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Quality of life of burn survivors treated in the military burn center

Linda H. Yoder, PhD, MBA, RN, AOCN, FAAN[a,*], *D. Curk McFall, MSN, RN*[a], *Dale N. Glaser, PhD*[b]

[a] *The University of Texas at Austin School of Nursing, Austin, TX*

[b] *Organizational Psychology Department, Alliant International University, San Diego State University, & Psychology Department, University of San Diego, San Diego, CA*

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ABSTRACT

Background: Limited research explains the quality of life (QOL) among burn survivors during post-hospitalization rehabilitation.

Purpose: To determine the QOL of military and civilian burn survivors treated in the military burn center.

Methods: In this longitudinal study, QOL was examined in 131 burn survivors (88 civilians; 43 military). Participants completed the Abbreviated Burn Specific Health Scale (BSHS-A) and the Satisfaction with Life Scale (SWLS) over 5 time points post-discharge.

Discussion: Civilian and military participants reported improved QOL over time on most BSHS-A subscales. Military participants had higher global BSHS-A scores at discharge, but at 6 months plateaued while civilians improved and had higher global BSHS-A scores at 18 months. Scores on the SWLS were consistently higher for military participants than for civilians.

Conclusion: Military versus civilian patients may have different expectations about their ability to rehabilitate. The post-hospitalization period needs to be better understood to develop appropriate QOL interventions.

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Introduction

There are approximately 1 million burn injuries annually in the United States with approximately 486,000 people receiving medical treatment in the United States each year (American Burn Association [ABA], 2016; U.S. Fire Administration, 2016). Deaths from fires and burns are the fifth most common cause of unintentional injury deaths in the United States and the third leading cause of fatal home injury (Burn Injury, 2017). There are 40,000 hospitalizations related

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* *Corresponding author:* Linda H. Yoder, The University of Texas at Austin School of Nursing, 1710 Red River, Austin, TX 78701.
E-mail address: lyoder@mail.nur.utexas.edu (L.H. Yoder).

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to burns; 30,000 of these hospitalizations occur at hospital burn centers (ABA, 2016). Forty-four percent of all nonmilitary-related burn admissions to burn centers are because of fire or flame injuries (thermal) (Burn Injury, 2017). More males (58.5%) than females (41.5%) suffer from burns. Most fires among civilians occur in the home (73%). Overall, the death rate from burn injuries has declined from 13.5 per million population in 2005 to 10.7 per million in 2014 because of increased prevention in the home and workplace. However, the cost of burn injuries in 2014 was $11.6 billion (U.S. Fire Administration, 2016). Likewise, the overall mortality rate from burns has declined because of advances in acute burn management and sepsis techniques with survival rates of 96.8%. However, there continues to be limited research addressing the long-term functional and psychosocial adaptation of burn survivors (Esselman, Thombs, Magyar-Russell, & Fauerbach, 2006; Goverman et al., 2016).

From a military perspective, burns have historically comprised between 5% and 20% of casualties sustained in the 20th and 21st centuries (Kauvar, Wade, & Baer, 2009). Burns sustained by military service members throughout the world are evaluated and treated within an echelon-based evacuation system with most of them arriving at San Antonio Military Medical Center in San Antonio, TX, the site of the U.S. Army Institute of Surgical Research (USAISR) Burn Center. The USAISR is unique because it serves as the sole worldwide referral center for all significantly burned military personnel. However, the USAISR also serves as a civilian regional burn center in South Texas, serving an area of 80,000 square miles with 6,800,000 people (Wolf et al., 2006). Civilian burn casualties are brought to the USAISR by local emergency medical services or are referred through a centralized referral system for medical emergencies in South Texas. At the USAISR, both military and civilian patients can receive primary burn care, reconstruction surgeries, and rehabilitation services.

