Parental Health Literacy, Empowerment, and Advocacy for Food Allergy Safety in Schools: A Cross-Sectional Study

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ABSTRACT

Background: Approximately 8% of elementary school-aged children in the United States have food allergies, a complicated health management situation that requires parents to use many types of health literacy, empowerment, and advocacy skills to work with school staff to protect their children. **Objective:** This cross-sectional study examined (a) whether the highest versus lowest levels of functional, communicative, and critical health literacy are associated with higher perceived effectiveness of parental advocacy behaviors for safe food allergy management in schools [parental advocacy]; and (b) whether communicative and critical health literacy are more strongly associated with parental advocacy than functional health literacy. **Methods:** A sample of parents of elementary school-aged children was recruited through 26 food allergy organizations and a research patient registry. Participants completed an anonymous online survey. Self-reported measurements of parental health literacy, empowerment, and advocacy were adapted and refined through pre-testing and pilot-testing. General linear model analyses were conducted to predict parental advocacy. **Key Results:** Participants ($N = 313$) were predominantly White, college-educated mothers with moderately high levels of food allergy knowledge, health literacy, empowerment, and parental advocacy skills. Parents who scored at the highest levels in the three dimensions of health literacy reported they engaged in more effective advocacy behaviors than parents who scored at the lowest levels. Parental advocacy was predicted largely by parental empowerment and the quality of the relationship with the school ($B = .41$ and $B = .40$, respectively). Functional health literacy and the child's diagnosis of asthma were smaller predictors. While accounting for covariates, functional health literacy was significantly associated with parental advocacy whereas communicative and critical health literacy were not. **Conclusions:** Interventions to impact parental empowerment and parent-school relationships, including a health-literate universal precautions approach of communicating food allergy school policies, may influence parental advocacy for food allergy safety in schools. Further research could use a performance-based multidimensional measure of health literacy. [***HLRP: Health Literacy Research and Practice*. 2023;7(3):e165–e175.**]

Plain Language Summary: This online survey of parents of school-aged children in the U.S. examined health literacy predictors of effective parental advocacy behaviors for safe food allergy management in elementary schools. The results suggest that the parents' quality of their relationship with the school, parental empowerment, functional health literacy, and the child's diagnosis of asthma were associated with parents' reports of effective advocacy for food allergy safety, but communicative and critical health literacy were not.

Parents of elementary school-aged children with food allergies need a sufficient level and variety of health literacy skills to work with school staff to safely manage food allergies. Parental health literacy is the degree to which people can obtain, communicate, appraise, and understand health information and services to make informed and shared health decisions for themselves and others (an adapted definition) (Patient Protection and Affordable Care Act, 2010; Koo, 2021; von Wagner et al., 2009). The range of health literacy skills is grouped into three dimensions: functional, communicative (interactive), and critical health literacy (Nutbeam, 2000). Functional health literacy skills (reading, writing, numeracy) are important contributors toward parental knowledge to manage a child's health condition (DeWalt & Hink, 2009;

Riemann et al., 2021). Evidence is inconclusive related to the association between parental health literacy and parental health behaviors or child health outcomes (DeWalt & Hink, 2009; Riemann et al., 2021). Furthermore, there is mixed evidence about the role of communicative health literacy skills (speaking, listening, interpersonal skills) and critical health literacy (synthesis and appraisal of health information for situational application) in chronic disease management (Lai et al., 2013; Londoño & Schulz, 2015; Náfrádi et al., 2016; Qiu et al., 2020; Wang et al., 2016). Limited evidence supports a paradox that high parental communicative and critical health literacy is associated with lower childhood vaccination compliance (Amit Aharon et al., 2017) and worse asthma symptoms (Ogasawara & Hashimoto, 2020). Specific to food allergies, caregivers' low health literacy, as measured by the Newest Vital Sign, may be associated with treatment knowledge gaps, failure to carry and correctly use an epinephrine autoinjector, and an increased number of allergic reactions (Egan et al., 2019).

