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ORIGINAL ARTICLE

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Preliminary validation of a self-efficacy scale for pediatric chronic illness

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Abstract

Background: Tracking self-efficacy may be useful for identifying children at risk for medical noncompliance. We created the Pediatric Rating of Chronic Illness Self-Efficacy (PRCISE) to measure self-efficacy in youth dealing with a chronic illness.

Method: Data were collected from 217 families where one child aged 7–20 (M_{age} = 13.62, SD_{age} = 2.92; 62.7% Latino, 58.1% female) had a chronic illness. Parent participants provided demographic information. Youth completed a depression measure, the Patient Health Questionnaire for Adolescents and the PRCISE. To determine the underlying latent structure of the scale, an exploratory factor analysis was conducted using parallel analysis. We also carried out two multiple linear regressions to explore the data and establish preliminary predictive validity.

Results: The measure was reduced to 15 items, demonstrating a one-factor solution with strong reliability. Predictors of lower self-efficacy included having parents who had not attended college, being African American, and having higher Patient Health Questionnaire for Adolescents scores, R^2 = .23, $F(11, 174) = 5.62$, $p < .001$. Main effects were qualified by a two-way interaction, such that the decrease in PRCISE scores associated with depressive symptoms was attenuated in children with less educated parents. In terms of predictive validity, higher PRCISE scores unexpectedly predicted more number of emergency room visits, R^2 = .12, $F(9, 113) = 2.73$, $p < .01$.

Conclusions: The PRCISE appears to be a reliable measure of a single self-efficacy construct. Secondary analyses revealed important health disparities in pediatric chronic illness self-efficacy. Next steps may include validation of the PRCISE using confirmatory factor analysis.

KEYWORDS

chronic illness, health disparities, pediatrics, self-efficacy

1 | INTRODUCTION

Self-efficacy, defined as the belief in one's ability to succeed, has been shown to predict, moderate, and mediate health behaviour change (Bandura, 2004). Self-efficacy may be particularly important to study in pediatric chronic illness given the high rate of medical nonadherence in this population. Increasing patient self-efficacy has been associated with a number of health improvements, including medical adherence and health knowledge, reduced illness activity, and increased positive health behaviours across different patient populations and illness types (Bandura, 2004).

Despite the importance of this construct to the management of pediatric chronic illness, only disease specific self-efficacy scales have been developed, rendering the study of childhood and adolescent self-efficacy across multiple disease types difficult. To address this limitation, we developed a measure of self-efficacy in pediatric chronic illness. The aim of the current study was to develop and evaluate the psychometric properties of the Pediatric Rating of Chronic Illness

Self-Efficacy Scale (PRCISE, pronounced "precise") in children ages 7 to 20 with a chronic illness. We also conducted exploratory analyses to investigate demographic and clinical variables associated with pediatric chronic illness self-efficacy.

Key messages:

- In children with chronic illness, self-efficacy has been shown to predict, moderate, and mediate health behaviour change.
- The Pediatric Rating of Chronic Illness Self-Efficacy (PRCISE) aims to assess self-efficacy across multiple disease types.
- Factor analysis suggests that the PRCISE is a reliable measure with a single underlying factor.

2 | METHODS

2.1 | Participants

Data were collected from 217 families who have a child with a chronic illness. Youths ranged in age from 7 to 20 (M_{age} = 13.62, SD_{age} = 2.92; 62.7% Latino; 58.1% female). Children were recruited from medical providers within the Loma Linda University Health System. Criteria for study inclusion included being able to read and complete the survey in English and having a chronic illness, defined as a health problem lasting three or more months that impacts a person's daily activities and requires frequent medical intervention and/or management (Compas, 2012).

2.2 | Measures

2.2.1 | Demographic survey

Parent participants completed a demographic questionnaire that provided information about their child's age, gender, race, primary health condition, number of emergency room visits in the past 12 months (hereafter referred to as "ER visits"), and number of missed schooldays in the last month (hereafter referred to as "missed schooldays"). Parents also provided information about their level of education.

