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SKIN SCARS CAUSED BY BURNS: VALIDITY OF THE BRISBANE BURN SCAR IMPACT PROFILE FOR PARENTS

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ABSTRACT

Objective: To validate the Brisbane Burn Scar Impact Profile for parents of children for the Brazilian cultural context.
Method: A quantitative analytical study conducted from April 2020 to July 2024 through in-person and online data collection at two Burn Treatment Centers in Paraná and Santa Catarina, Brazil. Four instruments were administered: Sample Characterization; the Brazilian version of the Brisbane Burn Scar Impact Profile; the POSAS Scar Assessment Scale; and the Pediatric Quality of Life Inventory (PedsQL™). Data were analyzed using the Statistical Package for the Social Sciences® and Jamovi, and assessed through Confirmatory Factor Analysis applying the Kaiser-Meyer-Olkin coefficient, Bartlett's test of sphericity, Cronbach's alpha, intraclass correlation, and correlations between the Brisbane Burn Scar Impact Profile, the POSAS Scar Assessment Scale, and PedsQL™.
Results: A total of 129 parents of children with burn scars participated in the study. Kaiser-Meyer-Olkin coefficient (0.65) and Bartlett's test (p-value below 0.05) statistical tests for validity proved adequate, indicating a coherent sample of adequate size. Cronbach's alpha and Intraclass Correlation (above 0.70) revealed acceptable internal consistency and positive correlations with the scales. Most items presented factor loadings above 0.40.
Conclusion: Validating the Brisbane Burn Scar Impact Profile for the Brazilian context represents a valuable contribution, especially given the scarcity of specific tools aimed at this population. It constitutes an essential instrument for assessing health-related quality of life in children with burn scars from parents' perspective.

DESCRIPTORS: Scar. Burns. Parents. Quality of life. Validation study.

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CICATRIZES DE PELE POR QUEIMADURAS: VALIDAÇÃO DO *BRISBANE BURN SCAR IMPACT PROFILE* PARA PAIS

RESUMO

Objetivo: Validar o *Brisbane Burn Scar Impact Profile* para pais de crianças para a cultura brasileira.
Método: Estudo quantitativo analítico realizado de abril de 2020 a julho de 2024, por meio da coleta presencial e *on-line* em dois Centros de Tratamento de Queimados, Paraná e Santa Catarina, Brasil, preenchendo quatro instrumentos: Caracterização da amostra; Versão brasileira do *Brisbane Burn Scar Impact Profile*; Escala de Avaliação Cicatricial POSAS; e Questionário da Qualidade de Vida Pediátrica PedsQL™. Os dados foram analisados no *Statistical Package for the Social Science*® e Jamovi, avaliados pela Análise Fatorial Confirmatória aplicando o coeficiente Kaiser-Meyer-Olkin, teste de esfericidade de Bartlett, alfa de Cronbach, correlação intraclasse e correlações entre *Brisbane Burn Scar Impact Profile*, Escala de Avaliação Cicatricial POSAS e Questionário da Qualidade de Vida Pediátrica PedsQL™.
Resultados: Participaram 129 pais de crianças com cicatrizes de pele por queimaduras. Os testes estatísticos para a validação demonstraram-se adequados: coeficiente Kaiser-Meyer-Olkin (0,65) e teste de Bartlett (p-valor abaixo de 0,05), com amostra coerente e de tamanho adequado. O alfa de Cronbach e a Correlação Intraclasse (acima de 0,70) revelaram consistência interna aceitável e correlações positivas com as escalas. A maioria dos itens apresentou carga fatorial acima de 0,40.
Conclusão: Validar o *Brisbane Burn Scar Impact Profile* para o contexto brasileiro representa uma contribuição valiosa, sobretudo pela escassez de ferramentas específicas voltadas a essa população. Configura-se como instrumento essencial para avaliar a Qualidade de Vida Relacionada à Saúde de crianças com cicatrizes de queimaduras na perspectiva dos pais.

DESCRITORES: Cicatriz. Queimadura. Pais. Qualidade de vida. Estudos de validação.

