

Clinical Correspondence

Validation of a measure of children's perceptions of their oncology camp experience: a national study

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Dear Editor,

Introduction

Summer camps for children with cancer and their families are common internationally [1]. They typically aim to provide children with recreational experiences while ensuring receipt of necessary medical care. Some camps also aim to improve health-related quality of life outcomes, including in physical, social, and psychological domains [2]. A growing literature has cited the importance of evaluating outcomes [3,4] and of assessing outcomes systematically across chronic-illness summer camps [5,6]. A major barrier to conducting evaluations of camps, including pediatric oncology camps, is a lack of standardized, validated outcome measures. To meet this gap, the current study assessed the factor structure of the Pediatric Camp Outcome Measure (PCOM), an existing standardized measure of children's perceptions of their camping experience. Results from the original validation study for the PCOM, which included children with complex heart defects who attended a medical summer camp, provided initial evidence for concurrent validity with psychological symptom measures [5].

Methods

Participants and procedures

Children (under age 18 years) were eligible if they attended 1 of 19 Children's Oncology Camping

Association, International summer camps in the US or Canada in 2012. Parents were notified about the study prior to camp via mail or at camp drop-off. They could opt their child(ren) out of the study. Camp staff administered the questionnaire to campers in a group setting. The last author's Institutional Review Board approved the study procedures.

Measure

The PCOM is a 29-item, self-report questionnaire assessing children's camp experiences [5]. Twenty-six items contribute to four subscales and a total score. Responses range from 1 (negative experience) to 5 (positive experience). Subscale scores are computed by summing item responses. The measure has demonstrated adequate reliability (Cronbach's alpha=0.80–0.93) [5]. A copy of the questionnaire can be obtained from the original scale author (Laura Simons, PhD).

Analytic plan

We performed descriptive statistics on the items and assessed the factor structure of the PCOM by applying maximum likelihood with robust standard error estimation. First, we examined the measurement model for the subscales [5] and removed items with factor loadings less than 0.4. Cronbach's alpha was used to measure internal consistency, with larger values indicating higher reliability [7]. Next, construct validity of the PCOM [5] was

Table 1. Item characteristics

Item	Mean	Median	Mode	Std.		
				Dev.	Minimum	Maximum
Self-esteem						
Feeling about self	4.55	5.00	5	0.69	1	5
Feeling of pride	4.20	4.00	5	0.84	1	5
Likes self	4.47	5.00	5	0.77	1	5
Physical empowerment	4.42	5.00	5	0.88	1	5
Feeling normal	4.50	5.00	5	0.84	1	5
Emotional						
Happy versus sad	4.42	5.00	5	0.81	1	5
Nervousness	3.99	4.00	5	1.10	1	5
Worrying	4.29	5.00	5	0.97	1	5
Perception by others	3.99	4.00	5	1.17	1	5
Sadness	4.43	5.00	5	0.88	1	5
Homesickness	4.30	5.00	5	1.08	1	5
Social						
Loneliness	4.45	5.00	5	0.93	1	5
Socializing	4.58	5.00	5	0.84	1	5
Someone to talk to	4.50	5.00	5	0.93	1	5
Making friends	4.33	5.00	5	0.86	1	5
Play with new kids	4.01	4.00	5	0.95	1	5
How often play with kids	4.31	5.00	5	0.90	1	5
Feeling of belonging	4.47	5.00	5	0.86	1	5
Feeling left out	4.47	5.00	5	0.90	1	5
Get along with others	4.49	5.00	5	0.82	1	5
Physical						
Activity level	4.57	5.00	5	0.71	1	5
Energy	4.25	5.00	5	0.93	1	5
Exercise	4.15	4.00	5	1.03	1	5
Sports activities	3.95	4.00	5	1.10	1	5

assessed via confirmatory factor analysis (CFA). A second-order CFA was examined with the four subscales as first-order factors and the entire questionnaire as the second-order factor. The model fit was assessed via the following: root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean squared residual (SRMR). An RMSEA of 0.08–0.10 indicates mediocre fit and 0.08 good fit [8]. An SRMR of less than 0.05 suggests good fit and 0.08 adequate fit [9]. A CFI of at least 0.9 indicates very good fit and 0.8 good fit [9].