2.2.2 | The Patient Health Questionnaire for Adolescents (PHQ-A)

Child participants completed the PHQ-A (Johnson, Harris, Spitzer, & Williams, 2002), a modified version of the widely used self-report tool for depression, the Patient Health Questionnaire (PHQ; Spitzer, Kroenke, Williams, & Patient Health Questionnaire Primary Care Study Group, 1999). Scale score totals were derived by summing scores across the first nine items of the scale. As recommended by the authors, cases with one or two missing responses received a prorated score.

2.2.3 | The Pediatric Rating of Chronic Illness Self-Efficacy (PRCISE)

The PRCISE was inspired by two previously validated disease-specific childhood self-efficacy scales (Bursch, Tsao, Meldrum, & Zeltzer, 2006; Caplin, Austin, Dunn, Shen, & Perkins, 2002) and an adult chronic illness self-efficacy scale (Lorig et al., 1996). Items began with the stem: "How sure are you that you can," followed by different perceived abilities relating to exercise; obtaining help from family, friends, and doctors; illness management; chores, hobbies, and recreation; symptoms; and mood. All 22 items were answered on a Likert scale from 0 to 10, ranging from 0 for *not at all sure* to 10 for *very sure*. Total scaled scores were then derived by summing across all item scores.

2.3 | Procedure

The study received approval from the Loma Linda University Institutional Review Board. Families were approached in clinics by a clinic staff member or by a member of the research staff in designated outpatient or inpatient pediatric clinics within the Loma Linda University Health System.

2.4 | Statistical analysis

2.4.1 | Factor analysis

Following data inspection, we used the expectation maximization (EM) procedure in SPSS to impute missing data. Of note, we used imputed values only in the exploratory factor analysis, given that the expectation maximization procedure underestimates standard errors that are important for inferential tests such as multiple linear regression (Von Hippel, 2004). Based on power estimates for exploratory factor analysis outlined by Furr and Bacharach (2014), we sought to collect at least 10 surveys per scale item, requiring roughly 220 participants for a final scale of 22 items. The current study collected data from 217 participants (including 195 scales with no missing items), proving sufficient for the final 15-item measure described below. We reduced the scale from 22 to 15 items due to significant intercorrelations among items (four items had $r > .8$), little decrement in the *reliability if item deleted* estimates (two items), and unusually high kurtosis (one item had kurtosis >3). A parallel analysis was then conducted on the 15-item scale using principal axis factoring (PAF) with oblique rotation (direct Oblimin).

2.4.2 | Multiple linear regression (MLR)

To establish whether comorbid depressive symptoms, health, and demographic variables predicted or were predicted by the PRCISE total score, we carried out two MLR analyses, one with the PRCISE as the dependent variable; and one using the PRCISE to predict ER visits. To narrow down potential control variables, bivariate correlations were calculated to examine the relationship between our main variables of interest (PRCISE, PHQ-A total scores, and ER visits) and possible demographic and health status covariates (child age, gender, ethnicity, illness type, parents' education level, and missed schooldays). Covariates that significantly correlated with the main study variables were included as controls in the two MLRs.

Variables were recoded as follows. The highest level of education of either parent or guardian was chosen to estimate the effect of parental education using four categories: "less than high school," "high school," "some college," and "college graduate or higher." The variable was subsequently dummy coded, using the most common educational level as the reference group: some college. Child ethnicity was also dummy coded using the following categories: Caucasian, African American, Asian, Latino and "other," with Caucasian serving as the reference group. The PHQ-A was scored and summed according to the authors' instructions, using prorated total scores for cases with fewer than three items missing (Johnson et al., 2002).

For our exploratory analysis of self-efficacy predictors, a hierarchical multiple linear regression analysis was used to examine the relative contributions of depression (as measured by the PHQ-A), ethnicity, and parental education on the PRCISE total score. We also examined all two-way interactions between parental education and depression on the PRCISE. Using the same process and same variable coding schemes, we conducted another MLR to establish the scale's preliminary predictive validity. This regression was used to determine whether the PRCISE predicted ER visits. Given high intercorrelations among the PHQ-A and both other proxy variables of health, the PHQ-A and missed schooldays were used as independent variables for the MLR predicting ER visits.

