



Development and validation of the school healthcare partnership scale for school nurses

Ju-Yeon Uhm., PhD, RN *

Associate Professor, Department of Nursing, Pukyong National University, Busan, Republic of Korea

ARTICLE INFO

Article history:

Received 20 January 2023

Revised 28 February 2023

Accepted 31 March 2023

Keywords:

Partnership

Psychometrics

Scale

School nursing

Type 1 diabetes mellitus

ABSTRACT

Purpose: This study was conducted to develop the School Healthcare Partnership Scale for School Nurses (SHCPS-S) for children with type 1 diabetes and to validate its psychometric properties.

Methods: This was a methodological study. A total 342 school nurses in South Korea participated in the study; 171 were randomly assigned to each group for exploratory factor analysis and confirmatory factor analysis. Data was collected from December 2021 to February 2022 via online survey. The Family Nursing Practice Scale was used to evaluate criterion validity, and the school nurse's professionalism scale and empathy were used to verify concurrent validity. Content validity review, response tests, and factor analysis were conducted.

Results: A 50-items pool was created based on a hybrid concept analysis. Forty items were selected following the content validity review, using content validity index. A 20-item scale with four factors (trusting relationships, balanced responsibility, providing tailored care, and transparent and open communication) was chosen following exploratory factor analysis. Confirmatory factor analysis for the four factors showed an adequate model fit. The correlation coefficient with the family nursing practice and school nurse's professionalism scale were 0.642, 0.630, and 0.376. The Cronbach's α was 0.919, and the correlation coefficient was 0.768 in test-retest.

Conclusions: The SHCPS-S is a valid and reliable scale to measure school nurses' perceived collaborative relationships with parents for children with type 1 diabetes.

Practical implications: This scale can be used as a tool in interventional studies to enhance school healthcare partnerships.

© 2023 Elsevier Inc. All rights reserved.

In 2019–2020, 19.4% of children in the US had special health care needs and 28.6% of households had at least one child with a health problem (Child and Adolescent Health Measurement Initiative, 2022). Allergies, asthma, seizure disorders, and diabetes accounted for 42%, 27.3%, 23%, and 1.9% of children and youth with special health care needs in the US, respectively (Ghandour et al., 2022), and are related to medical emergencies in schools (Gereige et al., 2022). For children with type 1 diabetes mellitus (T1D), written individualized diabetes medical management plans under the Section 504 plan or individualized education program of federal law are recommendations for during school hours and after-school activities (Gereige et al., 2022). Care coordination at schools is provided through a strong connection between students, families, school nurses, and primary healthcare providers for children suffering from chronic disease (Centers for Disease Control and Prevention, 2017).

School nurses play a pivotal role in care coordination for children with chronic diseases and their families, showing positive outcomes for child health through nurse-led interventions (Kindi et al., 2022). Staffing of an appropriate number of school nurses leads to decreased absences, improved grades and self-care (Best et al., 2021), and better glycemic control for students with T1D (Wilt, 2021). Working toward common goals, building relationships, and developing partnerships are crucial for care coordination of children with complex healthcare needs (McClanahan & Weismuller, 2015). As children's health cannot be considered in isolation from the family (Simpson & Tarrant, 2006), partnerships between school professionals, parents, and healthcare providers are essential for implementing successful school healthcare (SHC) for children with chronic diseases (An et al., 2022). In provinces responsible for SHC at the national level, parents of children with T1D reported high satisfaction with SHC (Evans-Atkinson et al., 2021).

However, SHC guidelines, such as individual healthcare plans, have not yet been implemented (Edwards et al., 2014). In one review, there was only limited documentation available from healthcare providers (Slas et al., 2022). In the US, which has strong SHC policies and procedures determined by federal and state laws for managing chronic health

* Corresponding author at: Department of Nursing, Pukyong National University, Republic of Korea.

E-mail address: juuhm@pknu.ac.kr (J.-Y. Uhm.).

conditions, only 57.2% of cases provided services for patient identification or school-based management, tracking, case management, and referral, and only 15.4% were available for access to consult with school physicians (Tiu et al., 2021). When medical support, such as action plans and communication with primary healthcare providers, is insufficient, cooperation and communication between school nurses and parents may become even more important in maintaining SHC for children with chronic disease, especially T1D.

In countries that do not provide adequate medical support in schools, SHC often depends on parents periodically visiting the school to help manage their child's T1D (Alaqeel, 2019; McCollum et al., 2019; Uhm & Choi, 2023). Although diabetes at the ages of 6–11 (0.13%) is less prevalent than asthma (9.87%) and food allergies (0.46%) (Miller et al., 2016), caregivers report that communication between healthcare providers and school was more frequent for children with diabetes (68.0%) than for allergies (32.0%) and asthma (33.9%) (Geffel et al., 2022). This finding may be because it is necessary to build SHC partnerships among stakeholders and action plans for students with T1D, such as blood glucose monitoring and insulin administration, to maintain students' target glucose level while they are at school. Additionally, parents of children with T1D have higher stress, anxiety, and depressive symptoms than parents of children without chronic disease (Van Gampelaere et al., 2020). Accordingly, school nurses need to understand the parents' psychological difficulties and help them adopt a cooperative approach for effective SHC.

Collaboration among stakeholders is a key element of care coordination among school nurses, and includes working toward common goals, building relationships, and developing partnerships (McClanahan & Weismuller, 2015). However, a mixed-methods review indicated that school nurses often perceive obstacles in the interpersonal aspects, such as lack of collaboration between families and school professionals in SHC for children with chronic diseases (Uhm et al., 2020). In a survey in the UK, 88% of 330 school nurses reported a lack of parental understanding about nurses' roles, and 82% reported a lack of communication with parents of children with chronic illness (Edwards et al., 2016). In other words, collaboration between family and school is important in SHC for children with chronic diseases; however, it is challenging for school nurses.

Although various outcomes of school nursing interventions have been measured (Best et al., 2018), there is no scale for measuring the degree of cooperation in SHC and the perceived collaboration between parents and school nurses through care coordination. There are scales for measuring the partnership between pediatric nurses and parents in acute hospitals (Choi & Bang, 2013), partnership in care between staff and families in nursing homes (Jang et al., 2021; Jang & Song, 2020), and partnership behavior between caregiver mothers at childcare centers for young children (Owen et al., 2000), however, there are no specific scales for the SHC context. Accordingly, this study addresses this gap by developing an SHC partnership scale for school nurses and parents of children with T1D and verifying its psychometrics.

Theoretical background

Partnerships between school nurses and families have been conceptualized as attending school nurse-family meetings, exchanging information, monitoring children's health, and being at school for children and families (Mäenpää et al., 2013). In this study, four attributes of school nurses' partnership with parents of children with T1D were extracted using a hybrid concept analysis based on a literature review and interviews (20 school nurses and 22 parents of children with T1D) (Uhm & Choi, 2022). The attributes are: 1) trusting relationships (establishing mutually trusting and respectful relationships between the school nurses and parents); 2) transparent and open communication (communicating openly and consistently to share and solve students' health problems); 3) balanced responsibility (compromising for

each other's needs, sharing roles, and working together to pursue common goal); and 4) providing tailored care (providing nursing actions by advocating for students' health and safety, supporting self-care, and performing a negotiated role together or individually to meet the student's care needs).

Methods

Purpose

This study was conducted to develop an SHC partnership scale for school nurses working with parents of children with T1D and validate its psychometric properties.