Burn injuries range from minor burns to life-altering injuries that are complex in nature and may result in extended rehabilitation after discharge because of long-term physical and psychological complications (Esselman et al., 2006; Falder et al., 2009). With the integration of burn centers, improvements in resuscitation techniques, development of new pharmaceutical agents, and early grafting, total mortality associated with burn injuries has decreased (Esselman, 2007; Leblebici et al., 2006). Despite these improvements, burn survivors are faced with physical, psychological, social, and spiritual challenges as a result of their injuries. Furthermore, burn survivors may experience persistent difficulties adapting to alterations in their preburn lifestyles because of the challenges resulting from their burn injuries (Esselman, 2007; Moi, Wentzel-Larsen, Salemark, Wahl, & Hanestad, 2006, 2007). After hospital or burn center discharge, many burn survivors require prolonged assistance to adjust to physical, psychological, and social stressors resulting from such a life-altering injury. Burn survivors, their families, and significant others may need to adapt to long-term alterations in all facets of their lives. Therefore, recovery from a major burn injury can be challenging and sometimes take several years for rehabilitation and full reintegration to work and social activities (Öster, Willebrand, & Ekselius, 2013). The return to the best quality of life (QOL) possible, including return to work or school, an acceptable appearance, and community integration are goals of modern burn care (Klein et al., 2007).

With improved survival rates of burn patients over the last four decades, more emphasis is now being placed on measuring and optimizing QOL for burn survivors (Goverman et al., 2016). QOL is a multifactorial and constantly changing state, and there are numerous ways of conceptualizing, defining, or measuring QOL; however, it is best evaluated by the person experiencing it (Costa, Rossi, Lopes, & Cioffi, 2008; Fayers & Machin, 2009; Novelli, Melandri, Bertolotti, & Vidotto, 2009; Stavrou et al., 2014). Because of the multidimensionality and subjectivity of the construct, there remains no consensus regarding the definition of QOL (Cromes, Holavanahalli, Kowalske, & Helm, 2002; Stavrou et al., 2014). However, there is agreement about major dimensions or domains of QOL. These include physical, psychological, and social functioning, general and/or disease symptoms (Ferrell, Grant, Padilla, Vemuri, & Rhiner, 1991; King, 2003; Schipper, 1990), and spirituality (Ferrell et al., 1991; King, 2003). Therefore, from a theoretical perspective, the construct of QOL comprises biological, psychological, social, and spiritual factors with measurable domains (Strain, 1990).

Because the USAISR staff provides burn care to both military and civilian patients, the USAIR Burn Center provides a unique opportunity to collect QOL outcomes data and compare the two groups. The purpose of this article is to report perceptions of QOL from military and civilian burn survivors during a period of 18 months after discharge from the USAISR. The conflicts in southwest Asia, Operation Enduring Freedom and Operation Iraqi Freedom, had not begun at the time this study was initiated in 2000; therefore, only a few military service members enrolled near the end of the recruitment period of the study were injured in those conflicts.

Methods

This study consisted of a prospective and longitudinal design. The research question was as follows: What are the changes in burn patients' perception of QOL in the first 18 months after burn center discharge? Approval for the study was obtained from the Brooke Army Medical Center Institutional Review Board and the Uniformed Services University of the Health Sciences Institutional Review Board. Participants met the following inclusion criteria:

a. Had been hospitalized for a burn injury for a minimum of 72 hr and required excision and grafting.
b. Were at least 18 years old.
c. Were able to read/speak English or Spanish. Patients with functional impairments could receive help from the research team member when completing the instruments. Spanish translation was provided as needed.
d. Consented to participate in this study during a period of 18 months.

Potential participants were approached within 1 week of hospital discharge; the study was explained by the study project director, and the consent form was reviewed. Because English- and Spanish-speaking patients could be enrolled in the study, certified translations of the consent form and the instruments were available. Although a Spanish version of the Abbreviated Burn Specific Health Scale (BSHS-A) was reported in the literature (Salvador Sanz, Sanchez-Payá, & Rodriguez-Marin, 1998, 1999), the language in that instrument was aimed at individuals living in Spain. The research team asked several Spanish speakers from South Central Texas to evaluate that instrument for use in this study. All the five individuals agreed that the Spanish in Texas is different, and a translation service was used to translate and back translate the BSHS-A for Spanish speakers from South Central Texas and Mexico. Once the patient had agreed to participate in the study, information from the patient's medical record also was gathered, such as total body surface area (TBSA) burned, length of stay (LOS), and the presence of inhalation injury.