3 | RESULTS

Demographic variables and other participant characteristics are summarized in Tables 1 and 2. PRCISE total scores varied according to certain study variables, detailed in Table 3. Inter-item correlations among PRCISE items are presented in Table 4; inter-variable correlations are presented in Table 5. Youth had a mean self-efficacy score of 114.34 (*SD* = 31.74) out of a possible 150, and a mean PHQ-A score of 4.55 (*SD* = 4.95) out of a possible score of 27.

3.1 | Factor analysis

A parallel analysis was conducted on the 15-item PRCISE scale using PAF with oblique rotation (direct Oblimin). Using the Kaiser-Meyer-Olkin (KMO) measure, we verified the sampling adequacy for the analysis (KMO = .93, considered "superb" according to Field, 2009). All KMO values for individual were .87 or greater, which is well above the acceptable limit of .5 (Field, 2009). We also used Bartlett's test of sphericity, χ^2 (105) = 2178.33, $p < .001$, to confirm that correlations between items were sufficient for PAF. The results of the parallel analysis supported a one factor structure, which explained 55.52% of the variance. The determinant had a value of 3.143E-005, which is significantly smaller than the necessary 0.0001. Table 6 demonstrates the factor loadings of our final one-factor matrix, selected as the best

TABLE 1 *T* tests measuring differences in continuous study variables by illness types

	Self-efficacy (PRCISE)		Depression (PHQ-A)		Age		Number of ER visits		Number of missed schooldays	
Illness type	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Endocrinology (*N* = 25)	123.41*	28.78	5.60	5.91	12.56	3.22	1.00	3.16	1.90	4.60
Nephrology (*N* = 30)	119.86	23.77	5.32	5.79	14.43	2.58	1.28	1.69	5.11	8.77
Cardiology (*N* = 18)	110.63	36.59	4.57	4.25	13.81	3.08	0.73	1.94	4.57	8.44
Hematology/oncology (*N* = 17)	111.23	24.31	6.85	5.94	13.59	2.40	1.00	1.59	6.38	10.71
Rheumatology (*N* = 44)	97.59*	41.22	3.32	4.49	13.59	2.91	0.69	1.44	3.06	5.48
Gastroenterology (*N* = 7)	127.80	15.16	6.16	3.56	13.00	1.29	0.67	1.03	10.00	10.95
Other (*N* = 26)	113.50	32.73	5.60	5.06	13.38	2.59	1.29	2.48	6.20	9.40
Missing (*N* = 48)	122.04	23.99	2.94	3.61	13.67	3.25	0.29	0.84	1.28	2.26

Note. PRCISE = Pediatric Rating of Chronic Illness Self-Efficacy; PHQ-A = Patient Health Questionnaire for Adolescents; ER = emergency room; Other illness type: asthma, cystic fibrosis, dermatitis, spina bifida, seizures, etc.

*$p < .05$.

TABLE 2 Categorical study variables by illness types

	Gender (%)		Race (%)					Highest parent education (%)			
Illness type	Female	Male	Black	Asian or Pacific Islander	Hispanic	Caucasian	Other	Less than high school	High school	Some college	College graduate or higher
Endocrinology (*N* = 25)	56.0	44	7.7	0.0	12.5	13.8	42.9	0.0	8.9	13.3	10.0
Nephrology (*N* = 30)	50.0	50	7.7	14.3	14.0	13.8	0.0	9.8	4.4	20.0	20.0
Cardiology (*N* = 18)	50.0	50	0.0	0.0	9.6	6.9	0.0	3.3	4.4	11.7	15.0
Hematology/ oncology (*N* = 17)	41.2	58.8	15.4	0.0	8.1	3.4	0.0	9.8	11.1	5.0	7.5
Rheumatology (*N* = 44)	63.6	36.4	30.8	28.6	20.6	10.3	14.3	24.6	22.2	16.7	12.5
Gastroenterology (*N* = 7)	71.4	28.6	11.5	0.0	1.5	3.4	14.3	0.0	4.4	3.3	7.5
Other (*N* = 26)	73.1	26.9	11.5	14.3	11.0	24.1	0.0	8.2	8.9	18.3	15.0
Missing (*N* = 48)	58.3	41.7	15.4	42.9	22.8	24.1	28.6	29.5	35.6	11.7	12.5