In addition to health literacy, some psychosocial variables, such as empowerment and self-efficacy, are considered important factors in the relationships between health literacy and health behaviors or health outcomes in several health literacy frameworks (Cudjoe et al., 2020; Paasche-Orlow & Wolf, 2007; Sørensen et al., 2012; von Wagner et al., 2009). An important parental health behavior to consider in the context of food allergy management in schools is their advocacy to prevent allergen exposure and to recognize and treat an allergic reaction quickly. In some districts, parents are the champions who promote implementation of food allergy guidelines in local schools (Lawlis et al., 2017).

Food allergies in schools are a useful topic to examine parental health literacy because of the health literacy challenges posed by understanding and implementing complex school management guidelines (Centers for Disease Control and Prevention [CDC], 2013; Waserman et al., 2021). The complexity of recommendations is challenging because of numerous methods to prevent exposures (CDC, 2013); difficulties with identifying an anaphylactic reaction (Lieberman et al., 2015); and barriers to rapid emergency response with epinephrine (Kao et al., 2018; Szychlinski et al., 2015). Emergency response must be quick because anaphylaxis poses a risk of severe impairment or death (Lieberman et al., 2015). Approximately 8% of children have the potential for food-related anaphylaxis (Gupta et al., 2018).

This cross-sectional study informs the gap in our understanding about parental functional, communicative, and critical health literacy in a specific context: food allergy management in elementary schools (Koo, 2021). The study tested the following hypotheses (a) three parallel hypotheses that parents who score at the highest levels on measures of functional, communicative, and critical health literacy report higher perceived effectiveness of advocacy behaviors for food allergy safety in schools [parental advocacy] than parents who score

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Grant: Funding was provided by the Rima E. Rudd Fellowship in Health Literacy sponsored through the Horowitz Center for Health Literacy, School of Public Health, University of Maryland, and the Biology and Behavior Across the Lifespan Organized Research Center Facilitation Award, University of Maryland School of Nursing.

Disclosure: The authors have no relevant financial relationships to disclose.

Acknowledgment: The authors thank Erin R. Hager and Boris D. Lushniak who provided valuable input during the dissertation process; the leaders of food allergy organizations who allowed or facilitated participant recruitment through their organizations, including the FARE (Food Allergy Research and Education) Patient Registry; and the parent volunteers.

This article is based on data published in Koo (2021).

Received: July 14, 2022; Accepted: February 10, 2023

doi:10.3928/24748307-20230823-01

at the lowest levels and (b) communicative and critical health literacy are more strongly associated with parental advocacy than functional health literacy. The results highlight the importance of functional health literacy, empowerment, and the quality of primary caregivers' relationships with schools as potential areas for intervention.

METHODS

Participants

Parents of children with food allergies were recruited through 26 food allergy organizations and one patient registry from November 2020 through February 2021 to participate in an online survey hosted on Qualtrics (version November 2020) (Koo, 2021). Through the groups, recruitment ads were emailed, posted in closed private social media groups, a blog, and a print magazine. Participants were included if they self-reported that they were parents, guardians, or primary caregivers of elementary school-aged children with life-threatening food allergies whose diagnosis was confirmed by a health care provider. The child must have attended kindergarten through 6th grade in-person in the United States at any time during the prior 12 months. The parent had to speak English, be older than age 18 years, and have internet access with any device. Exclusion criteria included prior participation in this or the pilot study. A small electronic gift card incentive was offered to every participant. Data were anonymized. Missing data were minimized through reminder pop-ups. Survey responses were evaluated for exclusion from analyses according to pre-set quality control criteria for highly suspicious, low-quality data (Kramer et al., 2014).

Measures

Development of measures. Measures of parental health literacy, empowerment, and advocacy were adapted for the context of parental perspectives about food allergy management in elementary school (Koo, 2021). Measures were revised after cognitive interviewing with six experts (with content validity index = 1.0 in three iterative rounds of revisions). Next, a pilot test with a convenience sample ($N = 33$) provided feedback about survey feasibility and scales' test/re-test reliability, criterion-related validity, and convergent validity. This led to further refinement of survey flow, items, and measures. Scale scores were the average of item responses, with possible ranges from 1 to 5. Higher scores indicated higher levels of self-reported parental health literacy, parental empowerment, and parental advocacy.