CICATRICES CUTÁNEAS POR QUEMADURAS: VALIDACIÓN DEL *BRISBANE BURN SCAR IMPACT PROFILE* PARA PADRES

RESUMEN

Objetivo: Validar el Brisbane Burn Scar Impact Profile para padres de niños en el contexto cultural brasileño.
Método: Estudio cuantitativo analítico realizado entre abril de 2020 y julio de 2024, mediante recolección presencial y en línea en dos Centros de Tratamiento de Quemados de los estados de Paraná y Santa Catarina, Brasil. Se aplicaron cuatro instrumentos: Caracterización de la muestra; versión brasileña del Brisbane Burn Scar Impact Profile; Escala de Evaluación Cicatricial POSAS; y Pediatric Quality of Life Inventory (PedsQL™). Los datos fueron analizados mediante el Statistical Package for the Social Sciences® y Jamovi, y evaluados mediante Análisis Factorial Confirmatorio, aplicando el coeficiente Kaiser-Meyer-Olkin, la prueba de esfericidad de Bartlett, el alfa de Cronbach, la correlación intraclase y las correlaciones entre el Brisbane Burn Scar Impact Profile, la Escala de Evaluación Cicatricial POSAS y el PedsQL™.
Resultados: Participaron 129 padres de niños con cicatrices cutáneas por quemaduras. Las pruebas estadísticas para la validación demostraron resultados adecuados: coeficiente Kaiser-Meyer-Olkin (0,65) y prueba de Bartlett (valor de p inferior a 0,05), indicando una muestra coherente y de tamaño adecuado. El alfa de Cronbach y la Correlación Intraclase (superiores a 0,70) revelaron una consistencia interna aceptable y correlaciones positivas con las escalas. La mayoría de los ítems presentó cargas factoriales superiores a 0,40.
Conclusión: La validación del Brisbane Burn Scar Impact Profile para el contexto brasileño representa una valiosa contribución, especialmente debido a la escasez de herramientas específicas dirigidas a esta población. Se configura como un instrumento esencial para evaluar la calidad de vida relacionada con la salud de niños con cicatrices por quemaduras desde la perspectiva de los padres.

DESCRIPTORES: Cicatriz. Quemaduras. Padres. Calidad de vida. Estudio de validación.

INTRODUCTION

The recognition of the family's role in a child's life is essential due to the support provided through involvement, participation, and partnership. Stressful situations, such as emergencies, are known to be perceived differently among family members depending on the context in which they are situated[1].

The relationship between parents and children exerts a major influence on child development and is fundamental in determining the mental and emotional well-being of an individual in formation. When burns occur, the family takes on many additional responsibilities beyond those already faced in daily life and tends to experience various negative emotions, such as guilt and remorse[2].

According to the results of a 2022[3] study, the authors collected information regarding who was with the child at the time of the accident, revealing that parents were present in 88.5% of cases. This highlights that parental presence does not always guarantee protection from accidents, either because of a lack of knowledge about the limitations associated with each stage of their children's development or because parents may not habitually consider the hazards present in the environment.

Burn injuries in children cause physical and emotional suffering, significantly burdening their families. Parents whose children sustain burns frequently experience immediate and profound stress resulting from witnessing their children in pain, as well as dealing with financial pressures and the emotional consequences of the incident. Stress following a child's burn injury has long-term implications for the entire family, presenting a complex challenge to mitigate. Children's dependence on their parents during recovery highlights the importance of parental well-being for the child's healing process and long-term health[4].

Providing care for a child with burns represents a difficult task for parents, and emotional reactions are intensified by the treatment process, which involves alternating periods of uncertainty and concerns affecting all family members. Hospitalization and treatment lead to the emergence of emotional reactions and changes in family dynamics, reflected in concerns regarding clinical progress, burn sequelae—including scars and physical limitations—and the child's return to the family environment and social activities[5].

In this context, the burn experience affects not only patients but also poses a major challenge for parents and impacts family structure. Furthermore, quality of life as perceived by parents differs from that reported by patients themselves[6].

Healthcare teams' knowledge regarding the various presentations of tissue injuries is extremely important, as proper identification can alleviate the pain associated with trauma and accelerate recovery, benefiting both patients and their families. Ongoing training is essential, highlighting the need for actions aimed at guiding and raising awareness among parents and the general population through educational programs, media campaigns, and other initiatives to prevent accidents[7].

There is a scarcity of instruments in Brazil for assessing the quality of life of individuals with burn scars, particularly among children and involving parents in this process. Therefore, a group of Brazilian researchers conducted the cross-cultural adaptation and content validity of an instrument developed by researchers in Brisbane, Australia, to assess quality of life from the perspective of parents of children and adolescents aged 8 to 18 years with burn scars. This instrument assesses physical symptoms and sensory aspects, emotional reactions, impact on social functioning and daily living, treatment impact, and environmental factors[8].

