, so we cannot infer causality. Our analyses nevertheless clearly show the importance of parent health

literacy to pediatric health risks, and suggest that this association reflects factors other than children's race/ethnicity, insurance type, or parent language preference. Second, our measures were self-reported. Third, our assessment of health literacy, although based on validated scales, has not been validated in pediatric populations. Health literacy is a complex construct and our measure may not have fully captured all aspects related to health literacy and should be interpreted only as a proxy measure. Fourth, our findings may be confounded by unmeasured variables. CHICA does not assess parent education, which may be associated with both parent literacy and several of our outcomes. Moreover, although we accounted for race/ethnicity and parent language preference, we did not have data to assess other proxies

of acculturation associated with maternal health behaviors, such as country of birth^{48,49} and duration of residence in the United States.⁵⁰ Finally, our study population, which was largely publicly insured, may not be representative of broader populations.

In summary, our findings indicate that there may be significant implications of low parent health literacy for improving the health of child populations. Although more studies are needed to understand the underlying reasons for these associations, our results provide a strong rationale for pediatricians to consider incorporating strategies to identify and address low parent health literacy in the clinical setting concomitantly with efforts to address parent depression, reduce child television

viewing, and lower the risk for pediatric injury.

ACKNOWLEDGMENTS

The authors thank Htaw Htoo and the Child Health Informatics Research and Development Laboratory for their help with data acquisition and management of the CHICA database. The authors also thank the clinic personnel who constantly help us evaluate and improve CHICA.

ABBREVIATIONS

AOR: adjusted odds ratio
CHICA: Child Health Improvement through Computer Automation
CI: confidence interval
EHR: electronic health record
PSF: prescreening form

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

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Pediatrics 2016;138;
DOI: 10.1542/peds.2016-0025 originally published online June 7, 2016;

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Pediatrics 2016;138;

DOI: 10.1542/peds.2016-0025 originally published online June 7, 2016;

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