Parental health literacy. The parental health literacy scale measures the degree of self-reported difficulty with health literacy tasks, adapted from the Functional, Communicative and Critical Health Literacy Scale (FCCHLS) with permission (Ishikawa et al., 2008). The FCCHLS was selected because some evidence suggests that communicative and critical health literacy may be more strongly associated with adult chronic disease management behaviors and outcomes than functional health literacy (Heijmans et al., 2015; Lai et al., 2013). The adapted scale consists of 12 items with five response options (from very difficult to very easy). In this study sample, the parental health literacy scale and three subscales demonstrated good internal consistency (Cronbach's alpha range = .85 to .92). The continuous forms of the health literacy variable and subscales were used for correlations and the two-step regression. To test three parallel hypotheses about highest versus lowest scorers, cut points for dichotomous health literacy variables were created by examining their distributions and Receiver Operating Characteristics to predict a correlated variable according to methods in the literature (Chou et al., 2020). In this highly educated sample, the lowest scores do not imply low or inadequate health literacy, but rather are distinguished from highest scores by dichotomizing.

Parental empowerment. The parental empowerment scale measures the self-reported degree of agreement with empowered statements related to food allergy management. It was adapted from the Health Empowerment Scale with permission (Londoño & Schulz, 2015) to include food allergy ideas from Warren et al. (2015). The scale contains nine items, with five response options (from strongly disagree to strongly agree), comprising three subconstructs (meaning, competence, and impact). Internal consistency was adequate ($\alpha = .77$).

Parental advocacy. Based on the literature (Burke et al., 2016; Burke & Sandman, 2017; Cawthon & Caemmerer, 2014; Malec et al., 2010; Wright & Taylor, 2014), the parental advocacy scale is new and measures the parents' perceived effectiveness of advocacy behaviors for safe food allergy management at school. It is composed of 13 items with five response options (from not successful to completely successful) that contain three subconstructs (educating others, requesting safety practices, and communicating with school staff). Reliability was very good ($\alpha = .93$).

Covariates included participant demographics, characteristics of the youngest child in elementary school with food allergies, child's diagnosis of asthma (0 = no, 1 = yes), school characteristics, and quality of the relationship with the school (rating of their relationship with the elementary school with five response options from poor to excellent). Lastly, the food allergies quality of life – parental burden (FAQOL-PB) (Cohen, 2004) was adapted to include five response options

instead of seven with permission from the current owner (FARE [Food Allergy Research and Education]). Data from four essay items about experiences related to advocating for food allergy safety in schools will be reported separately.

Statistical Analyses and Power

Statistical analyses were conducted using SPSS (version 27). Pearson's r correlations and independent t-tests examined bivariate associations. Based on the hypotheses, three analysis of covariance tests (ANCOVA) were conducted to predict mean differences in parental advocacy for lowest versus highest scorers on the three health literacy measures while controlling for covariates, 'quality of the relationship with the school' and FAQOL-PB. A two-step hierarchical linear regression to predict parental advocacy was conducted with three health literacy subscale measures (in continuous form) while controlling for parental empowerment, quality of the relationship with the school, and asthma. Statistical significance was set to alpha less than .05. Post-hoc power analyses conducted with SPSS and GPower 3.1.9.4 (Faul et al., 2009) demonstrated acceptable power achieved (range 83% to 99%, N = 306-311).

Ethical Considerations

The University of Maryland College Park granted primary Institutional Review Board (IRB) approval and the University of Maryland Baltimore granted secondary IRB approval for human participants research (Koo, 2021).

RESULTS

Participant Recruitment and Participation

Three hundred forty participants consented and started the survey (Koo, 2021). Twenty-four responses were excluded due to completing less than 50% of the survey. Of the remaining 317 responses, four responses were excluded according to pre-set quality criteria. Median survey completion time was 20 minutes. The estimated ad viewership was 8,200 persons, based on a subset of food allergy organizations' private social media groups' viewership and email open rates.