At the time of burn center discharge, as well as 3, 6, 12, and 18 months postdischarge, patients completed the BSHS-A, the Satisfaction with Life Scale (SWLS), and demographic and clinical data sheets developed by the research team. These instruments were chosen to mirror research being conducted by various U.S. burn centers (The Burn Rehabilitation Model System), which was funded by the National Institute on Disability and Rehabilitation Research (Goverman et al., 2016). The BSHS-A consists of four domains: physical, psychological, social, and general. The *physical* domain is further divided into mobility/self care, hand function, and role activities. The *psychological* domain is divided into body image and affective. The *social* domain is separated into family/friends and sexual health, and the *general* domain captures additional burn-specific impairments, such as pain, social sensitivity, and overall health, but it is not divided into subscales. The score for each domain and subscale consists of summing the participant's ratings for the items identified for that domain. The *global* score consists of the sum of all domain scores (Blades, Mellis, & Munster, 1982). The stem for the 80 items of the BSHS-A is *How much difficulty do you have…*, and the items are scored using a Likert-type scale consisting of 0 = extreme, 1 = quite a bit, 2 = moderate, 3 = a little bit, and 4 = none at all. The alpha coefficients for internal consistency/reliability estimates of the BSHS-A were high in four areas: physical health (0.86), body image (0.83), psychological health (0.92), and sexual health (0.86) (Blades et al., 1982). Both intrarater and inter-rater reliability testing showed positive correlations: $r = 0.89$, $p < .001$ and $r = 0.78$, $p < .05$, respectively (Munster, Horowitz, & Tudahl, 1987). In this study, the Cronbach's alpha for the Global BSHS-A score in English over the five data collection periods was 0.95. The alpha for the Spanish version of the BSHS-A was 0.91, which is slightly lower than reported in the literature for the Spanish version of the BSHS ($\alpha = 0.96$) (Salvador-Sanz et al., 1998). The BSHS-A domain alphas were similar in both languages with the following ranges over the five periods: physical = 0.90 to 0.93, psychological = 0.90 to 0.95, social = 0.68 to 0.87, and general health = 0.79 to 0.82. The alphas from both versions of the BSHS-A used in this study are consistent with the findings of Munster et al. (1987).

The SWLS is a five-item questionnaire developed as a measure of an individual's global subjective QOL (Diener, Emmons, Larsen, & Griffin, 1985). The SWLS was previously used with a variety of patients, such as those with chronic illnesses (Riley et al., 1998), adults with traumatic brain injuries (Corrigan, Smith-Knapp, & Granger, 1998), and burn patients (Patterson, Ptacek, Cromes, Fauerbach, & Engrav, 2000). The instrument measures the judgmental component of subjective well-being with a present-time focus. Confirmatory factor analysis demonstrated that the SWLS captures a single factor, accounting for 74% of the total variance (Pavot, Diener, Colvin, & Sandvik, 1991). Similar findings were replicated for the French, Swedish, Czech, and Spanish translations across adolescent, adult, and geriatric populations (Kildal, Andersson, & Gerdin, 2002; Moi et al., 2006; Salvador-Sanz et al., 1999).

Each of the five items on the SWLS is rated on a seven-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7). The items ask about ideal life, conditions of life, and satisfaction with present and past life; they can be summed to provide a satisfaction with life score ranging from 5 to 35. A score of 20 represents a neutral point at which the respondent is equally satisfied or dissatisfied; a higher score indicates greater satisfaction with life (Corrigan et al., 1998). Diener et al. (1985) reported good internal reliability (0.87), 2-week test–retest reliability (0.84), 2-month test–retest reliability (0.82), and 4-year test–retest reliability (0.54) for the SWLS. In this study, the alphas for the English and Spanish versions of the SWLS were 0.83, which is slightly lower than $\alpha = 0.87$ reported by Diener et al. (1985).

The SWLS also was moderately correlated (0.50–0.60) with other subjective well-being scales. In this study, the correlation between the BSHS-A and the SWLS was $r = 0.34$. Although this correlation was statistically significant at $p \leq .01$, it is low and therefore indicates limited collinearity. The BSHS-A is

considered to be a disease-specific QOL instrument, whereas the SWLS score represents a general gestalt of how a person perceives their life at that time.