Accordingly, the objective of this study was to validate the construct of the Brisbane Burn Scar Impact Profile (BBSIP) for parents of children older than 8 years with burn scars for the Brazilian cultural context.

METHOD

This was a quantitative analytical and descriptive study. The research was conducted as part of a larger project entitled “Cultural adaptation and validity of BBSIP for use in Brazil”. In previous studies, the processes of translation, synthesis of translations, validity by an expert committee, back-translation, and pre-testing of the instrument had already been carried out [8].

Study setting

The study was conducted in two ways: in person and online, at two burn treatment outpatient clinics from institutions that provide care exclusively through the Unified Health System, one located in the state of Paraná and the other in Santa Catarina. At the outpatient clinic in Paraná, interviews were conducted both in person and online, according to the parents’ preference and availability. At the outpatient clinic in Santa Catarina, all interviews were conducted remotely. In both institutions, when interviews were conducted online, they took place via WhatsApp video calls.

Study population

The study participants were parents of children older than 8 years, followed up in specialized burn care outpatient clinics. Inclusion criteria comprised parents accompanying children who suffered second- and third-degree burns, with more than 85% of the burned body surface epithelialized, corresponding to approximately 28 days from the occurrence of the injury[9]. These criteria were developed based on the instrument itself, being applicable to parents of children with burn scars, hence the importance of the time between the occurrence of the injury and the second- and third-degree scars.

Non-eligibility criteria comprised: parents of children with cognitive impairment, due to limitations in interpreting questions and answers regarding burns and quality of life in the presence of scars; burns involving the respiratory tract, as these are respiratory system injuries requiring a different type of quality-of-life assessment; and children with Stevens-Johnson syndrome, a severe cutaneous reaction to medications and infections that does not involve skin injury caused by direct or indirect contact with heat or cold sources, chemical products, electric current, among others.

Considering these criteria, it is important to highlight that they ensured sample homogeneity and the suitability of the instrument for the specific conditions of children with second- and third-degree burn scars who required hospitalization for treatment. However, this selection restricts sample representativeness, as it excludes parents of children with first-degree burns, children without scars, or those with other clinical complications. Therefore, the results more accurately reflect the experiences of parents of children with more severe burn scars but should be generalized with caution to other contexts or degrees of injury.

Instruments for data collection

Four instruments were applied: a) a sample characterization instrument, with data extracted through interviews with parents and from children’s medical records, composed of two parts: 1) parental data: sex, religion, marital status, education, and occupation; 2) child data: sex, whether they attend school, length of hospitalization, burned body surface area, cause of the accident, complications, treatment, and type of professionals who care for the child; b) the Brazilian version of BBSIP for parents of children over 8 years old, whose items refer to the impact of burn scars on the child’s quality of life, from parents’ perspective, with responses ranging from “not at all” to “very much”; c) the POSAS Scar Assessment Scale, answered in this study by the parents, which assesses signs and symptoms of scarring and contains six items with scores from 1 to 10 (1 = normal skin and 10 = worst scar or imaginable sensation)[10]; d) Pediatric Quality of Life Inventory Version 4.0 (PedsQL™),

parental report on their child aged 8 to 12 years, and their child aged 13 to 18 years[11], which assesses the child's overall quality of life from parents' perspective, with questions referring to the duration of a problem in the last month, and being scored on a five-point response scale (0 = never a problem, to 4 = almost always a problem).

Data collection procedures

For parents of patients from Paraná, data collection began in April 2020, and for those from Santa Catarina, in May 2022. Data collection continued until July 2024 in both states. Participants completed the survey only once. Efforts were made to obtain the largest possible sample size because of the statistical analyses required, resulting in a total of 129 parents.

Interviewers were trained researchers instructed to remain neutral, avoid influencing responses, and follow standardized interview scripts. In addition, in-person interviews were conducted in private rooms to reduce environmental influence. For online interviews, parents chose the location most convenient for them, helping to minimize potential bias.

Ethical aspects

The study was approved by the Research Ethics Committee and received a Certificate of Ethical Consideration Submission from both states and institutions.