Participant Characteristics

The participants were predominantly White, college-educated mothers (N = 313; **Table 1**). The participants reported that their youngest child in elementary school with food allergies was allergic to a median of three allergens (range, 1-19). The most frequently reported allergens were tree nuts, peanuts, and others not listed among the top 10 allergens. Nearly one-half of the children had asthma (48.8%). Participants represented 292 different schools and 276 different school districts in the U.S. Nearly 90% of schools required an emergency action plan for their child and 84% had a school nurse.

Participants reported moderately high levels of parental health literacy, parental empowerment, and parental advocacy (**Table 2**). Ceiling effects were noted for the functional health literacy measure but not for the other major variables. Most participants (71.8%) reported above average or excellent relationships with their schools. Parents had moderately high levels of food allergy knowledge and their FAQOL-PB was somewhat low.

Bivariate Analyses

In the bivariate analyses, the perceived effectiveness of parental advocacy behaviors for food allergy management in schools [parental advocacy] was significantly and positively associated with functional, communicative, and critical health literacy; parental empowerment; and the quality of the relationship with the school (p < .001; **Table 2**). Lower FAQOL-PB was associated with higher parental advocacy scores. Highest versus lowest scorers on the measures of functional, communicative, and critical health literacy also demonstrated significant favorable differences in mean parental advocacy scores (p < .001; **Table 3**). A child with asthma versus one without, and a school that required an emergency action plan versus one that did not, were significantly associated with differences in mean parental advocacy scores.

Health Literacy and Parental Advocacy

Three parallel hypotheses were tested with ANCOVA to determine if lowest versus highest scorers on self-reported measures of functional, communicative, and critical health literacy were associated with a difference in mean parental advocacy scores while accounting for the quality of the relationship with the school and FAQOL-PB (**Table 4**). Parents who scored at the highest levels in the three dimensions of health literacy reported that they engaged in advocacy behaviors for food allergy management in schools perceived to be more effective than parents who scored at the lowest levels (hypotheses accepted, p < .05). The models accounted for about 44% of the variance of parental advocacy (range, R^2 = .43 to .45 [adjusted R^2 = .42 to .45]). Partial eta-squared [partial η^2] is the proportion of total variance, or the effect size, of one predictor variable while accounting for the variance contributed by other variables. In all three models, the quality of the relationship with the school accounted for most of the variance in mean parental advocacy scores (range, partial η^2 = .38 to .39).

TABLE 1

Characteristics of Participants, Their Children with Food Allergies, and Elementary Schools

Characteristic	*n* (%)
Primary caregiver role: mother (*N* = 311)	301 (96.8)
Highest level of education completed (*N* = 309)	
Elementary school or primary school	1 (0.3)
High school or GED	15 (4.8)
Associate degree	25 (8.0)
Bachelor's degree	106 (34.1)
Any graduate degree	164 (52.7)
Race and ethnicity[a] (*N* = 311)	
Asian	20 (6.4)
Black/African American	5 (1.6)
Hispanic or Latino/a/ea (*N* = 311)	24 (7.7)
Multiracial, American Indian, Native Hawaiian, race and ethnicity not reported/ not available	12 (3.9)
White	264 (84.9)
Caregiver's number of children with food allergies (*N* = 311)	
1 child	240 (77.2)
2 children	63 (20.3)
3 or more children	8 (2.6)
Met with school staff to discuss food allergy management in the past 12 months[b]: Yes (*N* = 313)	266 (85.0)
Child's age (years)[a] (Mean 8.4; Median 8.5; range, 4-13 years; *N* = 310)	
4-6	81 (26.1)
7-9	122 (39.4)
10-13	107 (34.5)
Child's food allergens[c] (number of allergens: Mean 3.5; Median 3; range 1-19 allergens)	
Tree nut	230
Peanut	216
Other[d]	213
Shellfish, Soy, Wheat, Fin Fish, or Mustard (sum)	134
Egg	127
Milk	102
Sesame	77
Child has asthma: Yes (*N* = 306)	148 (48.8)
Child has a 504 Plan[a,e]: Yes (*N* = 312)	120 (38.5)

TABLE 1 (CONTINUED)

Characteristics of Participants, Their Children with Food Allergies, and Elementary Schools