TABLE 3 Analyses of variance examining mean differences in PRCISE total scores (n = 215)

Independent variable	F	p	Partial η^2	PRCISE scores of significant difference
Illness	2.20	<.05	0.09	Rheumatology < endocrinology
Gender	2.80	>.05	0.02	N/A
Ethnicity	3.14	<.05	0.07	African American/Hispanic < Caucasian
Parent education	5.96	<.01	0.09	Less than a high school < some college
Age	1.03	>.05	0.02	N/A
Depression (PHQ-A)	7.99	<.001	0.08	Moderate/severe < mild
Missed school days (in past 30 days)	1.23	>.05	0.03	N/A
ER visits (in past 12 months)	0.04	>.05	0.00	N/A

Note. PRCISE = Pediatric Rating of Chronic Illness Self-Efficacy; PHQ-A = Patient Health Questionnaire for Adolescents; ER = emergency room.

solution for the data. Overall, the PRCISE demonstrated high reliability (α = .94) and corrected item-total correlations greater than .6.

3.2 | Predicting the PRCISE Total score

As expected, self-reported depressive symptoms strongly predicted the PRCISE total score (b = −3.54, 95% CI [−5.26, −1.82], sr^2 = .09, p < .001). Having parents with less than a high school education (b = −37.73, 95% CI [−53.38, −22.08], sr^2 = .12, p < .001) or a high school education (b = −19.48, 95% CI [−35.96, −3.00], sr^2 = .03, p < .05) and being African American (b = −20.25, 95% CI [−36.91, −3.59], sr^2 = .03, p < .05) were also associated with lower self-efficacy. Other ethnicities and education levels were not significantly predictive of the PRCISE (see Table 7). Overall, the optimal linear combination of these three predictor variables accounted for 23% of the variance in PRCISE total scores, adjusted R^2 = .23, F(12, 174) = 4.52, p < .001.

We also tested interaction effects between the PHQ-A and parental education, adding all two-way interaction terms in the next step of the hierarchical MLR. We found that the effect of depression on the PRCISE total score significantly depended on parent education. Specifically, having parents with less than a high school education attenuated the effect of depression (t[1] = 2.39 95% CI [0.49, 5.10], p < .05). Although higher depression scores were consistently associated with lower scores on the PRCISE, this effect was stronger for children with parents of higher education. In other words, self-efficacy scores were less impacted by depressive symptoms in children with less educated parents (Figure 1).

3.3 | Predicting number of ER visits

A second MLR analysis was used to examine predictors of number of ER visits. The optimal linear combination of missed schooldays, illness type, PHQ-A, and PRCISE total scores accounted for 12% of the variance in number of ER visits, adjusted R^2 = .12, F(9, 113) = 2.73, p < .01. As anticipated, missed days of school (b = 0.04, 95% CI [0.01, 0.08], p < .05) and PHQ-A scores (b = 0.07, 95% CI [0.01, 0.13], p < .05) were positively associated with ER visits. Unexpectedly, higher PRCISE scores (i.e., better self-reported self-efficacy) were associated with more ER visits (b = 0.01, 95% CI [0.001, 0.02], p < .05). Of note, we also tested models without covariates to determine if the direction of the relationship changed; it did not. Results of the multiple regression model are presented in Table 8.

4 | DISCUSSION

4.1 | Factor structure of the PRCISE

The current study explored the preliminary reliability and validity of the PRCISE, a 15-item self-report measure of pediatric chronic illness self-efficacy. The exploratory factor analysis revealed a one-factor structure with high reliability, and the scale explained a significant amount of variance.

4.2 | Predicting the PRCISE total score

In the first MLR, we aimed to explore demographic and clinical predictors of self-efficacy, focusing on socio-economic factors and depressive symptoms. Compared to children who reported no depression symptoms, those with higher PHQ-A scores showed significant decrements in self-efficacy, confirming prior authors' assertion that the two constructs are inextricably linked (Kavanagh, 2014).