In-person interviews were conducted at the Burn Treatment Center outpatient clinic in Paraná. All parents of participating children signed the Informed Consent Form in printed format before the interview began. For online participation, a text message was sent via WhatsApp by the researcher to parents of children followed at the outpatient clinics in Paraná and Santa Catarina. Up to three contact attempts were made on different days and at different times. After agreement to participate, two Google Forms links were sent: the Child Assent Form and the Parent Informed Consent Form. Parents were informed that these links contained general information about the study and that only the child's full name should be entered in the first form and the parent's full name in the second. Once the names had been submitted, data collection was scheduled according to the availability of both the parents and the researcher.

Data analysis

Data were entered into Microsoft Excel for Windows® and analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 and Jamovi software.

During data consistency and quality checks, no missing values were identified in the analyzed variables. Therefore, no imputation methods or case exclusion procedures were required, ensuring the complete integrity of the database used.

Instrument interpretation

Mean scores were calculated for the ten domains containing items scored from 0 to 4. All five-point scales were scored as follows: "not at all" = 0, "a little" = 1, "somewhat" = 2, "quite a bit" = 3, and "very much" = 4. In general, a score of 0 is associated with "high quality of life – little discomfort", whereas a score of 4 is associated with "low quality of life – substantial discomfort". There is no total score for the instrument. If at least 50% of the items within a domain were not answered, that domain could not be calculated or analyzed. In this study, the interquartile range and median of each domain were analyzed for the sample of 129 parents.

Instrument validity

Construct validity was assessed using the Kaiser-Meyer-Olkin (KMO) coefficient to assess sample adequacy and the suitability of factor analysis. Bartlett's test of sphericity was used to test the null hypothesis of an identity matrix[12]. According to Hair, Anderson, and Tatham (1987)[13], KMO values above 0.50 are considered acceptable, and Bartlett's test is considered adequate when the p-value is below 0.05[14].

Cronbach's alpha is a widely used reliability measure for quantifying random measurement error present in a summed or averaged score generated by a multi-item measurement scale. Cronbach's alpha coefficient typically ranges from 0 to 1[15]. The minimum acceptable value for alpha is 0.70. This coefficient was adopted because of its demonstrated effectiveness in the literature and because it was also used in the original Australian study.

Concerning stability and reproducibility, the Intraclass Correlation Coefficient (ICC) was used through a test-retest procedure conducted within the recommended interval of 10 to 15 days[8], with values above 0.70 considered ideal.

Confirmatory Factor Analysis (CFA) is used to provide a confirmatory test of measurement theory[12]. Essentially, CFA assesses whether the collected data fit a previously proposed model. It should be emphasized that, for CFA, the model suggested in the original study, consisting of ten domains, was adopted[8]. In this analysis, items scored on the Likert scale were considered; therefore, items with open-ended responses were excluded.

Factor loadings indicate the extent to which an item contributes to a domain. In general, the higher an item's factor loading, the more important it is for the construct of interest. To determine communality, or the proportion of variability in each item explained by the factors, the factor loading was squared. Howard (2016)[16] suggests that an item is relevant to the construct if its factor loading exceeds 0.40.

For convergent validity, hypothetical correlations were calculated between the mean scores of each BBSIP domain and the items answered by parents in PedsQL™ and POSAS instruments. Spearman's correlation coefficient was used between BBSIP and PedsQL™, and between BBSIP and POSAS Scar Assessment Scale. Coefficients above 0.50 indicate variables measuring the same constructs, which is not considered an interesting outcome. Correlations between 0.30 and 0.50 indicate related but distinct constructs[17]. Positive correlations were expected.

As for model fit measures, the following indices were used: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). For both the CFI and TLI, values above 0.95 indicate good model fit. RMSEA values range from 0 to 1, with values below 0.05 indicating good fit. Values between 0.05 and 0.08 indicate reasonable fit, whereas values above 0.10 indicate poor fit[18,12].

RESULTS

Sample characterization

A total of 129 parents of children with burn scars completed BBSIP across both states. Of these, 66 participated in person at the outpatient clinic in the state of Paraná, and 63 participated online from the states of Paraná and Santa Catarina.

The mean time required for parents to complete BBSIP in person was 13.93 minutes, whereas the mean completion time online was 14.61 minutes. Of the participants, 121 (93.8%) were from the state of Paraná and eight (6.2%) from Santa Catarina. Most participants were female (89.9%) and married or living in a stable union (76%).