Study design

The scale was developed using a scale development guideline (Carpenter, 2018; DeVellis, 2016): 1) clearly determining the scale relates to a concept; 2) generating an item pool; 3) determining the measurement format; 4) having the initial item pool reviewed by experts; 5) considering the inclusion of validation items; and 6) administering items to a target sample. The psychometric properties of the preliminary scale were evaluated for validity.

Sample

In exploratory factor analysis (EFA), a small number of samples is acceptable when the commonality is 0.7 or higher, there are three to five factors, and five to seven items per factor; samples in the 100–200 range are also acceptable if there are conceptually well-determined factors and their commonality exceeds 0.5 (for most factor loadings >0.8) (MacCallum et al., 1999).

One-hundred and fifty samples are the minimum number for confirmatory factor analysis (CFA), if there are seven or less components with a "moderate" degree of communalities (= 0.5) without any undefined component factors, 100 people are allowed when there are five or fewer component factors and a component has three or more items with commonality exceeding 0.6 (Hair et al., 2019). The target number of samples was set at 400; however, data collection was terminated after recruiting 342 school nurses due to the workload caused by COVID-19 infection control at school. Thus, 342 participants were randomly assigned to two groups of 171 each for EFA and CFA.

Data collection

Data collection was requested through the school nurses' association of two provinces in South Korea and a representative online café for certifying as a school nurse and signing up as a member. An online survey was conducted using a URL from SurveyMonkey. The survey was set to proceed only after participants read the purpose and methods of the research and the consent form, and agreed to participate. Subsequently, they accessed the URL in the research notice. The survey period was approximately two months (December 2021 to February 2022).

Scale development

Generating an item pool

Initially, 70 items were developed based on the attributes and indicators derived from the concept analysis of the hybrid model, and 50 were selected as preliminary items (Uhm & Choi, 2022). Multiple negatives or double-barreled items creating confusion about the intended meaning were excluded in this phase. A five-point Likert scale was selected as the response format. Parents were defined as the child's legal father and mother, and the scale was developed in Korean.

Expert review and language adequacy

The content validity of the initial items was evaluated using the content validity index (CVI) conducted by nine experts. When the number of experts is 6–10, the CVI must be 0.78 or higher and the sum-CVI (S-CVI) must be 0.9 or higher. Items with an item-level CVI (I-CVI) < 0.8 were removed (Polit & Beck, 2006). Preliminary questions were confirmed after being reviewed by a professor in the Department of Korean Literature.

Response test for target population

Responses were tested to check the level of school nurses' understanding of the items in the preliminary scale and to check for errors in items. Twenty school nurses were asked online about the average and difficulty for each item, overall understanding of the scale, and appropriateness of the time required for completion, and were asked to freely describe their opinions on each item.

Validity test of the scale

Following item analysis, construct and criterion validity were evaluated to verify the validity of the preliminary scale in this phase. Construct validity is a method of confirming whether a scale has related constructs, and is evaluated by convergent and discriminant validity and factor analysis (Boateng et al., 2018). Convergent and discriminant validity investigate the validity regarding the expected relationship with other outcomes measures of good quality and expected difference between relevant groups (Mokkink et al., 2019). Criterion validity is a method to investigate the extent to which the scale has a strong relationship with the gold standard for measuring a concept, which is evaluated as predictive and concurrent validity (Boateng et al., 2018).

EFA and CFA were performed to verify the construct validity. The EFA, CFA, and convergent and discriminant validity were assessed to verify construct validity. Of 342 participants, half ($n = 171$) were used for EFA, and half ($n = 171$) for CFA, criterion validity, concurrent validity, and reliability tests. Participants were randomly assigned using SPSS.

Item analysis

For item analysis of the initial 40 items, the mean, range, inter-item correlation (IIC), item-total correlation (ITC), and ceiling and floor effects were evaluated. For normality, standardized skewness ($Z_{skewness}$) and kurtosis ($Z_{kurtosis}$) were evaluated with a cut-off of 1.96 ($p < .05$) (Hair et al., 2019). The criterion for the average IIC was 0.15 to 0.50 (Clark & Watson, 1995). Although some degree of multicollinearity is allowed in scale development (Hair et al., 2019), a correlation of 0.7 or more can be deleted as it is considered a duplicate item (Ferketich, 1991). Items with an ITC of < 0.30 were deleted (Boateng et al., 2018). Floor and ceiling effects were defined as >15% of the responses in items with the lowest (1) or highest (5) scores (Terwee et al., 2007).

Construct validity

Exploratory factor analysis

Common factor analysis was conducted to identify latent constructs using principal axis factoring (PAF); PAF outperforms principal components analysis (PCA), which includes unreliable measurement errors (Watkins, 2018). PAF also outperforms the maximum likelihood when factor loading is weak, sample size is small, and normality is violated (Watkins, 2018).

Promax rotation, a moderate inter-factor correlation based on previous research (Choi & Bang, 2013; Jang et al., 2021), was performed to control the inter-factor correlation (Carpenter, 2018; Hair et al., 2019). The factor loadings were set to 0.40 considering the sample size ($n = 171$ for EFA) for this study (Hair et al., 2019). The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO MSA) and Bartlett's sphericity tests were performed to evaluate the adequacy of the factor analysis (Hair et al., 2019).

Confirmatory factor analysis

Factors were identified based on a three-indicator rule (Hair et al., 2019). The absolute fit index, which evaluates the fit of the covariance matrix of data collected using the covariance matrix of the research model based on the theory, was evaluated. In addition, the incremental fit index, which provides information on the best model, was evaluated while considering the model's complexity (Woo, 2012).

As the absolute fit index, it is considered acceptable if the p -value of the χ^2 is ≥ 0.5 , and if the Chi-square minimum/degree of freedom (CMIN/DF) is less than three, and is considered good if it is less than two. When the standardized root mean square residual (SRMR) is 0.5 or less and the goodness-of-fit index (GFI) is >0.9, it is good. A root mean square error of approximation (RMSEA) of 0.08 or less is fair, and of 0.05 or less is good (Boateng et al., 2018). The incremental fit index was evaluated using the normed fit index (NFI), Tucker-Lewis index (TLI), and comparative fit index (CFI). One of these values indicates a perfect fit, and ≥ 0.9 indicates a good fit (Woo, 2012). For model comparison, the larger the Akaike information criterion (AIC), the better the model (Woo, 2012).

Convergent and discriminant validity

Convergent validity refers to the degree of concordance between observed variables that measure latent factors; the validity is secured when the standardized estimate is ≥ 0.5 (≥ 0.7 ideally) (Hair et al., 2019). Convergence validity was also evaluated using an average variance extracted (AVE) of 0.5 or more. Construct reliability (CR) of 0.7 or higher means that there is adequate convergent validity as well as internal consistency. CR and AVE were calculated using standardized estimates and standard errors in the CFA.

Discriminant validity refers to the degree to which the difference between independent latent variables is indicated; the lower the correlation between the latent variables, the greater the discriminant validity. The AVE value of the latent factors must be greater than the squared correlation coefficient between them, which reflects discriminant validity (Hair et al., 2019). Discriminant validity was evaluated using known-group validity, which was assessed by comparing the mean SHC partnership scores of participants in the top 20% and bottom 20% of the family nursing score to evaluate criterion validity.