Characteristic	*n* (%)
Child's number of severe allergic reactions[f] in past 12 months (*N* = 313)	
0	257 (82.1)
1	46 (14.7)
2 or more	10 (3.2)
Representing unduplicated elementary schools in sample (*N* = 293)	292 (99.7)
Representing unduplicated school districts in sample (*N* = 296)	276 (93.2)
School setting[h] (*N* = 312)	
Suburban	209 (67.0)
City	75 (24.0)
Rural	25 (8.0)
School requires individual emergency action plan[g]: Yes (*N* = 312)	279 (89.4)
School has a school nurse: Yes (*N* = 312)	262 (83.7)

Adapted from Koo (2021).
[a]Some participants chose *prefer not to answer* so frequencies and percentages may not match totals. [b]Some participants chose *don't remember* so frequencies and percentages may not match totals. [c]Participants could select more than one allergen. [d]Other allergens reported by participants included: apple, avocado, banana, barley, beans, beef, broccoli, buckwheat, cantaloupe, carrot, cauliflower, celery, chia seed, chicken, chickpea (garbanzo bean), cinnamon, cocoa, coconut, corn, cucumber, date, eggplant, fig, flax seed, "fresh produce," garlic, gluten, grape, green bean, kiwi, legumes, lentils, lima bean, melon, millet, navy beans, nectarine, oat, oral allergy syndrome: birch pollen-associated fruits/vegetables, orange, peach, peas, pineapple, pitted fruits, pomegranate, poppy seed, pork, pumpkin seed, quinoa, red lentil, rice, rye, sorghum, spelt, strawberry, seeds, sunflower seed, sweet potato, tomato, watercress, watermelon, white beans, and zucchini. [e]504 Plan = a plan developed with the school for a child who has a disability (such as life-threatening food allergies) to ensure that the student has access to a free and appropriate public education. [f]The number of severe allergic reactions were defined as "How many times was your child been treated for a severe allergic reaction to food with epinephrine or by an emergency medical team?" [g]School requires an individualized food allergy emergency action plan signed by a health care provider. [b,h]Some participants chose *don't know* so frequencies and percentages may not match totals.

A two-step hierarchical linear regression was conducted to predict parental advocacy while controlling for covariates (**Table 5**). In step one, the covariates parental empowerment, quality of the relationship with the school, and the child's diagnosis of asthma accounted for 49% of the variance in parental advocacy (Model 1 R^2 = .49. In step two, the largest predictors of parental advocacy were parental empowerment and the quality of the relationship with the school (B = .41 and B = .40, respectively). In this second step, functional health literacy was significantly associated with parental advocacy (p = .018) whereas communicative and critical health literacy were not (p > .05). Thus, the hypothesis that communica-

TABLE 2

Participant Characteristics and Their Correlations with Perceived Effectiveness of Parental Advocacy Efforts

Scale	Mean	*SD*	Median	Range	Pearson's *r* with Parental Advocacy
Parental advocacy[a]	3.86	0.73	3.91	1.33-5	-
Parental health literacy (HL)[a]	3.74	0.67	3.83	1.83-5	.34**
Functional health literacy[a]	3.87	0.78	4.00	1.25-5	.28**
Communicative health literacy[a]	3.83	0.72	4.00	1.50-5	.30**
Critical health literacy[a]	3.52	0.86	3.75	1-5	.30**
Parental empowerment[a]	4.23	0.47	4.22	1-5	.49**
Quality of relationship with school[a]	3.95	0.92	4.00	1-5	.63**
Food allergy quality of life - PB (*N* = 311)	3.35	0.85	3.35	1.18-5	–.21**
Participation in cause advocacy activities[a]	1.86	1.30	2.00	0-4	–.09
Food allergy knowledge score (*N* = 312)	5.73	1.60	6.00	1-8	.03

Note. No significant bivariate correlations among parental advocacy and education level, child's current age, number of years since diagnosis, total number of allergens, lifetime number of severe allergic reactions, 12-month number of severe allergic reactions, degree of support group participation, and the number of children with food allergies for whom participant is primary caregiver. PB = parental burden.
Adapted from Koo (2021).
[a]*N* = 313.
**$p < .001$.

tive and critical health literacy are more strongly associated with parental advocacy than functional health literacy was rejected. Functional health literacy accounted for 4% of the variance in parental advocacy (Model 2 $R^2 = .53$ ($\Delta R^2 = .04$). Asthma also was a significant small predictor ($p = .032$).