In terms of educational level, 71 participants (55.0%) had completed or incomplete secondary education; 38 (29.4%) had completed or incomplete elementary education; 11 (8.5%) had completed higher education; and seven (5.4%) had incomplete higher education. Concerning economic activity, 58.1% had paid employment. Participants' ages ranged from 25 to 76 years, with a mean age of 38 years and a median age of 37 years.

The mean time elapsed between the accident and the date of the survey, as reported by the parents, was 633 days, with a median of 250 days. The mean length of hospitalization was 19 days, with a median of 15 days.

In this context, the clinical characteristics of burns among children and adolescents were highlighted: regarding Total Burn Surface Area (TBSA), 66 (51.6%) had less than 20% TBSA affected and 62 (48.4%) had more than 20%; the main circumstance was domestic accidents for 120 (93.0%); the most frequent causative agent was scalding, accounting for 54 cases (41.9%), followed by contact burns, electrical injuries, and chemical burns; 57 (50.9%) underwent skin grafting, the main complication reported. In terms of outpatient treatment, 80 (62.0%) used moisturizer; 55 (42.6%), sunscreen; 43 (33.3%), compression garments; 23 (17.8%), antihistamines; 22 (17.1%), sunflower oil; and 12 (9.3%), silicone.

Instrument validity

The KMO coefficient was 0.65, indicating that both sample size and factor analysis were adequate. Bartlett's test of sphericity yielded a p-value below 0.05, as expected.

Concerning Cronbach's alpha coefficients, except for the social interactions and appearance domains, all values were above 0.70, indicating acceptable internal consistency (Table 1).

Table 1 – Analysis of the Brisbane Burn Scar Impact Profile for Parents domains using Cronbach's alpha coefficients. Paraná and Santa Catarina, Brazil, 2020–2024. (n=129).

Brisbane Burn Scar Impact Profile for Parents	Cronbach's alpha
Overall impact of burn scars (8 items): 1a, 2a, 2b, 2c, 3a, 3b, 3c, 3d	0.84
Sensory frequency (3 items): 4,5, 6	0.79
Mobility (4 items): 8a, 8b, 8c, 8d	0.69
Daily living (11 items): 8e, 8f, 8g, 8h, 8i, 8j, 8k, 8l, 8m, 8n, 8o	0.83
Social interactions (4 items): 9a, 9b, 9c, 9d	0.52
Appearance (4 items): 10a, 10b, 10c, 10d	0.53
Emotional reactions (9 items): 11a, 11b, 11c, 11d, 11e, 11f, 11g, 11h, 11i	0.96
Physical symptoms (6 items): 13a, 13b, 13c, 13d, 13e, 13f	0.83
Parent and family concerns (3 items): 15a, 15b, 15c	0.74
Parental impact (5 items): 16a, 16b, 16c, 16d, 16e	0.86
Total (57 items)	0.96

For each instrument domain, the means of the corresponding items were compared at two time points, before and after the test-retest procedure. The ideal ICC value should be greater than 0.70 (Table 2). Although the social interactions and physical symptoms domains presented ICC values below 0.70, all confidence intervals included or exceeded 0.70, as expected.

Table 2 – Comparison of Brisbane Burn Scar Impact Profile for Parents items before and after test-retest using the Intraclass Correlation Coefficient and Confidence Interval. Paraná and Santa Catarina, Brazil, 2020–2024. (valid n=42).

Brisbane Burn Scar Impact Profile for Parents	Intraclass Correlation Coefficient	95% Confidence Interval
Overall impact of burn scars (8 items)	0.89	0.79-0.94
Sensory frequency (3 items)	0.89	0.79-0.94
Mobility (4 items)	0.74	0.52-0.86
Daily living (11 items)	0.78	0.59-0.88
Social interactions (4 items)	0.66	0.37-0.81
Appearance (4 items)	0.82	0.66-0.90
Emotional reactions (9 items)	0.88	0.78-0.94
Physical symptoms (6 items)	0.60	0.27-0.78
Parent and family concerns (3 items)	0.78	0.53-0.89
Parental impact (5 items)	0.88	0.78-0.94
Total (57 items)	0.79	0.59-0.89

The mean scores of each BBSIP domain showed positive and significant correlations with all POSAS Scar Assessment Scale items (Table 3). The mobility, daily living, and social interactions domains showed weak correlations.