Some of the variance was also explained by ethnicity. Specifically, being of African American race was associated with lower self-efficacy than being of Caucasian race. This difference may be accounted by both patient- and system-level discrepancies. On one hand, African Americans have been shown to be less adherent to dietary recommendations, more likely to report side effects of medications, and less likely to engage in physical activity (Warren-Findlow, Seymour, & Huber, 2012); all of which contribute to lower adherence. On the other hand, minority patients may also be treated differently by the health professionals they encounter. Minorities are less likely to have had a recent physician visit (Flores & Lin, 2013), to have a coordinated medical home (Raphael, Guadagnolo, Beal, & Giardino, 2009), and are more frequently prescribed a complex drug regimen than their White counterparts (Warren-Findlow et al., 2012).

Parent education was also a significant predictor of self-efficacy. Specifically, children of parents with no college education reported lower self-efficacy than their counterparts. The association between lower education and worse health outcomes is also well established (Osborn, Paasche-Orlow, Bailey, & Wolf, 2011; Paasche-Orlow & Wolf, 2007). Three mechanisms are thought to contribute to this relationship. One, patients of lower education have less access to and lower use of healthcare care due to differences in income and health literacy (Paasche-Orlow & Wolf, 2007). Two, uneducated patients are likely to be less comfortable in their interactions with medical providers for

TABLE 4 Correlations among the final 15 PRCISE items

Item	*N*	SE2	SE3	SE4	SE5	SE6	SE7	SE9	SE11	SE12	SE13	SE15	SE16	SE17	SE18	SE20
SE2	212	6.85 (3.18)														
SE3	208	0.45	7.96 (2.73)													
SE4	208	0.41	0.73	7.70 (3.01)												
SE5	209	0.48	0.52	0.59	7.31 (3.20)											
SE6	210	0.42	0.56	0.58	0.51	8.20 (2.64)										
SE7	210	0.42	0.53	0.46	0.45	0.66	7.98 (2.41)									
SE9	210	0.40	0.45	0.41	0.41	0.57	0.57	8.03 (2.48)								
SE11	205	0.46	0.52	0.58	0.51	0.62	0.61	0.66	7.98 (2.60)							
SE12	209	0.56	0.49	0.46	0.39	0.56	0.54	0.51	0.55	7.58 (2.81)						
SE13	210	0.57	0.62	0.54	0.50	0.51	0.53	0.52	0.62	0.66	8.20 (2.52)					
SE15	209	0.47	0.52	0.51	0.37	0.47	0.55	0.43	0.54	0.61	0.69	7.38 (3.01)				
SE16	205	0.55	0.50	0.45	0.54	0.55	0.51	0.56	0.57	0.53	0.63	0.55	7.05 (2.70)			
SE17	205	0.47	0.42	0.37	0.50	0.43	0.46	0.53	0.54	0.49	0.56	0.53	0.76	7.11 (2.73)		
SE18	206	0.49	0.47	0.49	0.44	0.44	0.50	0.46	0.56	0.55	0.65	0.69	0.64	0.70	7.26 (2.77)	
SE20	207	0.45	0.46	0.46	0.44	0.56	0.52	0.47	0.62	0.54	0.60	0.66	0.63	0.61	0.70	7.10 (2.99)

Note. All correlations are significant at $p < .001$. See Table 6 for the item descriptions. Means and standard deviations are displayed on the diagonal with means on top and standard deviations below, in parentheses.

TABLE 5 Spearman's rho correlations

	Age	Gender	Ethnicity	Illness type	Parent education	ER visits	Missed days of school	PRCISE	PHQ-A
Age	1								
Gender	−0.088	1							
Ethnicity	−0.013	0.01	1						
Illness type	−0.023	−0.153	−0.082	1					
Parent education	−0.05	0.1	−0.012	−0.009	1				
ER visits	0.03	−.155*	0.039	0.026	.149*	1			
Missed days of school	0.117	0.034	0.048	.169*	0.127	.376**	1		
Self-efficacy (PRCISE)	−0.019	.152*	.252**	−0.144	.203**	−0.014	−0.051	1	
Depression (PHQ-A)	.258**	−0.133	−0.034	−0.015	0.066	.274**	.299**	−.369**	1

Note. PRCISE = Pediatric Rating of Chronic Illness Self-Efficacy; PHQ-A = Patient Health Questionnaire for Adolescents; ER = emergency room.