Statistical Analyses

Data were entered into an access database and then transferred to SPSS, version 23 (IBM Corporation, Armonk, NY). Descriptive statistics and measures of central tendency were used to examine the demographic and clinical data. Chi-square and *t* tests were conducted to compare the groups on key demographic and clinical variables. Multilevel linear modeling (MLM) was conducted as the multivariate analysis method used to examine the QOL data over time. MLM is a flexible and powerful statistical tool that can be used in longitudinal studies because all data are included in the analyses to include those data from participants who may have left the study or died. Also, MLM methods can easily handle the type of missing data often present in longitudinal studies (Glaser & Hastings, 2011; Schonfeld & Rindskopf, 2007); in this study, missing data were primarily missing completely at random. Statistical significance was set at $\alpha = 0.05$ throughout, and continuous data are presented as mean ± standard deviation unless otherwise noted.

Findings

During the data collection period from January 2000 to October 2006, 203 patients were screened based on the eligibility criteria, and 131 patients were enrolled (64.53%). Nine of the first 32 participants enrolled were lost to follow-up during suspension of human use research at the USAISR, unrelated to this study. In addition, there were at least two missing time points in the data from 17 of the first 32 subjects enrolled. Once the study was resumed in March 2001, there were only six participant attritions and three deaths (unrelated to the study) during the remainder of the data collection. Therefore, the overall attrition rate was 13%. This relatively low attrition rate was achieved by the research team developing a rapport with the participants and stressing that their data were vital to the understanding of burn rehabilitation outcomes over time.

Sample

The demographic and clinical characteristics of the entire sample ($n = 131$) are provided in Tables 1 and 2. Regarding key clinical variables, the groups differed significantly in percent TBSA burned ($t = 2.28$; $p = .02$) and percent of partial thickness burn ($t = 3.58$; $p \leq .000$) but not in percent full thickness burn. The difference between the military and civilian LOS was statistically significant ($t = -2.31$; $p = .025$). Military participants had a longer LOS because they can remain hospitalized to receive more extensive inpatient rehabilitation, whereas civilian participants either received subsequent care in the civilian sector if they were insured or they received minimal or no rehabilitative follow-up if they were uninsured. Because no insurance data could be obtained in this study, this was not a variable under investigation.

Table 1 – Demographic Characteristics of the Sample

Variable	Civilian, $n = 88$		Military, $n = 43$	
Age	M	SD	M	SD
	40.86	14.01	26.60	7.63
	n	%	*n*	%
18–30	27	31	33	77
31–40	18	20	6	14
41–50	24	28	4	9
51–60	10	12	0	0
61–75	9	10	0	0
Gender				
Female	13	15	3	7
Male	75	85	40	93
Ethnicity				
Caucasian	38	43	27	63
African American	7	8	7	16
Hispanic	42	48	7	16
Asian	1	1	0	0
Pacific Islander	0	0	1	2
American Indian	0	0	1	2
Marital status				
Married	49	56	16	37
Single	28	32	23	54
Widowed	2	2	0	0
Other	9	10	4	9
Currently employed				
Yes	69	78	43	100
No	19	22	0	0
Income				
≤$19,999	44	50	6	14
$20,000–39,999	27	31	29	67
$40,000–59,000	9	10	7	16
≥$60,000	8	9	1	2
Education				
Less than high school	12	14	0	0
Some high school	16	18	1	2
High school graduate	24	27	18	42
Vocational/technical	7	8	5	12
Some college	19	22	13	30
College graduate	6	7	5	12
Graduate school	4	5	1	2

Note. M, mean; SD, standard deviation.

The demographic data demonstrates that the military service members were significantly younger ($t = 13.78$; $p \leq .001$), fewer were married ($\chi^2 = 16.11$; $p \leq .001$), were better educated overall ($\chi^2 = 64.56$; $p \leq .000$), and typically earned a higher income ($\chi^2 = 0.91.88$; $p \leq .001$).

Chi-square results indicated a significant difference in ethnicity between the groups ($\chi^2 = 15.87$; $p = .007$); there were more Hispanics in the civilian group, but the percentages of minorities in the military group were reflective of the military population in general.