Criterion validity

The Family Nursing Practice Scale (Simpson & Tarrant, 2006), which evaluates nurses' feelings toward your work with families, was used to verify the criterion validity of our scale. Nurses' critical appraisal of family systems nursing practice (knowledge, skill, and confidence), promoting family participation and reciprocity in the therapeutic relationship of this scale were included as an attribute of partnership (Choi & Bang, 2013; Coyne & Cowley, 2007). The scale has two dimensions: practice appraisal and nurse-family relationships. The psychometric properties of the scale were verified. Cronbach's α was 0.84 and 0.89 at the time of development and in this study, respectively. As other measures of concurrent validity, the school nurse's professionalism scale was used to evaluate the concurrent validity of the tool (Kwon, 2020). This scale includes four factors: professional accountability, autonomy, competency development, and social recognition. Cronbach's α was 0.92 at the time of development and 0.92 in this study. In addition, seven items of perspective taking in the interpersonal response index domain, developed to measure empathy ability, were used (Davis, 1983). Cronbach's α was 0.70–0.78 at the time of development and 0.73 in this study.

Reliability test of the scale

Internal consistency, construct reliability (CR), and stability were evaluated through test-retest to confirm the scale's reliability. Cronbach's α was calculated to evaluate internal consistency. CR was calculated using the standard error values of the standardized and

non-standardized estimates in the CFA. Test-retest was performed two weeks after the first evaluation to evaluate the stability of the scale among 53 participants.

Ethical considerations

This study was approved by the university's institutional review board (IRB: 1041386–202108–HR-44-02). The purpose and methods of the research were explained, and participation was voluntary after consent was obtained. A beverage coupon was provided as a reward for survey participation.

Analysis

Descriptive statistics, correlation analysis, Chi-square test, independent *t*-test, reliability test, and item reduction using PAF were performed using SPSS 27.0. AMOS 28.0 was used for CFA. The significance of the standardized estimate value and critical ratio was confirmed. Model fit was evaluated using the absolute χ^2 , CMIN/DF, SRMR, RMSEA, GFI, NFI, TLI, and CFI.

Results

Expert review of preliminary items

The I-CVI of the 50 preliminary questions ranged from 0.56 to 1.00, and the S-CVI was 0.92. Among the initial questions, four with an I-CVI of 0.78 or less were deleted, as were four items that were recognized differently from the original intended meaning. Three items with similar meanings were integrated into one item, reflecting experts' opinions. Forty preliminary items were finalized.

Findings of the response test

A preliminary survey was conducted among 20 school nurses. Perceived partnership level was 4.06 ± 0.39 on a five-point Likert scale, and the difficulty level was 3.57 ± 0.37 on a four-point Likert scale, indicating that most of the questions were not difficult. As the kurtosis of an item on "care in emergency" was 7.35 and there was an opinion that the item did not have the specificity of partnership, it was deleted. A new item was added to reflect an opinion on "sharing physician's prescriptions," and the preliminary scale was confirmed with 40 items (Supplementary file).

Findings of the validity tests

Item analysis

Of 342 participants, the average score for the scale with the initial 40 items was 4.02 ± 0.43 . The mean of each item ranged from 2.89 to 4.57 (items 36 and 30, respectively) (Supplementary file). The range of $Z_{skewness}$ and $Z_{kurtosis}$ of each item were -7.59 – 0.71 and -5.65 – 7.70 , respectively. Items 1, 19, and 29 were deleted, as they exceeded the cut-off values for both $Z_{skewness}$ and $Z_{kurtosis}$. The range of the IIC was 0.081–0.798. The average IIC was 0.344, which was within the acceptable range. The ITC ranged from 0.363 to 0.683. Items 4 and 22 had correlations of over 0.7. Item 30, which had an extreme ceiling effect of 50%, was deleted. There were no floor effects. Ultimately, 34 items were retained for theoretical reasons. For the final EFA, 171 participants were randomly allocated, which is close to the minimum sample of five per item. The characteristics of the participants are shown in Table 1. There was no difference in demographics between the EFA and CFA groups.

Construct validity

EFA. As the normality of several items was violated in the item analysis (Supplementary file), PAF was performed using Promax rotation.

Table 1
Participant's demographics (N = 342).

	Group for EFA (n = 171)	Group for CFA (n = 171)	t or Chi-Square	P
	Mean or n (%)			
Age	43.95 ± 8.99	44.46 ± 8.75	−0.536	0.592
Career as a school nurse (year)	10.71 ± 9.85	11.23 ± 9.77	−0.491	0.624
School healthcare partnership	4.03 ± 0.41	4.02 ± 0.45	0.240	0.810
Family nurse practice	3.58 ± 0.63	3.61 ± 0.63	−0.460	0.645
School nurse professionalism	3.39 ± 0.42	3.39 ± 0.39	0.133	0.894
Empathy	3.84 ± 0.47	3.84 ± 0.54	0.046	0.964
Gender				
Female	170 (99.4)	168 (98.2)	1.012	0.623
Male	1 (0.6)	3 (1.8)		
Education				
University	144 (84.2)	140 (81.9)	0.332	0.666
Graduate school	27 (15.8)	31 (18.1)		
Position				
Full-time	126 (73.7)	117 (68.4)	1.152	0.340
Part-time	45 (26.3)	54 (31.6)		
Region				
Metropolitan	126 (73.7)	128 (74.9)	0.061	0.902
Non- Metropolitan	45 (26.3)	43 (25.1)		
Type of school				
Public school	167 (97.7)	170 (99.4)	1.827	0.371
Private school	4 (2.3)	1 (0.6)		
Number of students				
<500	69 (40.4)	67 (39.6)	0.179	0.981
501 to 1000	64 (37.4)	65 (68.5)		
1001 to 1500	33 (19.3)	31 (18.3)		
≥1501	5 (2.9)	6 (3.6)		
Students with chronic disease				
1 to 2	74 (43.0)	78 (45.6)	4.258	0.235
3 to 5	43 (25.1)	34 (19.9)		
6 to 20	41 (24.0)	52 (30.4)		
≥21	13 (7.6)	7 (4.1)		

EFA = exploratory factor analysis, CFA = confirmatory factor analysis, Significance $P < .05$.

Following rotation, the five-factor solution was responsible for the common variance, constituting 51.10% of the total variance (Table 2). The first, second, and third factors accounted for 13.28%, 10.94%, 11.13% of the total variance and 25.98%, 21.40%, 21.78% of common variance, respectively. The fourth and the fifth factors accounted for 8.66% and 7.09% of the total variance and 16.96% and 13.88% of the common variance, respectively. Both KMO MSA and Bartlett's Test of Sphericity were satisfactory. Twenty items with five factors were extracted from the EFA.

CFA. Five factors were extracted from the EFA. The self-care and providing negotiated care dimensions were separated from the PAF. However, in the previous concept analysis for this study, these dimensions were attributes classified as one dimension, "providing tailored care" (Uhm & Choi, 2022). Therefore, it was decided to select a better model by comparing two CFA models: a five-factor model derived from the EFA finding (Model 1, Fig. 1), and a four-factor model derived from the theoretical framework (Model 2, Fig. 1). All critical ratios obtained by dividing the non-standardized coefficient by the standard error were >1.965 , and the *p*-value was significant at $p < .001$.

In Model 1, the lowest and highest standardized factor loads were 0.527 and 0.933, respectively. The absolute fit indices were included in the recommended range with the CMIN/DF = 1.994, SRMR = 0.035, and RMSEA = 0.076. In the incremental fit indices, CFI was >0.9 , but normed fit index and TLI were <0.9 . In Model 2, the lowest and highest standardized factor loads were 0.528 and 0.932, respectively. Absolute fit indices were included in the recommended range with the CMIN/DF = 1.774, SRMR = 0.034, and RMSEA = 0.067. The incremental fit indices, including TLI and CFI, were higher than 0.9.

The two models were acceptable. When comparing the absolute fit indices, incremental fit indices, and AIC between models, Model 1

Table 2
Exploratory factor analysis (Principle axis factoring) (N = 171).