*$p < .05$.

**$p < .001$.

TABLE 6 Results of exploratory factor analysis for the PRCISE based on final, single-factor solution (n = 195)

Item	Factor loading
How sure are you that you can continue to do your hobbies and things you enjoy? (Item 13)	0.81
How sure are you that you can reduce your physical discomfort or pain? (Item 16)	0.78
How sure are you that you stay away from things that make you feel bad? (Item 11)	0.77
How sure are you that you can keep your health problems from getting in the way of what you want to do? (Item 18)	0.77
How sure are you that you can keep from feeling sad about your health? (Item 20)	0.76
How sure are you that you can go to school without having your health get in the way of your learning? (Item 15)	0.75
How sure are you that you can ask your doctor questions when you are worried or unsure about your health? (Item 6)	0.73
How sure are you that you can complete your household chores? (Item 12)	0.72
How sure are you that you can make yourself better when you feel sick? (Item 17)	0.72
How sure are you that you can follow your doctor's advice every day? (Item 7)	0.71
How sure are you that you can get help from family with tasks and activities such as homework or chores? (Item 3)	0.70
How sure are you that you can tell when feelings in your body mean that you should see a doctor again? (Item 9)	0.69
How sure are you that you can get family to help you when you are feeling sad or worried (such as listening or talking about problems)? (Item 4)	0.68
How sure are you that you can get friends to help you when you are feeling sad or worried (such as listening or talking about problems)? (Item 5)	0.64
How sure are you that you can exercise regularly? (Item 2)	0.64
Eingenvalue	8.33
Percentage of variance	55.52
Cronbach's alpha	0.94

TABLE 7 Results of multiple regression analysis predicting the PRCISE total score from depression (PHQ-9) and covariates

Variables	*b*	*SE*	β	*t*	*p*	95% CI	sr^2
Depression (PHQ-A)	**−3.54**	**0.87**	**−0.53**	**−4.07**	**<.001**	**[−5.26, 1.82]**	**0.09**
Black/African American	**−20.25**	**8.44**	**−0.21**	**−2.40**	**<.05**	**[−36.91, −3.59]**	**0.03**
Asian/Asian American	−22.81	12.13	−0.14	−1.88	>.05	[−46.75, 1.14]	0.02
Latino/Hispanic American	−9.58	6.63	−0.14	−1.45	>.05	[−22.68, 3.52]	0.01
Other race/ethnicity	5.66	14.10	0.03	0.40	>.05	[−22.18, 33.50]	0.00
Less than high school	**−37.73**	**7.92**	**−0.53**	**−4.76**	**<.001**	**[−53.38, −22.08]**	**0.12**
HS graduate	**−19.48**	**8.35**	**−0.25**	**−2.33**	**<.05**	**[−35.96, −3.00]**	**0.03**
College graduate or higher	−5.41	8.57	−0.07	−0.63	>.05	[−22.32, 11.51]	0.00
PHQ-A x less than HS	**2.80**	**1.17**	**0.29**	**2.39**	**<.05**	**[0.49, 5.10]**	**0.03**
PHQ-A x HS	2.06	1.26	0.19	1.63	>.05	[−0.44, 4.55]	0.02
PHQ x college graduate of higher	0.17	1.40	0.01	0.12	>.05	[−2.60, 2.93]	0.00

Note. Bolded values are significant at $p < .05$. Race/ethnicity reference group = Caucasian; Parent education reference group = some college; PRCISE = Pediatric Rating of Chronic Illness Self-Efficacy; PHQ-A = Patient Health Questionnaire for Adolescents; HS = high school.