Table 2 – Clinical Characteristics of the Sample

Variable	Civilian, $n = 88$		Military, $n = 43$	
	M (SD)	Mdn	M (SD)	Mdn
LOS (days)	28.10 (24.94)	17	47.93 (54.14)	25
% TBSA burned	19.2 (15.2)	14.7	14 (10.4)	11.1
	n	%	*n*	%
0.01%–10%	31	35	19	44
11%–20%	23	26	12	28
21% or greater	34	39	12	28
	M (SD)	Mdn	M (SD)	Mdn
% FT burned	7.8 (12.9)	2.0	7.5 (9.9)	2.5
	n	%	*n*	%
0.01%–10%	69	78	30	70
11%–20%	8	9	7	16
21% or greater	11	13	6	14
	M (SD)	Mdn	M (SD)	Mdn
% PT burned	11.4 (9.9)	10	6.5 (5.7)	5.5
	n	%	*n*	%
0.01%–10%	47	53	34	79
11%–20%	27	30	7	16
21% or greater	14	16	2	5

Note. FT, full thickness; LOS, length of stay; M, mean; Mdn, median; PT, partial thickness; SD, standard deviation; TBSA, total body surface area.

Only six participants used the Spanish versions of the consent form and instruments.

Differences Over Time

The BSHS-A global (overall score) and domain scores are presented in Table 3. The civilians and military patients had similar scores over the course of the study. The scores also remained stable over time demonstrating no significant improvement. At 18 months, there was only a 4% to 11% deviance from the domain maximum scores in both groups.

The mean SWLS scores were consistently lower for the civilians than for the military participants. Civilian scores were lowest at 3 and 6 months after burn center discharge, whereas the military scores remained relatively stable and only improved slightly at 18 months. The highest SWLS score was achieved at 18 months in both groups. At 18 months, the civilian SWLS scores were 27% lower than the possible maximum score, and the military score was 20% lower than the possible maximum score.

The MLM results indicated that for the BSHS global score the overall effect for group (military vs. civilian) × time interaction was significant, $F(4, 426.91) = 4.98$, $p = .001$, and the overall effect for time also was significant, $F(4, 426.93) = 60.42$, $p < .001$. When examining the domains of the BSHS-A, for the physical domain, the overall effect for group × time interaction was significant, $F(4, 426.18) = 4.85$, $p = .001$, and the overall effect for time also was significant, $F(4, 426.2) = 96.88$, $p < .001$. Social domain scores also demonstrated a significant effect for the group × time interaction, $F(4, 435.68) = 4.56$, $p = .001$, and the overall effect of time was significant $F(4, 435.72) = 4.28$, $p = .002$. For the general domain, the overall effect for the group × time interaction was significant, $F(4, 424.9) = 3.25$, $p = .012$, and the overall effect for time was significant, $F(4, 424.9) = 48.84$, $p < .001$. This means that there were differences within and between the participants in each group. However, for the psychological domain, the overall effect for group × time interaction was not significant, but the overall effect for time was significant, $F(4, 433.17) = 10.17$, $p < .001$. This means that there were no significant differences between the civilian and military participants' scores, but within each group, there were difference over time. No other explanatory variables, such as age, LOS, TBSA burned, or FT burn, were significant. For the SWLS scores, the overall effect for group × time interaction was not significant, and the overall effect for time also was not significant. However, one explanatory variable, age, was significant, $F(1, 121.46) = 2.05$, $p = .003$.

Discussion

To our knowledge, this is the first analysis of QOL/SWL data, using valid and reliable instruments, from civilian and military patients treated during the same period at the USAISR. The ages of the civilian and military participants in this study are almost identical to the sample in a study by Wolf et al. (2006), where mortality was examined during a period similar to when this study was taking place. The USAIR provides a unique environment to compare outcomes between civilians and military service members because it is the only burn center in the United States where these two types of patients are admitted and cared for by the same staff using the same treatment protocols. In this study, when examining QOL during18 months after burn center discharge using the BSHS-A, the global score and the physical, social, and general domain scores showed that there were statistically significant differences between the civilian and military patients. However, when examining the scores in Table 3, the differences are slight and not clinically relevant. What is evident is that the civilian and military participants had similar rehabilitation trajectories over time.