Number of item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1	0.807	-0.103	-0.088	0.005	0.124
2	0.702	0.023	0.005	-0.083	0.038
3	0.600	0.177	0.148	0.082	-0.167
4	0.587	0.322	-0.021	0.055	-0.256
5	0.525	-0.109	0.092	-0.056	0.359
6	0.512	0.028	0.141	0.106	-0.045
7	-0.077	0.830	0.119	-0.065	0.041
8	0.063	0.703	0.049	-0.002	0.006
9	0.101	0.619	-0.075	0.024	0.155
10	0.025	0.616	-0.101	0.075	0.120
11	-0.048	0.096	0.859	-0.156	-0.006
12	0.166	-0.144	0.728	0.019	-0.023
13	0.047	0.023	0.667	0.096	-0.010
14	-0.100	0.025	0.562	0.195	0.195
15	-0.023	-0.026	-0.077	0.996	0.014
16	0.064	0.047	0.082	0.676	0.038
17	0.021	0.063	0.289	0.405	0.073
18	0.274	0.101	0.075	-0.025	0.621
19	-0.183	0.061	0.033	0.081	0.615
20	0.302	0.175	-0.071	0.001	0.573
Eigen value	2.66	2.19	2.23	1.73	1.42
Rotation sums of squared loadings	5.489	5.222	4.691	3.732	4.035
% of total variation explained by the factors	13.28	10.94	11.13	8.66	7.09
Cumulative total variance (%)	13.28	24.21	35.34	44.01	51.10
% of common variance	25.98	21.40	21.78	16.96	13.88
Kaiser-Meyer-Olkin MSA	0.895				
Bartlett's Test of Sphericity	<0.001				

MSA = measure of sampling adequacy.

4-factor) was better (Table 3). Therefore, a four-factor model was chosen. The standardized factor load, inter-factor correlation (CFA), and number of items for each factor are shown in Fig. 1.

Convergent and discriminant validity. In the CFA, the standardized estimates of all items ranged from 0.528 to 0.932 (minimum threshold ≥ 0.5). AVEs ranged from 0.636 to 0.744, which were greater than reference value ≥ 0.5 , and CR values ranged from 0.885 to 0.928 (minimum threshold ≥ 0.7) (Table 4), which demonstrated convergent validity.

In CFA, the squared correlation coefficients (Φ^2) between Factors 1 and 2, Factors 1 and 3, and Factors 1 and 4 were 0.564, 0.486, and 0.537, respectively. The Φ^2 between Factors 2 and 3 and Factors 2 and 4 were 0.429 and 0.403, respectively. The Φ^2 between Factors 3 and 4 was 0.341. AVEs ranged from 0.636 to 0.744, which were greater than Φ^2 between the two factors. Additionally, a significant difference among SHC partnership scores in known-group comparisons (3.66 ± 0.41 in the bottom 20% versus 4.48 ± 0.42 in the top 20% of family nursing practice, $t = -0.82$, $p < .001$). These showed discriminant validities.

Criterion validity

The correlation coefficient between SHC partnership and the family nurse practice was 0.642, which reflected criterion validity (Table 5). The correlation coefficients between SHC partnership and school nurse professionalism and empathy were 0.630 and 0.376, respectively, which reflected concurrent validity.

Findings of the reliability test

The Cronbach's α of each factor ranged from 0.784 to 0.856, and the α of SHC partnership scale was 0.919. IIC ranged from 0.128 to 0.812 ($M = 0.375$). The CR was higher than 0.7, which reflected internal consistency. The test-retest correlation coefficient for measuring the scale's stability was 0.768 ($p > .001$), which was statistically significant (Table 4).

Confirmation of the scale

The 20-item scale with 4 factors identified through CFA was named the School Healthcare Partnership Scale for School Nurses (SHCPS-S). The SHCPS-S was verified through confirmation of reliability and validity (Supplementary file). A 20-item scale with four factors (trusting relationships, balanced responsibility, providing tailored care, and transparent and open communication) was chosen following factor analysis. The 20-item SHCPS-S is scored using 5-point Likert scale, and the total scores range from 20 to 100 points. For the group for CFA, the summed score of SHCPS-S was 81.58 ± 8.81 (range 54 to 100), and average score of SHCPS-S was 4.08 ± 0.44 (range 2.70 to 5.00).

Discussion

This study was conducted to verify the reliability and validity of a scale to measure school nurses' perceived partnership with parents in SHC. The scale's validity was verified through the development of attributes and items based on valid theoretical constructs that explained the phenomenon of interest that is, partnerships between school nurses and parents in school settings (DeVellis, 2016). The scale was developed with items based on a hybrid model concept analysis comprising the findings of both the theoretical and field phases to obtain a well-formed definition of the concept.

EFA and CFA were performed with distinct participant groups to verify the construct validity. This study was conducted using the PAF to assess the sources of common variance. Compared to PCA, PAF does not retain unnecessary items by not including error variance (Carpenter, 2018). Common factor analysis can compensate for the disadvantage that PCA has too many components while including error variance, and has the advantage of being more generalizable when presenting a hypothesized model to CFA (Carpenter, 2018). Further, this study used oblique rather than orthogonal rotation, considering the correlation between the attributes of partnerships in previous nursing areas (Choi & Bang, 2013; Jang et al., 2021). Promax rotation was performed considering the correlation between factors of moderate or higher degrees (Carpenter, 2018; Hair et al., 2019).

In CFA, the remaining absolute fit indices, such as root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and Chi-square minimum/degree of freedom (CMIN/DF), were acceptable. Although the values for GFI were less than the threshold value, several studies have accepted models with values above 0.8 or 0.85 (Mori et al., 2022; Shin & Kim, 2021). Although the RMSEA is controversial as an absolute fit index, it generally suggests a cut-off value of 0.05 or 0.08; the smaller the value, the better (Hair et al., 2019). The normed fit index (NFI) and Tucker-Lewis index (TLI) were < 0.9 ; however, comparative fit index (CFI) was acceptable in both Models 1 and 2. CFI is meaningful, as is independent of model complexity, sample size, and CFI increase (Cheung & Rensvold, 2002). However, NFI and TLI were higher in Model 2 than in Model 1; in particular, TLI exceeded 0.9 in Model 2. Therefore, further studies need to compare models in which the factor 'supporting self-care' is included in and independent of 'providing tailored care' using CFA.

Convergent and discriminant validity demonstrated adequate construct reliability (CR) and average variance extracted (AVE) values. The SHCPS-S showed criterion validity with a correlation coefficient of 0.64 with the Family Nursing Practice Scale. It also showed concurrent validity by presenting a high correlation with measures of school nurses' professionalism and empathy. This aligns with the findings of a previous study in which partnerships with parents, as perceived by nurses in an inpatient setting, showed a correlation with nurse professional values and compassion scales (0.57 and 0.66, respectively) (Choi & Uhm, 2022).