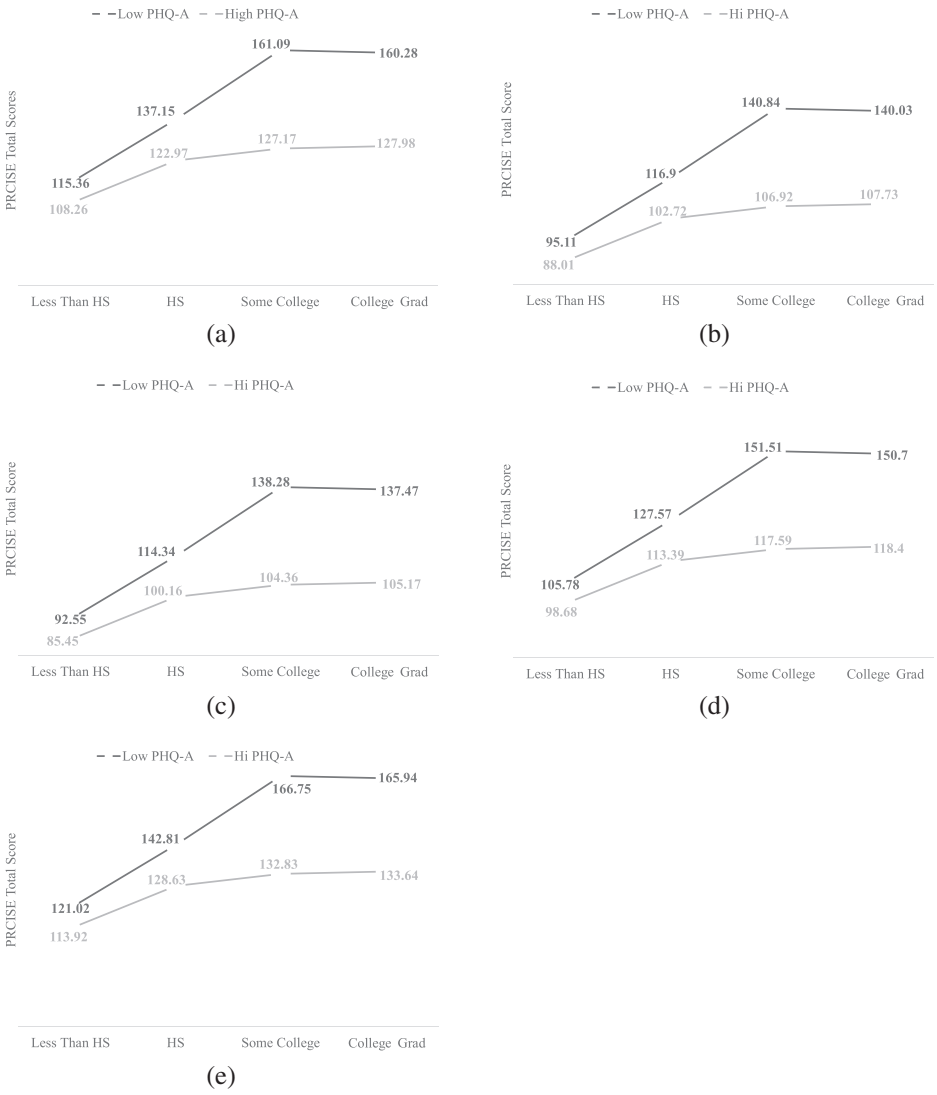

FIGURE 1 Pediatric Rating of Chronic Illness Self-Efficacy scores as a function of having low or high PHQ-A scores for children along parent education levels. (a) Caucasian children, (b) African American children, (c) Asian children, (d) Latino children, (e) children of other ethnicities. HS = High school; PHQ-A = Patient Health Questionnaire for Adolescents; college grad refers to children of parents who graduated college or higher.

TABLE 8 Results of multiple regression analysis predicting number of ER visits in last year from self-efficacy and covariates

Variables	*b*	*SE*	β	*t*	*p*	95% CI	sr^2
Self-efficacy (PRCISE)	**0.01**	**0.01**	**0.22**	**2.17**	**<.05**	**[0.001, 0.02]**	**0.04**
Depression (PHQ-A)	**0.07**	**0.03**	**0.23**	**2.28**	**<.05**	**[0.01, 0.13]**	**0.04**
Number of missed schooldays	**0.04**	**0.02**	**0.22**	**2.30**	**<.05**	**[0.01, 0.08]**	**0.04**
Illness: Endocrinology	−0.49	0.48	−0.11	−1.02	>.05	[−1.43, 0.46]	0.01
Illness: Nephrology	0.41	0.39	0.12	1.04	>.05	[−0.37, 1.19]	0.01
Illness: Cardiology	0.14	0.51	0.03	0.27	>.05	[−0.87, 1.14]	0.00
Illness: Haematology/oncology	0.41	0.52	0.08	0.78	>.05	[−0.62, 1.43]	0.00
Illness: Gastroenterology	−0.14	0.77	−0.02	−0.18	>.05	[−1.66, 1.39]	0.00
Illness: Other	−0.05	0.43	−0.01	−0.11	>.05	[−0.89, 0.80]	0.00