The fact that civilian patients started with lower scores on most BSHS-A domains yet had slightly higher or similar scores when compared with the military participants at 18 months is interesting given that many of the civilian patients did not have access to the same amount of rehabilitative services as the military participants. In many cases, because of lack of insurance and low income, the civilian participants received

Table 3 – BSHS-A Global and Domain Scores As Well As SWLS Scores

Scores	Maximum Score	Status	Discharge Civilian ($n = 88$) Military ($n = 43$) Mean	SD	3 Months Civilian ($n = 67$) Military ($n = 40$) Mean	SD	6 Months Civilian ($n = 60$) Military ($n = 41$) Mean	SD	12 Months Civilian ($n = 72$) Military ($n = 41$) Mean	SD	18 Months Civilian ($n = 70$) Military ($n = 43$) Mean	SD
BSHS-A global (total)	320	Civilian	261.02	33.08	278.70	40.21	296.63	29.35	304.06	17.14	304.04	23.35
		Military	267.53	31.08	289.87	26.13	295.58	21.19	295.15	27.92	295.63	31.21
BSHS-A physical	80	Civilian	51.57	18.08	65.01	19.03	73.20	11.40	75.35	9.24	75.73	9.12
		Military	57.77	15.32	72.43	7.83	74.12	5.73	74.41	8.19	75.02	7.39
BSHS-A psychological	120	Civilian	107.33	12.73	107.85	16.37	112.15	12.58	114.71	7.05	114.63	10.00
		Military	104.53	12.71	109.50	12.44	110.95	10.49	110.12	12.03	109.70	16.43
BSHS-A social	60	Civilian	56.11	5.77	56.66	6.51	58.52	3.27	59.21	1.88	59.03	3.12
		Military	57.86	3.02	58.02	3.08	58.51	3.13	57.95	3.99	57.51	6.10
BSHS-A general	60	Civilian	46.08	7.70	49.18	8.12	52.77	7.81	54.79	5.00	55.04	5.49
		Military	47.37	7.21	49.92	7.20	52.00	6.11	52.66	7.39	53.39	6.30
SWLS	35 (neutral = 20)	Civilian	24.73	7.42	23.79	8.11	24.52	8.19	25.35	7.43	25.54	7.21
		Military	26.70	5.79	26.63	6.48	26.83	6.06	26.78	6.98	28.02	6.33

Note. BSHS-A, Abbreviated Burn Specific Health Scale; SD, standard deviation; SWLS, Satisfaction with Life Scale.

limited follow-up burn care. In future studies, it would be ideal to determine the type and amount of health insurance the civilian patients possessed and the degree to which they were able to receive rehabilitative services. In addition, in this sample, the civilians had a slightly higher percentage TBSA burned than the military patients, potentially leading one to falsely believe that their perceptions of QOL might be less positive.

The BSHS-A results from this study are similar to those of Öster et al. (2013). Although they used the brief version of the BSHS, they found that improvements in domain scores were not statistically significant until participants were 2 to 7 years from being burned. They concluded that significant improvement in postburn QOL could be expected after 2 years. This supports the belief that more prospective longitudinal QOL research is needed among burn patients.

The military participants' BSHS-A psychological domain scores were lower than those of the civilians at 6, 12, and 18 months, indicating that this may be a period where more extensive reassessment of psychological issues take place. During this time, military service members may be faced with having to leave the military because of their injury or follow-up surgeries. These results are consistent with the findings of Patterson et al. (2000) who stated that at 6 months after a burn injury the individual is attempting to reestablish previous patterns of life. In addition, there may have been an issue of *expectations* affecting the psychological QOL perceptions of the military participants. In most cases, the military burn survivors did not want to be discharged from the military; they almost universally wanted to rejoin their military units. The military participants who were being discharged voiced the most unhappiness when interacting with the research team. In short, many of these primarily young and male service members expected to work toward maximal recovery to remain in the military. The civilian participants may not have had this level of life reassessment taking place, and therefore, their QOL scores tended to slightly increase over time as seen in Table 3. However, in both groups, the psychological domain scores remained flat indicating limited improvement over time, demonstrating that more psychological support may be needed for both groups.

The civilian participants had lower SWLS scores than the service members at all time points, with scores being lowest at the 3- and 6-month time points, perhaps indicating a time of greater need. In several cases, the research team members worked with burn center social workers at these time points to access community resources for civilian patients to prevent them from being evicted from their living quarters or to attain food stamps for proper nutrition to support wound healing. Although this was not an intervention study, these actions were deemed ethically important by the research team, although the subsequent SWLS scores may have been affected by these actions. Also, it must be noted that the civilian participants might have judged their satisfaction with life to be lower before the

burn because of lower educational status, income, and/or culture.