Table 3 – Spearman correlation matrix and convergent validity of the Brisbane Burn Scar Impact Profile for Parents domains with the POSAS Scar Assessment Scale. Paraná and Santa Catarina, Brazil, 2020–2024. (n=97).

Brisbane Burn Scar Impact Profile for Parents	POSAS Scar Assessment Scale answered by parents						
	Pain	Itching	Color	Stiffness	Thickness	Irregular scar	Overall opinion
Overall impact of burn scars (8 items)	0.45†	0.49†	0.59†	0.55†	0.55†	0.58†	0.69†
Sensory frequency (3 items)	0.51†	0.60†	0.35†	0.39†	0.33†	0.30†	0.37†
Mobility (4 items)	0.33†	0.22*	0.28†	0.26*	0.11	0.22*	0.40†
Daily living (11 items)	0.50†	0.38†	0.19	0.25*	0.15	0.29†	0.40†
Social interactions (4 items)	0.35†	0.29†	0.19	0.20	0.17	0.26*	0.32†
Appearance (4 items)	0.35†	0.30†	0.42†	0.43†	0.32†	0.40†	0.51†
Emotional reactions (9 items)	0.47†	0.44†	0.36†	0.36†	0.31†	0.36†	0.53†
Physical symptoms (6 items)	0.37†	0.46†	0.30†	0.51†	0.54†	0.44†	0.50†
Parent and family concerns (3 items)	0.35†	0.34†	0.32†	0.45†	0.35†	0.37†	0.42†
Parental impact (5 items)	0.37†	0.36†	0.24*	0.30†	0.24*	0.31†	0.29†

* Significant correlation test p<0.05; † Significant correlation test p<0.01

Furthermore, the mean scores of each BBSIP domain were correlated with the mean scores of each PedsQL™ domain. For convergent validity, Spearman's correlation coefficient was also used between BBSIP and PedsQL™, revealing positive correlations (Table 4). In this case, all BBSIP domains for parents showed positive correlations with all domains of PedsQL™, as expected in convergent validity analysis.

Table 4 – Spearman correlation matrix and convergent validity of the Brisbane Burn Scar Impact Profile for Parents domains with the Pediatric Quality of Life Inventory. Paraná and Santa Catarina, Brazil, 2020–2024. (n=97).

Brisbane Burn Scar Impact Profile for Parents	Pediatric Quality of Life Inventory			
	Physical	Emotional	Social	School
Overall impact of burn scars (8 items)	0.60†	0.63†	0.45†	0.45†
Sensory frequency (3 items)	0.53†	0.46†	0.31†	0.43†
Mobility (4 items)	0.64†	0.38†	0.28†	0.29†
Daily living (11 items)	0.72†	0.46†	0.41†	0.29†
Social interactions (4 items)	0.49†	0.44†	0.38†	0.30†
Appearance (4 items)	0.48†	0.58†	0.28†	0.29†
Emotional reactions (9 items)	0.55†	0.66†	0.40†	0.40†
Physical symptoms (6 items)	0.35†	0.32†	0.46†	0.28†
Parent and family concerns (3 items)	0.47†	0.38†	0.46†	0.33†
Parental impact (5 items)	0.46†	0.45†	0.46†	0.40†

* Significant correlation test $p<0.05$; † Significant correlation test $p<0.01$

For CFA, the structure originally proposed with ten domains was adopted. To assess construct validity, an Exploratory Factor Analysis (EFA) was performed using a Scree Plot to determine whether the number of domains would be the same as that proposed by the original authors. The results suggested that 11 or 12 domains would be an appropriate number, differing from the ten domains proposed in the original study.

Most items presented factor loadings above 0.40, indicating that they are important for the construct. Factor loadings above 0.40 were obtained through factor analysis with extraction of ten domains and Varimax rotation using the principal domains method. The ten domains explained 77.0% of the total variability in the data. However, the grouping indicated by the factor loading analysis did not resemble the grouping proposed in the original study.

None of the fit indices—CFI, TLI, and RMSEA—presented adequate values for the original structure.

DISCUSSION

A lack of studies in both national and international literature was identified regarding validity and factor analysis of instruments designed for parents of children and adolescents with burn scars.

The minimum sample size (N) of 50 participants was considered for this study based on the literature[19], which highlights that the minimum sample size varies according to the level of communalities, factor loadings, number of variables per factor, and number of factors. The findings indicate that factor recovery can be reliable with sample sizes well below 50, with N=50 being considered a reasonable absolute minimum.