Note. Bolded values are significant at $p < .05$. Illness reference group = rheumatology; PRCISE = Pediatric Rating of Chronic Illness Self-Efficacy; PHQ-A = Patient Health Questionnaire for Adolescents.

fear that "their limited literacy will be exposed," thereby increasing feelings of shame and perpetuating the discomfort in medical settings (Paasche-Orlow & Wolf, 2007, p. S20). Three, lower health literacy is associated with reduced compliance with necessary self-care behaviours (Paasche-Orlow & Wolf, 2007). Finally, self-efficacy may mediate the relationship between education and health. Osborn et al. (2011)

proposed that lower education contributes to reduced treatment seeking and adherence to medical recommendations because patients feel ineffectual in knowing when and how to advocate for care and how to follow medical recommendations.

Parent education also influenced the relationship between self-efficacy and depression, as observed in the significant interaction between these three variables. Although higher PHQ-A scores were consistently predictive of lower PRCISE scores, the effect of depression was more substantial for children of parents with higher education. By contrast, the difference between children with below average versus above average PHQ-A scores was attenuated in participants whose parents had less than a high school education (Figure 1). The difference in slopes may reflect the possibility that lower self-efficacy related to education may depreciate scores to such a degree that depression does not exacerbate health motivation or confidence to the same degree as it does in children who would otherwise feel competent and efficacious with regard to health management.

4.3 | Predicting number of ER visits

The second MLR was designed to explore the scale's predictive utility. As aforementioned, self-efficacy has been identified as an important predictor of management success in adolescents (Dunbar-Jacob & Mortimer-Stephens, 2001). As such, we sought to determine whether PRCISE scores predicted a variable considered to be a proxy of health status: the number of ER visits in the last year. Although the PRCISE did predict the number of ER visits, this relationship was unexpectedly, though marginally positive. Otherwise said, having higher self-efficacy predicted more ER visits. This finding, though initially perplexing, may be explained by the fact that children who report greater self-efficacy may be more confident in their ability to perceive significant changes in their health status. As such, when health unexpectedly worsens, these children may be better able to advocate for an emergency visit. As Holman and Lorig (2014) explain, chronic conditions require the patient to become his or her own specialist in order to accurately manage and monitor symptoms. It is also possible that the construct was influenced by other factors such that youth with higher self-efficacy scores may have been part of systems that promoted seeking urgent medical care whereas those of low self-efficacy were in environments less attuned to acute health changes.

5 | CONCLUSION

We demonstrated that the PRCISE is a highly reliable scale with one factor. This study is unique in its finding that minority status and parent education significantly influence children's belief in their ability to succeed in personal health management. The study must also be considered in terms of its limitations. To begin, the survey did not collect information about adherence, limiting our ability to explore whether the PRCISE can be used to track compliance with medical regimens. Additionally, 26% of respondents failed to list their child's principal medical diagnosis; restricting the inferences, we are able to make about differences based on diagnostic group. Lastly, the cross-sectional nature of this study limits our ability to make causal or directional inferences.

Despite these limitations, we believe that the reliability and predictive validity of the PRCISE make it a promising measure. Because biological measurement of adherence across pediatric chronic illness is not possible due to differences in biomarkers, treatments, and disease courses, an accurate self-efficacy scale would permit the active monitoring of patients who are likely to be noncompliant with medical recommendations. Clinical use of the PRCISE may also assist providers in tailoring medical education approaches based on patient and family factors. In other words, practitioners could effectively use the PRCISE to assess patients' understanding of their illness and tailor education of self-management approaches based on these scores. In terms of future analyses, next steps may include confirming the scale's structure through a confirmatory factor analysis, and furthering predictive and discriminant validity by testing whether the PRCISE predicts or is predicted by other clinical and health variables.

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