In an analysis of data from the Burn Model System National Database, the SWLS scores reported by Goverman et al. (2016) were worse than those of the civilians in this study. The ages of the patients in that sample and the important clinical characteristics were similar to participants in this study. At burn center discharge, they asked patients to answer the SWLS based on their recall of their life 4 weeks before their burn injury. Although there were more patients in that study, there was a higher percentage of minorities in the present study. Therefore, it is interesting that the SWLS scores of the civilian patients in this study at 12 and 18 months were slightly better than the preburn scores reported by Goverman et al. Because the SWLS scores represent a global perspective of QOL, there may be a cultural explanation for why the civilians in this study viewed their QOL as better than the respondents of Goverman et al.

The fact that the SWLS scores of the military participants were consistently slightly higher than those of their civilian counterparts in light of the slightly lower BSHS-A scores may seem puzzling at first. Again, it must be remembered that the SWLS captures an overall bigger picture of one's satisfaction with life rather than perceptions of discrete domains of QOL. Often the military participants commented that they were *happy to be alive* and thankful for the extensive burn care they were receiving. In contrast, at least three of the civilian participants were burned in fires they started, and many of the civilians had considerable social concerns affecting them, such as loss of income and limited local social support.

In summary, the findings from this study support the findings of other research indicating that burn recovery is consistent with a more complex biopsychosocial model of recovery in which QOL outcomes are thought to involve a convergence between emotional and physical factors (Patterson et al., 2000). The burn literature leads one to believe that the first year after burn is the most important adjustment period (Cromes et al., 2002; Patterson et al., 2000). However, the findings from this study support the idea that perhaps the adjustment period for burn patients is longer than 2 years (Klein et al., 2007; Wasiak et al., 2013). Military service members may need more time to adjust because of their physical and role expectations for themselves as military service members. The role of expectations in relation to QOL outcomes is supported by the work of Blalock, Bunker, and DeVellis (1994) who demonstrated that attaching more importance to the need for improvement can create increased psychological stress. This may provide some explanation for why the psychological domain scores of the BSHS-A among the military participants were lower than the civilians' scores.

There are several limitations to this study. First, the loss of patients because of factors unrelated to this study did affect the sample size negatively. Second, the QOL and SWL perceptions for both instruments were self-reported, but this is consistent with other burn studies using such instruments. There are no *normed* values for these instruments, so it is difficult to determine what is an acceptable vs. good, vs. excellent QOL recovery for burn patients. One can only examine the participants' scores in relation to the possible maximum instrument scores and make a judgment about recovery.

The military burn center is the only ABA-designated burn center that consistently treats both military service members and civilians in the same units with the same staff and treatment protocols, thereby allowing civilian–military QOL/SWL comparisons to be made. Typically, burn centers keep data regarding morbidity and mortality, but prospective QOL/SWL data are lacking. Also, as more information is published about QOL/SWL among burn patients, it is clear that longitudinal studies of greater duration than 2 years are needed to fully understand the rehabilitation trajectories of these patients. Military burn patients are typically followed in the burn clinic for ongoing assessment and treatment. Brief QOL/SWL assessments could be integrated into these visits and maintained in a database that could be analyzed over time. Also, the QOL/SWL assessments could prompt early interventions for psychological or social issues that may arise; functional status issues are usually more obvious. When this study began, the military burn patients were not followed by a case manager, but by the end of the study period, case managers were put in place to follow service members' rehabilitation more closely.

The data from this study could also be used to brief congress and leaders in the Department of Defense to demonstrate the QOL/SWL outcomes achieved in the military burn center. Burn rehabilitation requires extensive services to assist recovering patients over the course of years, not just months. In addition, more psychological support may be needed for patients between 6 and 18 months after burn center discharge. QOL outcomes affect the readiness of the military and the ongoing need to fund acute and rehabilitative burn care and research in the military.

Conclusions

Clearly, more research is needed to examine the QOL/SWL perceptions of burn survivors over time, especially groups that are socially or culturally disparate. Examining QOL/SWL perceptions prospectively beyond 2 years is needed. Burn patients may need up to a decade to fully rehabilitate. It also appears that civilians may need different types of interventions at different periods than military service members. Mental health and social interventions to address these needs can be provided by psychiatric clinical nurse specialists, case managers, and social workers. Regarding burn research, what is most needed are

qualitative studies to put the quantitative data into context and provide explanations for some of the findings at various time points. Only with a combination of quantitative and qualitative methods can the QOL/SWL perceptions and needs of burn patients be better understood.

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