DISCUSSION

In this cross-sectional study, the findings highlight the importance of parental empowerment and the quality of the relationship with the school as the strongest predictors of parental advocacy (Koo, 2021). These findings are consistent with the literature (Burke et al., 2019; Burke & Hodapp, 2016; Cudjoe et al., 2020; Mackey et al., 2016). Secondly, the unexpected finding that functional health literacy may be more important than communicative and critical health literacy adds to the mixed evidence regarding the role of communicative and critical health literacy in health management (Amit Aharon et al., 2017; Lai et al., 2013; Londoño & Schulz, 2015; Náfrádi et al., 2016; Ogasawara & Hashimoto, 2020; Qiu et al., 2020; Wang et al., 2016).

Empowerment and Quality of the Relationship with the School

The salience of parental empowerment in this study is congruent with systematic reviews that show some evidence that self-efficacy, a component of empowerment, is associated with chronic disease management behaviors and health outcomes (Cudjoe et al., 2020; Mackey et al., 2016). Psychological empowerment is related to asthma self-management behaviors (Londoño & Schulz, 2015) and medical decision-making (Sak et al., 2017).

This study's finding that the quality of the relationship with the school is an important factor in parental advocacy is supported by studies demonstrating the significant role of the parent-professional partnership on intermediate outcomes related to parental advocacy for children's special education services (Burke et al., 2019; Burke & Hodapp, 2016). Building relationships is considered foundational to interpersonal advocacy efforts (Crawford & Arnold, 2016; Wright & Taylor, 2014). Promoting school-family partnerships that address power dynamics through shared responsibilities, trust, and two-way communication is essential for optimal outcomes in students with disabilities (Haines et al., 2017).

Functional Health Literacy as a Predictor of Parental Advocacy

Functional health literacy was a significant predictor of parental advocacy, whereas communicative and critical health literacy were not significant. This surprising finding

may be due to the high ceiling effect of the functional health literacy variable, likely related to the sample's high education level (Koo, 2021). Limited evidence supports the association between functional health literacy and chronic disease management behaviors of parents on behalf of their children (DeWalt & Hink, 2009; Riemann et al., 2021), including correct epinephrine autoinjector technique (Egan et al., 2019). The unexpected finding may be explained by the self-reported nature of the health literacy measure, and future studies could consider a performance-based measure of health literacy (Ayre et al., 2020; Schulz et al., 2021).

TABLE 3

_T_-Test Results Comparing Values of Variables of Interest on Mean of Parental Advocacy

Variable	*N*	Mean	*SD*	T[a]	p Value[b]
Functional health literacy				-4.30	
Lowest scorers	152	3.69	.74		**<.001**
Highest scorers	161	4.03	.68		
Communicative health literacy				-.5.08	**<.001**
Lowest scorers	148	3.65	.72		
Highest scorers	165	4.05	.69		
Critical health literacy				-.4.45	**<.001**
Lowest scorers	153	3.68	.72		
Highest scorers	160	4.04	.70		
Asthma				-2.60	**.010**
No	158	3.76	.71		
Yes	148	4.00	.75		
School requires emergency plan				-2.88	**.004**
No	16	3.36	.79		
Yes	279	3.89	.72		
School has a nurse				-0.28	
No	47	3.85	.72		.781
Yes	262	3.88	.73		
Parent/caregiver role				0.56	.575
Mother	301	3.87	.73		
Father	10	3.74	.83		

Note. School requires emergency plan means that a school requires an individualized food allergy emergency action plan signed by a health care provider. T-test results showed no significant difference in the mean of parental advocacy for registered nurse time in building (part-time/full-time); child has a 504 Plan (yes/no); child on immunotherapy (yes/no); and survey participant has health-related education (yes/no).
Adapted from Koo (2021).
[a]Degrees of freedom: range, 293-311.
[b]The bolded *p* values represent p < .05.