Parents are generally responsible for the treatment and care of their children's scars and may face practical challenges such as memories of the injury, feelings of guilt, and anxiety regarding scarring. Parental guilt following a child's burn injury is associated with increased parental stress; moreover, a direct relationship has been demonstrated between increased maternal stress and increased child stress after a burn injury[20].

Furthermore, parent-reported outcomes are essential when investigating the quality of life of children who are still too young to reliably report complex issues such as their thoughts and feelings. However, these reports should be interpreted as a perspective distinct from that of the child[21].

Thus, health-related quality of life (HRQoL) in burn patients was considered the "individual's health status related to their ability to respond and adapt to changes associated with individual, family, and social aspects resulting from the health-related accident", from the perspective of the family or caregivers of children and adolescents[22].

The KMO coefficient was above 0.50, indicating an acceptable sample size. As for Bartlett's test of sphericity, the p-value was below 0.05, and the sample was considered coherent and adequate, in addition to the ICC presenting appropriate upper limits.

It was observed that, in the overall impact of burn scars domain, items 2B. (Physical symptoms of the scar) and 3C. (As emotional reactions and your child's mood) do not appear to explain the same dimension as the other items, due to the Cronbach's alpha coefficient being below 0.70. It may be questioned whether grouping these variables within the same BBSIP domain could be considered a methodological limitation.

In the social interactions domain, because of the COVID-19 pandemic, or simply because the child had not left home during the week preceding the interview, these items may not have been answered or may have been marked as "not applicable", which could explain the analyses showing low correlations.

Furthermore, in the appearance domain, the last two items asked how bothered the child was by the looks received from other people because of the scars, and by comments that the parents or the child received from other people because of the scars during the previous week. Similarly to the discussion above, these questions may have been answered as "not applicable".

The physical symptoms domain, for instance, includes item 13A, which addresses skin contracture, a sensation that children and adolescents may perceive more accurately than their parents. Alternatively, physical symptoms may have changed in the parents' perception during the days preceding the retest, which may explain the ICC value below 0.70.

Moreover, hypothetical correlations were performed through the convergent validity analysis of BBSIP with the POSAS Scar Assessment Scale and PedsQL™, and positive correlations were found.

Within the context of this study, it is recognized that caregiving is a common part of parenting. However, the functional limitations and long-term dependence of a child with special needs transform the parental role in a distinct manner. In this regard, a study aimed at conducting the cultural adaptation and examining the psychometric properties of an instrument assessing parental participation among

parents of children with special needs used both EFA and CFA and found the scale to be a reliable and valid tool with a high level of reliability. Additionally, the authors emphasized the need for further studies with larger samples to assess other factors within the studied population[23].

Another study conducted in Southern Brazil to assess the psychometric properties of an assessment questionnaire on informal caregiver competencies highlighted that structural validity was assessed through EFA and CFA. Prior to EFA, the KMO index, also known as the measure of sampling adequacy, was calculated. This statistical test suggests the proportion of variance in the items that may be explained by a latent variable, indicating the degree of suitability of applying EFA to the dataset, and demonstrated evidence of reliability and validity[24].

A study[25] aimed at providing psychometric validity of the online version of the Hospitalization, Illness, and Treatment Coping Scale – Parent Version performed CFA; however, because an adequate model fit was not achieved, EFA was subsequently conducted. The results demonstrated that the instrument has reliable psychometric properties and can be completed online. It is a useful tool that may be employed in future studies to assess coping strategies adopted by parents facing a child's hospitalization. It is quick and easy to use and may assist healthcare professionals in designing therapeutic interventions or preventive measures targeted at this population.

According to a study[26] on the validity and reliability of an instrument designed to assess family effectiveness, which was tested by family health specialists, it was possible to affirm that, based on CFA, the most significant items within each dimension were related to the instrument's theoretical model.

Furthermore, considering that quality of life is a sensitive indicator of living conditions, health status, and social interactions experienced by individuals, reflecting their culture, values, and expectations, a study[27] observed that the instrument under investigation proved feasible for large-scale application while maintaining reliability parameters similar to those of the validity study. Moreover, CFA demonstrated acceptable characteristics, confirming the instrument's structure in the studied population and enabling its use as a model and incentive for future quality-of-life assessments.