Results

There were 2608 children who participated in the study (47% male, 55% with history of cancer). Item means ranged from 3.65 to 4.76 (Table 1). Item 9 (worry about cancer during camp) within emotional functioning (EM) and item 12 (feeling tired at camp) within physical functioning (PF) had factor loadings less than 0.4; thus, these two items were removed (see Table 2 for reliability). The

Table 2. Internal consistency of the subscales

Scale	Alpha	Corrected item-total correlation	Alpha if item deleted
Self-esteem	0.738		
Feeling about self		0.540	0.683
Feeling of pride		0.548	0.674
Likes self		0.567	0.668
Physical empowerment		0.366	0.748
Feeling normal		0.512	0.688
Emotional	0.756		
Happy versus sad		0.464	0.731
Nervousness		0.488	0.724
Worrying		0.567	0.702
Perception by others		0.454	0.736
Sadness		0.599	0.697
Homesickness		0.454	0.733
Social	0.850		
Loneliness		0.522	0.839
Socializing		0.584	0.833
Someone to talk to		0.497	0.842
Making friends		0.646	0.826
Play with new kids		0.556	0.836
How often play with kids		0.583	0.832
Feeling of belonging		0.639	0.827
Feeling left out		0.557	0.835
Get along with others		0.541	0.837
Physical	0.648		
Activity level		0.518	0.550
Energy		0.386	0.608
Exercise		0.446	0.568
Sports activities		0.415	0.597

alpha was 0.91 for the total score. For the second-order CFA ($CFI=0.833$, $SRMR=0.312$, $RMSEA=0.055$), the CFI and RMSEA were adequate but the SRMR was not. Further examination revealed that PF had a relatively large residual variance (0.33) compared with the other three subscales (0.05–0.01), suggesting that PF may be a separate component from the second-order factor. Thus, we modified the model such that PF was correlated with the second-order factor but not a subscale of the second-order factor.

In the modified model, two general factors were specified – a PF factor and a second-order psychosocial functioning (PSF) factor. The modified model demonstrated very good fit: $CFI=0.881$, $SRMR=0.048$, and $RMSEA=0.047$. To evaluate how well the items predicted the first-order factors, we examined the factor coefficients. These coefficients ranged from 0.48 to 0.68 for self-esteem, 0.46 to 0.70 for EM, 0.53 to 0.71 for social functioning (SF), and 0.51 to 0.69 for PF. All three subscales had high associations with the second-order, PSF factor ($p < 0.001$ for all), with SF having the highest loading at 0.924. The correlation between PF and PSF was 0.71.

Conclusions

Results indicate that the PCOM is a valid measure of children's perceptions of their physical, emotional, social, self-esteem, and overall functioning as related to their participation in an oncology camp. Results also support the theoretical framework that the PCOM is heterogeneous and that the PSF factor may be a second order factor that comprises of three subscales: self-esteem, SF, and EM. This structure is consistent with the widely used health-related quality of life measure, the Pediatric Quality of Life Inventory [10]. Limitations to note include that the results obtained may differ for other camps and that there may be other influences on children's experience not included in the PCOM.

Future studies seeking to evaluate children's functioning in relation to oncology camp sessions could use the PCOM as an outcome measure. The PCOM could also be used to complement camp-specific measures, enabling comparison of outcomes across sites and generation of summary of outcomes for multiple sites. Camps could use the results of the PCOM to complement camp-specific measures to assess whether a camp is meeting its goals or fulfilling its mission statement. Camper responses on the PCOM could also assist camps in understanding which domains of functioning they are impacting more or less than others. Such findings could inform the camp's efforts to augment or redesign particular camp programming. By quantifying the physical and psychosocial impact of camp, camps will also be able to provide substantive data to patients, families, caregivers, and charitable foundations who are considering attending, referring, or donating to these camps. Future research should investigate the following: (a) use of the four subscale scores versus the two 'physical' and 'psychosocial' functioning scores, (b) development of additional items to address ceiling effects in the current items and that show more variability in responses, (c) non-modifiable and modifiable factors impacting camper outcomes, (d) potential differences between perceived camp experiences of children with cancer versus their siblings,

and (e) how sensitive the PCOM is to camp-related changes in children's functioning. In addition, additional development of the PCOM could include assessing its convergent, discriminant, and predictive validity within the pediatric oncology population. The use of the PCOM will augment the empirical base for pediatric oncology camps while also providing recommendations on how to improve outcomes across domains of functioning.

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Conflict of interest

The authors have declared no conflicts of interest.

Key points

- Pediatric oncology summer camps are common.
- A major barrier to conducting oncology camp evaluations has been the lack of a standardized outcome measure.
- This study evaluated the use of a standardized outcome measure (PCOM) using modern psychometric analysis in a large pediatric oncology population.
- Results indicated that the PCOM is a valid measure of children's perceptions of physical, emotional, social, self-esteem, and overall functioning as related to their oncology camp experience.
- Future studies on pediatric oncology camp could use the PCOM as an outcome measure.

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