Highest Versus Lowest Scorers on Measures of Health Literacy

A practical difference in a research measurement means a real-world difference that impacts patients (Wright et al., 2012). In this study, the statistically significant differences are interpreted as borderline differences for real-world implications for highest versus lowest scorers in the three dimensions of health literacy to predict parental advocacy (0.2-0.3 on 5-point scales; less than one-half of the standard deviation of the outcome measure, using accepted criteria for a minimal clinically important difference) (Chan, 2013; Wright et al., 2012). These results add to the mixed evidence about the associations between communicative and critical health literacy and chronic disease management behaviors in diabetes (Lai et al., 2013; Wang et al., 2016), hypertension (Náfrádi et al., 2016; Qiu et al., 2020), asthma (Amit Aharon et al., 2017; Londoño & Schulz, 2015), and childhood vaccinations (Ogasawara & Hashimoto, 2020).

STRENGTHS AND LIMITATIONS

This study is valuable in the field of health literacy because it addresses a gap in our understanding about the relationship between three dimensions of health literacy and parental behaviors for a child's food allergy management. This understudied issue (Ditzler & Greenhawt, 2016; Egan et al., 2019) is examined with carefully constructed multidimensional measures. Study strengths include rigorous methods for disease-specific adaptations of measures; pilot-testing; and robust statistical methods (Koo, 2021). The sample represents many distinct schools and districts in the U.S. without significant duplication. Assessing health literacy outside of the context of the health care encounter has good potential for understanding how to impact disease-management health behaviors (Guzys et al., 2015).

Limitations of this study are related to the cross-sectional design that cannot infer causality in relationships among variables; biases of self-selection, self-report, and history; and generalizability of the sample of predominantly college-educated, White mothers (Koo, 2021). Temporal causality cannot be inferred, for example, in that the quality of the

TABLE 4

Three ANCOVA Models to Predict Parental Advocacy with Lowest Versus Highest Scorers in Functional, Communicative, and Critical Health Literacy

Model	Variable	Mean (95% Confidence Interval)[a]	F[b]	p Value[c]	Partial Eta-Squared
Functional health literacy	Corrected model		79.40	**<.001**	.44
	Functional health literacy		14.50	**<.001**	.04
	Lowest scorers	3.74 [3.65, 3.83]			
	Highest scorers	3.99 [3.90, 4.08]			
	Quality of relationship with school		194.33	**<.001**	.39
	Food allergy quality of life - PB		3.66	.057	.01
Communicative health literacy	Corrected model		82.51	**<.001**	.45
	Communicative health literacy		20.00	**<.001**	.06
	Lowest scorers	3.72 [3.62, 3.81]			
	Highest scorers	4.01 [3.92, 4.09]			
	Quality of relationship with school		196.06	**<.001**	.39
	Food allergy quality of life - PB		2.63	.11	.01
Critical health literacy	Corrected model		76.34	**<.001**	.43
	Critical health literacy		9.09	**.003**	.03
	Lowest scorers	3.77 [3.66, 3.86]			
	Highest scorers	3.97 [3.88, 4.05]			
	Quality of relationship with school		186.87	**<.001**	.38
	Food allergy quality of life - PB		3.83	.051	.01

Note. ANCOVA = Analysis of Covariance; PB = parental burden. For all models: $N = 311$.
[a]95% confidence interval bootstrap results based on 1,000 bootstrap samples.
[b]F statistic: Between participants, degrees of freedom ranged from 1 to 3; within participants, degrees of freedom ranged from 307 to 310.
[c]The bolded *p* values represent $p < .05$.

relationship with the school may not be a predictor of parental advocacy but rather a reaction to the school culture and practices (Burke et al., 2019; Burke & Hodapp, 2016). All variables were survey measures of participants' perceptions, and thus are subject to self-report bias. Self-selection and historical biases are probable due to recruitment efforts through a research patient registry and many online food allergy organizations, as well as due to COVID-19-related restrictions to virtual recruitment methods. Findings are not generalizable to populations with low educational attainment or diverse races and ethnicities; yet, future analysis of essay responses from the larger study may provide insights regarding health-literate and empowered strategies to advocate for food allergy safety in schools.