According to a 2024 study[28] conducted in Paraná, which aimed to assess the University Student Depression Inventory construct, the Brazilian version of a mental health assessment instrument, the authors emphasized the importance of construct validity and employed CFA. However, they highlighted as a limitation the relatively small number of participants, suggesting the need for a larger sample drawn from different Brazilian states to allow a more precise adaptation to the cultural nuances of each region. This finding is consistent with the present study, which also used this statistical analysis and faced difficulties in obtaining a larger sample size.

A study conducted in Northeastern Brazil aimed at assessing the Inventory of Ethical Problems in Primary Health Care adapted to the child health context reported that validity may be assessed through EFA when there are still no clear ideas regarding the number and types of dimensions encompassed by the construct under investigation. The study revealed a multidimensional structure and demonstrated evidence of validity and reliability supporting its application[29].

Based on these findings, the importance of conducting EFA and proposing a new structure in future studies is emphasized in order to improve the fidelity of the instrument's use.

BBSIP, originally developed by Tyack *et al.*[17], in its version adapted and validated for the Brazilian context, represents a significant advancement in the assessment of quality of life related to burn scars in children and adolescents from parents' or caregivers' perspective. The use of BBSIP in nursing clinical practice enables a patient- and family-centered approach, systematically identifying the domains most affected by the injury (physical, functional, emotional, and social) and guiding individualized care interventions. By quantifying the impact of burn scars on daily life and family well-being, the instrument allows nurses to develop more specific care plans, strengthen longitudinal follow-up, and assess the effectiveness of rehabilitation and psychosocial support interventions[30].

Furthermore, BBSIP contributes to communication between the multidisciplinary team and family members, promoting empathetic communication and the active involvement of caregivers in the therapeutic process.

Within the scope of public policies, BBSIP provides robust data that may support public health decision-making and improve rehabilitation programs for burn survivors, who remain epidemiologically relevant in this age group in Brazil. By highlighting the magnitude of the physical and psychosocial impacts of scars, the results obtained with the instrument support the creation or expansion of integrated rehabilitation services, psychological support, and long-term follow-up after hospital discharge. Standardizing the use of BBSIP in burn treatment centers throughout Brazil may also facilitate the development of national databases, which can be useful for resource planning and the formulation of prevention and social reintegration policies[31]. Thus, the instrument not only strengthens evidence-based nursing practice but also contributes to the development of public policies guided by the real experiences of patients and their caregivers, promoting more humane and equitable care in the context of pediatric burns.

The limitations of this study regarding the in-person modality included difficulties in data collection due to the specificity of the age group of burn survivors between 8 and 18 years, which prolonged the data collection period in order to achieve the required sample size (N), as well as the restricted operating hours of the burn treatment outpatient clinic. It should also be noted that, because of missed follow-up appointments related to burn scar monitoring, it may be inferred that there is limited patient adherence to follow-up care after the injury. Concerning the online modality, the limitations included telephone numbers recorded in medical records that either did not have WhatsApp accounts or were no longer valid; unsuccessful contact attempts despite three messages being sent on different days and at different times; and difficulties in coordinating a time when both the child or adolescent and their parent were available simultaneously. Nevertheless, it was observed that online interviews allowed children and their parents to feel more comfortable and choose the most convenient time to participate. Furthermore, the importance of continuing this research in other outpatient clinics and Brazilian states should be emphasized, considering the possibility of differences in treatment approaches and distinct sociodemographic profiles among populations from different regions.

CONCLUSION

CFA enabled BBSIP validity and, therefore, it may be used, with caution, in healthcare services to assess the quality of life of children and adolescents with burn scars in Brazil from parents' perspective. Furthermore, family-assessed HRQoL is important because it allows researchers and healthcare professionals to better understand this issue and implement interventions aimed at improving scar healing as well as providing appropriate emotional and social support.

The findings demonstrated coherence, satisfactory internal consistency, positive correlations with other scales, and adequate factor loadings for the construct. Future studies should apply the instrument to samples from other regions of the country and, consequently, in different contexts.

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NOTES

ORIGIN OF THE ARTICLE

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Study design: Silvestrim PR, Pimenta RA, Zampar EF.
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Discussion of results: Silvestrim PR, Pimenta RA.
Writing and/or critical review of the content: Silvestrim PR, Pimenta RA.
Final review and approval of the final version: Silvestrim PR, Pimenta RA.

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DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical and confidentiality restrictions.

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