The scale's reliability was evaluated on the basis of its internal consistency and stability. The internal consistency of the SHCPS-S was verified, showing a higher Cronbach's α range of 0.784–0.856 and over 0.7

A. Model 1 (5-factor)

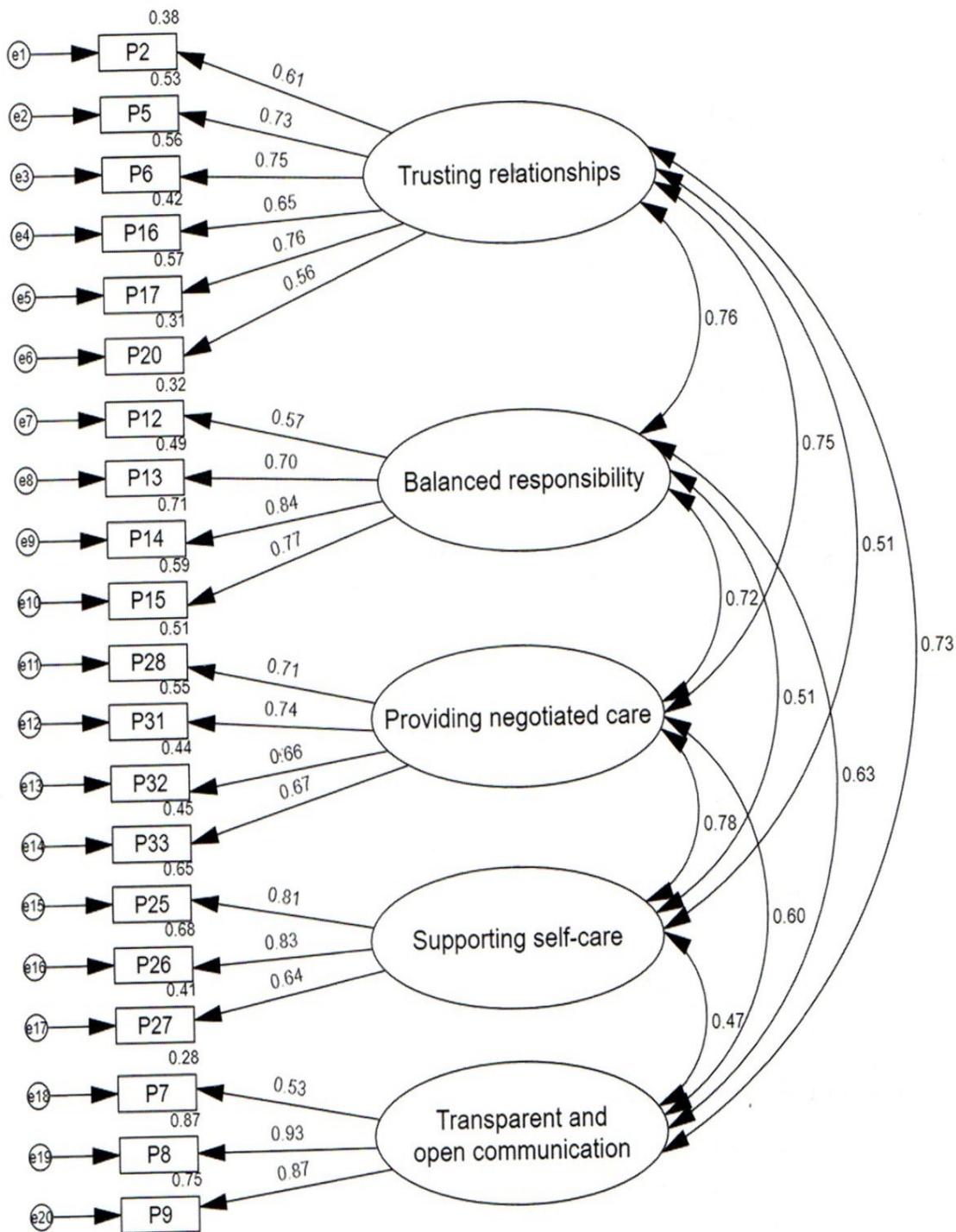


Fig. 1. Modeling through confirmatory factor analysis.

CR (Hair et al., 2019). The criterion for the average inter-item correlation (IIC) is 0.15–0.50 (Clark & Watson, 1995), and an average r between 0.20 and 0.40 implies an optimal level of item specificity (Piedmont & Hyland, 1993); in this study, the IIC was 0.356, which was within this range. Cronbach's α of ≥ 0.7 is considered acceptable (DeVellis, 2016). If the CR is ≥ 0.7 , it means that there is adequate convergent validity and internal consistency (Hair et al., 2019). The test-retest correlation coefficient was 0.768, which verified the stability of the scale for measurements under a similar design and data collection. Based on the above, it can be inferred that the SHCPS-S has good reliability and validity.

The SHCPS-S showed a better fit in the model using four dimensions: trusting relationships, balanced responsibility, providing tailored care, and transparent and open communication with parents. Trust, negotiation, shared decision-making, shared knowledge, and communication

are well-known attributes of partnership (Bidmead et al., 2002; Hook 2006).

First, trust is characterized by a dynamic process and relationship attributes (Dinç & Gastmans, 2013). The trust between nurses and patients can be evaluated by whether the nurse is present when the patient needs it, and whether the nurse performs according to the patient's needs (Stolt et al., 2016). In the nursing partnership scale, a trust relationship is an essential aspect that is included as a dimension or item (Choi & Bang, 2013; Jang et al., 2021). The "trusting relationships" dimension of this study included parents' politeness and respect for school nurses' professionalism. These results are similar to those in which the family respects healthcare professionals in the trust dimension of the Scale for Staff-Family Partnership in Long-Term Care (SSFPLC) (Jang et al., 2021). By contrast, respect for parents is included the "reciprocity" dimension in the Pediatric Nurse-Parent Partnership