RESEARCH IMPLICATIONS

The unexpected finding regarding the salience of functional health literacy, but not communicative nor critical health literacy, has a few possible explanations. Health literacy is a complex multidimensional construct that is difficult to measure. Self-reported health literacy measures, compared to testable measures, may not accurately capture health literacy (Ayre et al., 2020; Schulz et al., 2021). Yet, the most used testable measure of health literacy, the Newest Vital Sign (NVS), involves reading a food label and thus may not be an appropriate measure for parents of children with food allergies due to high ceiling effects (Ditzler & Greenhawt, 2016; Egan et al., 2019). A different objective measure of health literacy may be necessary in food allergy research. The covariate 'quality of the relationship with the school' was measured with a single item, yet this construct may benefit from a multidimensional assessment similar to the measure of family-school partnership (Burke et al., 2019; Burke & Hodapp, 2016). Furthermore, other variables not captured in this study may explain the variance in parental advocacy. Recruitment methods beyond virtual means and specialized online groups are necessary to reach a more heterogeneous sample with diverse educational attainment.

PRACTICE IMPLICATIONS

The quality of the relationship with the school and parental empowerment are important factors associated with

TABLE 5

Hierarchical Regression to Predict Parental Advocacy

Variable	B	95% CI for B		SE B	Beta	R^2	ΔR^2
		LL	UL				
Step 1							
(Constant)	0.18	–0.35	0.71	.28		.49	.49**
Parental empowerment	0.47**	0.34	0.60	.07	0.31		
Quality of relationship with the school	0.42**	0.35	0.48	.03	0.53		
Asthma	0.14*	0.02	0.26	.06	0.09		
Step 2							
(Constant)	–0.37	–0.94	0.20	.29		.53	.04**
Parental empowerment	0.41**	0.28	0.55	.07	0.27		
Quality of relationship with the school	0.40**	0.34	0.47	.03	0.51		
Asthma	0.13*	0.11	0.24	.06	0.09		
Functional health literacy	0.11*	0.02	0.21	.05	0.12		
Communicative health literacy	0.08	–0.04	0.20	.06	0.08		
Critical health literacy	0.03	–0.07	0.13	.05	0.03		

Note: CI = confidence interval; LL = lower limit; UL = upper limit; SE = standard error.
Step 1: $F(3, 302) = 98.06$, $p < .001$. Step 2: $F(6,299) = 56.47$, $p < .001$.
*$p < .05$.
**$p < .001$.

the parental advocacy for food allergy safety behaviors in schools. School personnel and parents can improve the quality of their relationship and through open communication styles that emphasize listening, trust-building methods, and consistent implementation of systemic policies (Burke & Hodapp, 2016; Haines et al., 2017). In the related context of advocating for special education services, the parents' perceived quality of the relationship with the school was not equivalent to their satisfaction with services nor the school's response to advocacy efforts (Burke, et al., 2019). A school's response to advocacy efforts for food allergy safety may influence the quality of the parent-school relationship, or vice versa, but causality cannot be inferred from this study. To improve parental empowerment, practitioners can encourage building on small successes to improve self-efficacy and adjusting outcome expectations (Bandura, 2004). This could be accomplished through a role-play in which a parent successfully talks about how to avoid food allergen exposures before conversing with a classroom teacher. The important role of functional health literacy found in this study underscores the fundamental necessity of childhood education and adult literacy programs, as well as a health-literate universal precautions approach (Agency for Healthcare Quality and Research, 2015) to communicate school safety management policies.

In conclusion, functional health literacy seems to be the salient dimension of health literacy when measured by a three-dimensional self-report scale to predict effective advocacy behaviors for food allergy safety in schools among highly educated mothers. Health literacy appears to be one of many factors that impact parental chronic disease management strategies and impact everyday life encounters outside of healthcare services. Areas for intervention may target enhancing parental empowerment and the quality of their relationship between parents and schools through open communication and building trust regarding food allergy management.

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