B. Model 2 (4-factor)

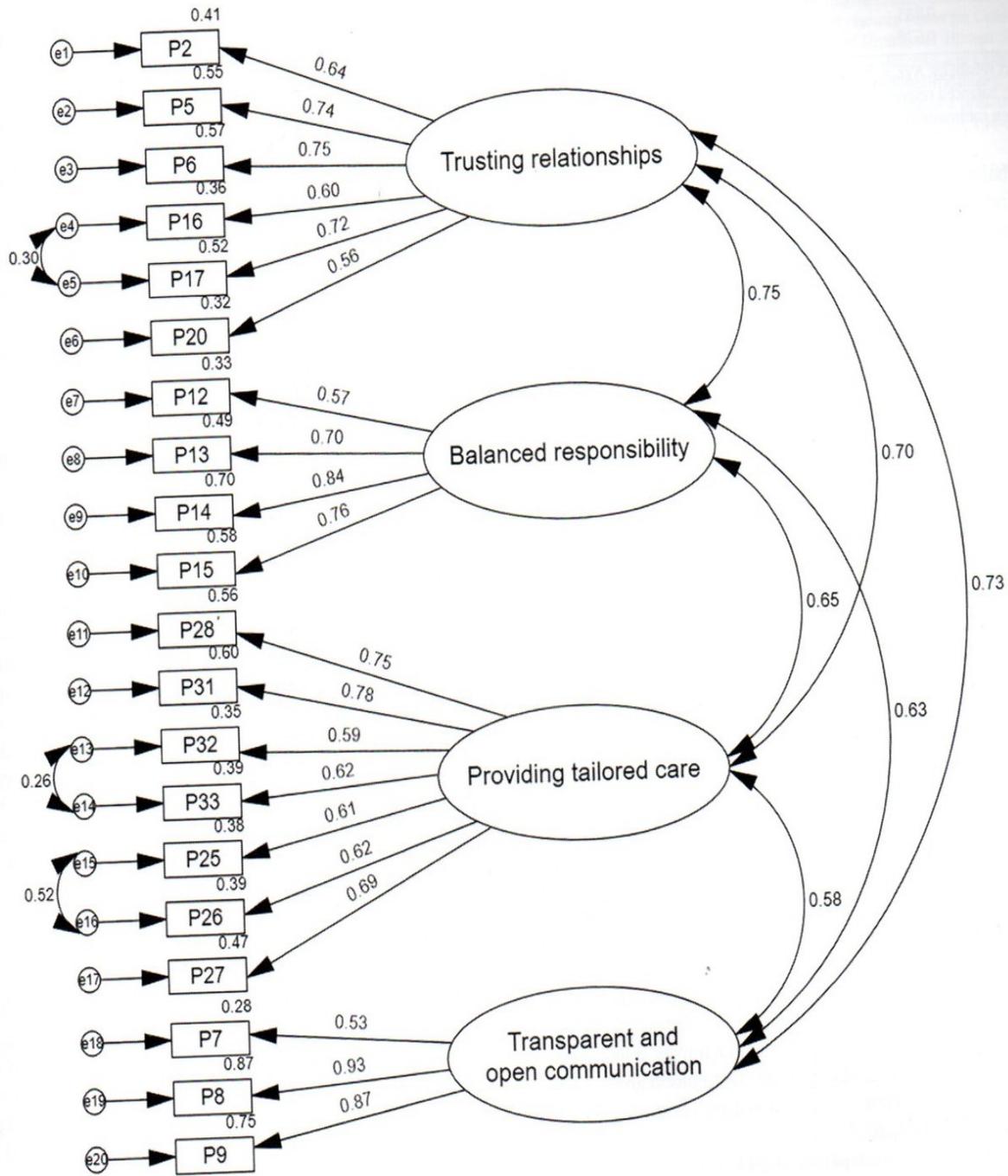


Fig. 1 (continued).

Scale (PNPPS). In the “trusting relationships” dimension of our scale, three sentences were mutually recognized for each situation and role as a common goal. “Recognition of each situation and roles” is similar to “understanding each other’s position” of the PNPPS (Choi & Bang, 2013). “Common goal” (an item included in the SSFPLC) was included

in the collaborative relationship and communication dimension (Jang et al., 2021). “Assisting each other” from this study was similar to the “working with others to meet student health needs” in leveraging the school and family team dimension in the scope of practice in school nurses scale (White et al., 2021).

Table 3
Comparison of model fit through confirmatory factor analysis (N = 171).

	CMIN/DF	RMR	RMSEA	GFI	NFI	TLI	CFI	AIC
Model 1 (5-factor)	1.994	0.035	0.076	0.836	0.826	0.885	0.903	418.986
Model 2 (4-factor)	1.774	0.034	0.067	0.850	0.845	0.911	0.924	383.605
Criteria	< 2	≤ 0.05	≤ 0.08	> 0.9	> 0.9	> 0.9	> 0.9	
Interpretation	Good	Good	Good			Acceptable fit	Acceptable fit	

CMIN/DF = Chi-square minimum/degree of freedom, CFI = comparative fit index, RMSEA = root mean square error of approximation, GFI = goodness-of-fit index, NFI = normed fit index, TLI = Tucker-Lewis index.

Table 4
Cronbach's alpha, composite reliability, and average variance extracted (N = 171).

	Factor 1	Factor 2	Factor 3	Factor 4
Cronbach's a	0.833	0.799	0.856	0.784
CR	0.885	0.919	0.928	0.892
AVE	0.636	0.737	0.650	0.744

CR = construct reliability, AVE = average variance extracted, Factor 1: trusting relationships, Factor 2: balanced responsibility, Factor 3: providing tailored care, Factor 4: transparent and open communication.

Second, balanced responsibility included a total of four items: verification of parents' SHC needs and preferences, explanation of the scope of school nurses in administering SHC, compromise for each other's requirements, and healthcare decisions through discussion. Compared with previous studies, negotiations in this study contained a compromise process to determine the parent's role in SHC, and SSFPLC included behaviors or perceptions to encourage parental participation (Jang et al., 2021). This dimension was comparable with items in the leveraging the school and family team dimension in the scope of practice in school nurses scale, such as "involve student/family in planning for their needs" on working with others to improve the health needs of students (White et al., 2021).

The third dimension, providing tailored care, included essential nursing and professional roles to be played for children with chronic diseases that are determined by negotiation with parents and supporting self-care. This dimension aligns with the attributes of partnership, including working together to negotiate goals, plans and boundaries, participation and involvement, and support and advocacy (Bidmead et al., 2002). This dimension is similar to the "professional domain" in the SSFPLC (Jang et al., 2021). As some students require continuous glucose monitoring, parents can know the child's status first and then ask the school nurse to take action. When parents visit the school, the school nurse's role in students' SHC negotiated. Accordingly, items related to checking the students' condition at parents' request and providing student care within the scope discussed with the parents are unique to this scale, reflecting partnerships in school settings. Based on this study's EFA, school nurses believe that they should proactively reinforce self-care, rather than only upon parents' request or through negotiations. However, when "supporting self-care" and "providing negotiated care" were combined into one factor, the model was better in CFA. It is believed that school nurses consider it necessary to work with parents to support students' self-care. School nurses' role in diabetes care includes being present, maintaining stable blood glucose level and improving metabolic control, and educating children with T1D (Stefanowicz & Stefanowicz, 2018).

The fourth dimension is transparent and open communication. Effective communication among stakeholders is a key issue in SHC for chronic diseases (Uhm et al., 2020) and an essential attribute of scales for measuring partnerships. However, several items in this dimension were excluded owing to their high correlation with other dimensions; only three items were retained in this study. As effective communication should entail meeting when necessary, maintaining contact, and

an open mind, items related to visits or contact and an open mind were included. The communication dimension in most scales for measuring partnerships in pediatric units in hospitals (Choi & Bang, 2013) and long-term facilities (Jang et al., 2021) includes communication. The mother-caregiver partnership scale includes questions on providing counterparty information and discussing child or patient problems to share information, asking the patient or child, and talking to the subject to seek information in the relational domain (Owen et al., 2000). This aligns with the findings of SHCPS-S in this study but contrasts with the mother-caregiver partnership scale, which contains items regarding praising and advising the counterparty (Owen et al., 2000), compared with previous studies on partnership development.

Combining the above, the SHCPS-S appears to be conceptually appropriate, as well as reliable and valid can be used as a tool in interventional studies to enhance school healthcare partnerships. It is essential to improve conditions for SHC to promote strong partnerships. Because school nurses' workload and local regulations are still obstacles to their role (Davis et al., 2021), efforts to reduce these obstacles are vital. It is also necessary to develop effective educational content for school nurses regarding best school diabetes care (Beak & Kim, 2021) and provide them with sufficient education.

Practical implications

The SHCPS-S can be used to measure an outcome of school nurse regarding introducing a school health policy and guidelines for children with T1D. Future research is needed to see how the perceived partnership levels of school nurses relate to the health outcomes of children with other chronic diseases. In addition, this scale can be used to assess whether the degree of partnership differs according to students' type of chronic disease and the number of students with T1D assigned to each school nurse. Finally, a comparative study of the partnership between parents and school nurses will can facilitate understanding of the obstacles faced by each, which can be used as data for developing interventions.

Limitations

First, although the sample size was adequate, only school nurses from specific regions were included. Future research should include heterogeneous groups of school nurses. Second, even if the factors from EFA were tested by CFA, the number of factors derived from EFA differed from the number of factors derived from the concept analysis; therefore, it is necessary to reconfirm the number of factors using EFA.

Conclusion

The SHCPS-S was developed to measure school nurse's partnership with parents of children with T1D using a scale development procedure and dimensions derived based on the hybrid concept. The factors were confirmed through EFA and CFA. PAF was performed to minimize

Table 5
Correlations among main variables (N = 171).

Scale	Factor 1	Factor 2	Factor 3	Factor 4	FNP	SNP	Empathy
Scale	1						
Factor 1	0.864**	1					
Factor 2	0.823**	0.607**	1				
Factor 3	0.828**	0.595**	0.544**	1			
Factor 4	0.777**	0.611**	0.594**	0.496**	1		
FNP	0.642**	0.514**	0.577**	0.532**	0.495**	1	
SNP	0.630**	0.584**	0.415**	0.575**	0.480**	0.420**	1
Empathy	0.376**	0.352**	0.224**	0.333**	0.326**	0.331**	0.285**

Factor 1: trusting relationships, Factor 2: balanced responsibility, Factor 3: providing tailored care, Factor 4: transparent and open communication.
** All P < .001, Scale = school healthcare partnership scale for school nurses, FNP = Family nurse practice, SNP = school nurse professionalism.

redundancy, and Promax oblique rotation was performed in consideration of the high correlation between regions.

Four factors were derived from the EFA and verified from the CFA: trusting relationships, balanced responsibility, providing tailored care, and transparent and open communication. The SHCPS-S is reliable, demonstrating internal consistency and stability. The scale showed criterion and concurrent validity, with a high correlation with school nurse professionalism, empathy, and family nurse practice.

The findings of this study show that the SHCPS-S is a psychometrically appropriate scale. It would be useful for measuring school nurses' perceived collaborative relationships with parents of children with T1D. Nurses can use this scale to measure outcomes regarding introducing a school health policy and guidelines for children with T1D. Additionally, this scale can be used for comparative studies of health outcomes of children with other chronic disease, school nurses' workload, and parents' partnerships with school nurse.

Funding

This work was supported by the National Research Foundation of Korea (NRF), funded by the Korean Government's Ministry of Science and ICT (MSIT) (NRF-2018R1C1B5086063).

Data availability

The datasets analyzed during the current study are not publicly available due to ethical restrictions, but they are available from the corresponding author on reasonable request.

Declaration of Competing Interest

There are no conflicts of interest to declare.

Acknowledgments

I am deeply grateful to the school nurses who participated in the survey.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pedn.2023.03.019>.

References

- Alqaheel, A. A. (2019). Are children and adolescents with type 1 diabetes in Saudi Arabia safe at school? [article]. *Saudi Medical Journal*, 40(10), 1019–1026. <https://doi.org/10.15537/smj.2019.10.24582>.
- An, R., Li, D., Cole, M., Park, K., Lyon, A. R., & White, N. H. (2022). Implementation of school diabetes care in the United States: A scoping review. *The Journal of School Nursing*, 38(1), 61–73. <https://doi.org/10.1177/10598405211026328>.
- Beak, E. M., & Kim, Y. H. (2021). Factors included in T1DM continuing education for Korean school nurses: A systematic review. *International Journal of Environmental Research and Public Health*, 18(4). <https://doi.org/10.3390/ijerph18041620>.
- Best, N. C., Nichols, A. O., Waller, A. E., Zomorodi, M., Pierre-Louis, B., Oppewal, S., & Travers, D. (2021). Impact of school nurse ratios and health services on selected student health and education outcomes: North Carolina, 2011–2016. *The Journal of School Health*, 91(6), 473–481. <https://doi.org/10.1111/josh.13025>.
- Best, N. C., Oppewal, S., & Travers, D. (2018). Exploring school nurse interventions and health and education outcomes: An integrative review. *Journal of School Nursing*, 34(1), 14–27. <https://doi.org/10.1177/1059840517745359>.
- Bridgman, C., Davis, H., & Day, C. (2002). Partnership working: What does it really mean? *Community Practitioner*, 75(7), 256–259.
- Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Frontiers in Public Health*, 6, 149. <https://doi.org/10.3389/fpubh.2018.00149>.
- Carpenter, S. (2018). Ten steps in scale development and reporting: A guide for researchers. *Communication Methods and Measures*, 12(1), 25–44. <https://doi.org/10.1080/19312458.2017.1396583>.
- Centers for Disease Control and Prevention (2017). *Research Brief: Addressing the needs of Students with Chronic Health Conditions: Strategies for Schools*. Department of Health and Human Services, Centers for Disease Control and Prevention. Retrieved May 20 from https://www.cdc.gov/healthyschools/shs/chronic_disease_management.htm.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance [academic journal]. *Structural Equation Modeling*, 9(2) (233–232).
- Child and Adolescent Health Measurement Initiative (2022). *2020–2021 National Survey of Children's health (NSCH) data query*. Data resource Center for Child and Adolescent Health supported by the U.S. Department of Health and Human Services. Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB). Retrieved January 02 2023 from www.childhealthdata.org.
- Choi, M. Y., & Bang, K. S. (2013). Development and testing of a pediatric nurse parent partnership scale. *Journal of Korean Academy of Nursing*, 43(2), 194–202. <https://doi.org/10.4040/jkan.2013.43.2.194>.
- Choi, M. Y., & Uhm, J. Y. (2022). Factorial validity of the pediatric nurse parent partnership scale-pediatric nurses (PNPPS-PN). *Healthcare (Basel)*, 10(6). <https://doi.org/10.3390/healthcare10060991>.
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7, 309–319.
- Coyne, I., & Cowley, S. (2007). Challenging the philosophy of partnership with parents: A grounded theory study. *International Journal of Nursing Studies*, 44(6), 893–904. <https://doi.org/10.1016/j.ijnurstu.2006.03.002>.
- Davis, D., Maughan, E. D., White, K. A., & Slota, M. (2021). School nursing for the 21st century: Assessing scope of practice in the current workforce. *The Journal of School Nursing*, 37(5), 374–386. <https://doi.org/10.1177/1059840519880605>.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44(1), 113–126. <https://doi.org/10.1037/0022-3514.44.1.113>.
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (4th ed.). SAGE Publication.
- Dinc, L., & Gastmans, C. (2013). Trust in nurse-patient relationships: A literature review. *Nursing Ethics*, 20(5), 501–516. <https://doi.org/10.1177/0969733012468463>.
- Edwards, A., Street, C., & Rix, K. (2016). *Nursing in schools: How school nurses support pupils with long-term health condition*. London, UK: National Children's Bureau.
- Edwards, D., Noyes, J., Lowes, L., Haf Spencer, L., & Gregory, J. W. (2014). An ongoing struggle: A mixed-method systematic review of interventions, barriers and facilitators to achieving optimal self-care by children and young people with type 1 diabetes in educational settings. *BMC Pediatrics*, 14, 228. <https://doi.org/10.1186/1471-2431-14-228>.
- Evans-Atkinson, T., Fung, A., Antunes Silvestre, A., Crozier, T., & Hursh, B. (2021). Evaluation of a province-wide type 1 diabetes care plan for children in the school setting. *Canadian Journal of Diabetes*, 45(1), 15–21. <https://doi.org/10.1016/j.cjcd.2020.04.004>.
- Ferketich, S. (1991). Focus on psychometrics. Aspects of item analysis. *Research in Nursing & Health*, 14(2), 165–168. <https://doi.org/10.1002/nur.4770140211>.
- Geffel, K. M., Lombardi, B. M., Yu, J. A., & Bogen, D. (2022). Prevalence and characteristics of Providers' Care coordination communication with schools. *Academic Pediatrics*, 22(7), 1184–1191. <https://doi.org/10.1016/j.acap.2022.01.009>.
- Gereige, R. S., Gross, T., Jastaniah, E., & HEALTH, C. O. S., & MEDICINE, C. O. P. E. (2022). Individual medical emergencies occurring at school. *Pediatrics*, 150(1). <https://doi.org/10.1542/peds.2022-057987>.
- Ghandour, R. M., Hirai, A. H., & Kenney, M. K. (2022). Children and youth with special health care needs: A profile. *Pediatrics*, 149(Supplement 7). <https://doi.org/10.1542/peds.2021-056150D>.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate Data Analysis* (8th ed.). Cengage.
- Hook, M. L. (2006). Partnering with patients—a concept ready for action. *Journal of Advanced Nursing*, 56(2), 133–143. <https://doi.org/10.1111/j.1365-2648.2006.03993.x>.
- Jang, H. Y., & Song, E. O. (2020). Development and validation of the scale for partnership in care-for family (SPIC-F). *International Journal of Environmental Research and Public Health*, 17(6). <https://doi.org/10.3390/ijerph17061882>.
- Jang, H. Y., Song, E. O., & Ahn, J. W. (2021). Development and validation of the scale for staff-family Partnership in Long-term Care (SSFPLC). *International Journal of Older People Nursing*, e12426. <https://doi.org/10.1111/opr.12426>.
- Kindi, Z. A., McCabe, C., & McCann, M. (2022). Impact of nurse-led asthma intervention on child health outcomes: A scoping review. *The Journal of School Nursing*, 38(1), 84–97. <https://doi.org/10.1177/10598405211003303>.
- Kwon, O. (2020). *Development of Professionalism Scale in School Health Teachers Chung-Ang University*. Seoul.
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4(1), 84–99. <https://doi.org/10.1037/1082-989X.4.1.84>.
- Mäenpää, T., Paavilainen, E., & Åstedt-Kurki, P. (2013). Family-school nurse partnership in primary school health care. *Scandinavian Journal of Caring Sciences*, 27(1), 195–202. <https://doi.org/10.1111/j.1471-6712.2012.01014.x>.
- McClanahan, R., & Weismuller, P. C. (2015). School nurses and care coordination for children with complex needs: An integrative review. *The Journal of School Nursing*, 31(1), 34–43. <https://doi.org/10.1177/1059840514550484>.
- McCullum, D. C., Mason, O., Codd, M. B., & O'Grady, M. J. (2019). Management of type 1 diabetes in primary schools in Ireland: A cross-sectional survey. *Irish Journal of Medical Science*, 188(3), 835–841. <https://doi.org/10.1007/s11845-018-1942-7>.
- Miller, G. F., Coffield, E., Leroy, Z., & Wallin, R. (2016). Prevalence and costs of five chronic conditions in children. *The Journal of School Nursing*, 32(5), 357–364. <https://doi.org/10.1177/1059840516641190>.
- Mokkink, L. B., Patrick, D. L., Alonso, J., Bouter, L. M., de Vet, H. C. W., & Terwee, C. B. (2019). COSMIN Study Design checklist for Patient-reported outcome measurement instruments. Retrieved January 1 from <https://www.cosmin.nl/tools/checklists-assessing-methodological-study-qualities/>.

- Mori, Y., Sasaki, M., Ogata, Y., & Togari, T. (2022). The development and validation of the Japanese version of job satisfaction scale: A cross-sectional study on home healthcare nurses. *BMC Research Notes*, 15(1), 205. <https://doi.org/10.1186/s13104-022-06092-2>.
- Owen, M. T., Ware, A. M., & Barfoot, B. (2000). Caregiver-mother partnership behavior and the quality of caregiver-child and mother-child interactions [academic journal]. *Early Childhood Research Quarterly*, 15(3), 413–428.
- Piedmont, R. L., & Hyland, M. E. (1993). Inter-item correlation frequency distribution analysis: A method for evaluating scale dimensionality [report]. *Educational and Psychological Measurement*, 53(2) (369–368).
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health*, 29(5), 489–497. <https://doi.org/10.1002/nur.20147>.
- Shin, H. J., & Kim, J. I. (2021). Development and validation of the happiness scale for middle-aged women based on existence, relation, and growth theory. *Asian Nurs Res (Korean Soc Nurs Sci)*, 15(2), 96–104. <https://doi.org/10.1016/j.anr.2020.12.002>.
- Simpson, P., & Tarrant, M. (2006). Development of the family nursing practice scale [article]. *Journal of Family Nursing*, 12(4), 413–425.
- Slas, E., Nguyen, Y., & McIltrout, K. (2022). Communication between schools nurses and health care providers on students with asthma: An integrative review. *The Journal of School Nursing*, 38(1), 48–60. <https://doi.org/10.1177/10598405211045693>.
- Stefanowicz, A., & Stefanowicz, J. (2018). The role of a school nurse in the Care of a Child with diabetes mellitus type 1 - the perspectives of patients and their parents: Literature review. *Zdravstveno Varstvo*, 57(3), 166–174. <https://doi.org/10.2478/sjph-2018-0021>.
- Stolt, M., Charalambous, A., Radwin, L., Adam, C., Katajisto, J., Lemonidou, C., Patiraki, E., Sjövall, K., & Suhonen, R. (2016). Measuring trust in nurses – Psychometric properties of the Trust in Nurses Scale in four countries. *European Journal of Oncology Nursing*, 25, 46–54. <https://doi.org/10.1016/j.ejon.2016.09.006>.
- Terwee, C. B., Bot, S. D. M., de Boer, M. R., van der Windt, D. A. W. M., Knol, D. L., Dekker, J., ... de Vet, H. C. W. (2007). Quality criteria were proposed for measurement properties of health status questionnaires [academic journal]. *Journal of Clinical Epidemiology*, 60(1), 34–42.
- Tiu, G. F., Leroy, Z. C., Lee, S. M., Maughan, E. D., & Brener, N. D. (2021). Characteristics associated with school health Services for the Management of chronic health conditions. *The Journal of School Nursing*, 37(5), 387–395. <https://doi.org/10.1177/1059840519884626>.
- Uhm, J. Y., & Choi, M. Y. (2023). *School health teachers as Partners in Diabetes Caring: Maternal perspectives*. (Unpublished manuscript).
- Uhm, J. -Y., & Choi, M. -Y. (2022). School nurse-parent Partnership in School Health Care for children with type 1 diabetes: A hybrid method concept analysis. *Asian Nursing Research*, 16(5), 282–291. <https://doi.org/10.1016/j.anr.2022.11.001>.
- Uhm, J. Y., Choi, M. Y., & Lee, H. (2020). School nurses' perceptions regarding barriers and facilitators in caring for children with chronic diseases in school settings: A mixed studies review [review]. *Nursing and Health Sciences*, 22(4), 868–880. <https://doi.org/10.1111/nhs.12786>.
- Van Gampelaere, C., Luyckx, K., van der Straaten, S., Laridaen, J., Goethals, E. R., Casteels, K., ... Goubert, L. (2020). Families with pediatric type 1 diabetes: A comparison with the general population on child well-being, parental distress, and parenting behavior. *Pediatric Diabetes*, 21(2), 395–408. <https://doi.org/10.1111/pedi.12942>.
- Watkins, M. W. (2018). Exploratory factor analysis: A guide to Best practice. *Journal of Black Psychology*, 44(3), 219–246. <https://doi.org/10.1177/0095798418771807>.
- White, K. A., Davis, D., & Maughan, E. D. (2021). Development and validation of an instrument to measure scope of practice in school nurses. *Journal of Advanced Nursing*, 77(7), 3226–3237. <https://doi.org/10.1111/jan.14867>.
- Wilt, L. (2021). The relationships among school nurse to student ratios, self-efficacy, and glycemic control in adolescents with type 1 diabetes. *The Journal of School Nursing*, 37(4), 230–240. <https://doi.org/10.1177/1059840519870314>.
- Woo, J. (2012). *Model concept and understanding of structural equations*. Hannarae.

