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The Relation between Satisfaction with Appearance and Race and Ethnicity: A National Institute on Disability, Independent Living, and Rehabilitation Research Burn Model System Study

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Abstract

Research supports that people of color in the U.S. have poorer outcomes after burn injury compared to White individuals. The current study sought to explore burn health disparities by testing the relationship between racial and ethnic minority status, a proxy for systemic discrimination due to race and ethnicity, with two key constructs linked to functional outcomes, *satisfaction with appearance* and *social community integration*. Participants included 1,318 burn survivors from the Burn Model System National Database (mean age = 40.2, *SD* = 12.7). Participants completed measures of satisfaction with appearance and social community integration at baseline, 6-, 12-, and 24-months post burn injury. Linear regressions revealed that racial and ethnic minority status significantly related to lower satisfaction with appearance and social community integration compared to White individuals at all time points. In addition, satisfaction with appearance continued to significantly relate to greater social community integration even while controlling for race and ethnicity, age, sex, burn size, and physical disability at 6-, 12-, and 24-month time points. Overall, the study supports that racial and ethnic minority burn survivors report greater dissatisfaction with their appearance and lower social community reintegration after burn injury.

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Keywords

Satisfaction with appearance; community integration; race; ethnicity; burn injury

Introduction

Burns, an injury to tissue caused by heat, radiation, or chemicals [1], creates not only physical, but also psychological consequences. In the U.S. alone, it is estimated that there are approximately 410,149 non-fatal burn injuries each year [2]. Even with the U.S. being considered a high-income country equipped with comprehensive burn care centers and advanced medical treatments, burn injuries continue to disproportionally affect racial and ethnic minority individuals post-discharge, likely due to systemic racism and unfair treatment [2]. Despite this known disparity, limited research has examined psychological factors related to burn injury among racial and ethnic minority burn survivors.

Burn health disparities among people of color in the U.S. have been well documented, especially in clinical outcomes. As an example, national studies of individuals with burn injury demonstrated that Black individuals have significantly more operations, complications in the hospital, infections (e.g., septicemia, urinary tract infections [3]) and risk for mortality [4] compared to White individuals. This trend is similar with functional outcomes: Holavanahalli, Sanchez, and Kowalske (2016) found that Black burn survivors reported significantly poorer functional outcomes (via the SF-12® Health Surveys) compared to White burn survivors [5]. However, further work is needed to explore burn mental health disparities in outcomes *after* hospital discharge. Examination of the relationship between satisfaction with appearance and community integration, two constructs uniquely related to mental health and quality of life, may elucidate our understanding of mental health disparities among racial and ethnic minority burn survivors.

Theoretical Framework

Given the cultural emphasis in the United States with its prescribed standards for physical beauty, including little to no imperfections, impairments, or blemishes [6-7], it is important to take a holistic approach to individuals impacted by burn injury with their response to injury and re-adjustment into their communities. The concept of body image encompasses "systemic, cognitive, affective, conscious, and unconscious representation that people have concerning their bodies during their biological development and throughout their social relationships" [8] (p. 506). To better understand body image among burn survivors, Thombs and colleagues tested a staged process outlined by previous researchers [9-11]: body image, or satisfaction with appearance, generally decreased after burn injury, but gradually improved with time. As a person's appearance changes, their social skills necessary for psychosocial functioning may also adapt accordingly. This framework suggests that satisfaction with injury and community integration are uniquely intertwined with one another. However, there is a paucity of research that has integrated the role of racial and ethnic minority status within this framework.

Satisfaction with Appearance

Consistent with Thombs et al.'s framework, satisfaction with appearance, a subjective measure after burn injury, has been shown to not only predict functional outcomes, but also be a stronger correlate of functional outcomes than objective measures of burn, such as scarring, burn size and location of the burn [9, 12-14]. In fact, body image dissatisfaction among burn survivors was the most salient predictor of psychosocial functioning up to 12-months following burn injury, especially for women and individuals with large burns [9, 14]. A separate study of burn survivors demonstrated that dissatisfaction with appearance was related to challenges with mental and physical health-related quality of life, even after controlling for premorbid quality of life and injury severity [15]. Specifically, dissatisfaction with appearance is linked to increased depression [9, 16-17], posttraumatic stress symptoms [15, 17-18], anxiety, and lower vitality, and social functioning [12, 19].

General research on body image has shown some subtle differences among racial and ethnic minority persons. As an example, some studies have shown that Black adolescents have more positive body image satisfaction than White adolescents [20], while other studies support that people of color are less satisfied with cosmetic surgeries, such as rhinoplasty, compared to White individuals [21]. A handful of studies examining burn survivors found that people of color in their samples were more likely to report general distress compared to White persons [22]. It is known that subjective assessment of satisfaction with appearance after burn injury is a stronger predictor of functional outcomes than objective assessment [9, 12-13, 15]; however, little is known whether racial and ethnic discrimination, a proxy for systemic discrimination, is related to lower satisfaction with appearance or whether satisfaction with appearance is related to psychosocial functioning among people of color.

Community Integration

Within Thombs and colleague's framework, over time an individual may adapt with their injury, gain skills, and further integrate into one's community [9]. Community integration, or one's capacity to return to recreational, vocational, and/or educational activities and social participation [23], is an important outcome after burn injury as survivors transition from the hospital to the community [24]. As an example, returning to work post-burn injury has been correlated with decreased posttraumatic stress symptoms and improved quality of life [25-26]. Furthermore, social participation is linked with higher reported life satisfaction and positive mental health [27]. Community integration is predicted by younger age, lower burn severity, high pre-injury job satisfaction, and milder pre-injury psychiatric and substance use history [13]. Pierce and colleagues (2019) found that European American persons reported higher community integration 24-months after discharge compared to African American and Latinx American individuals even after controlling for age, sex, burn size, number of days in inpatient rehabilitation, and active range of motion deficits [28]. Similarly, Wrigley and colleagues (1995) found that White burn survivors were ten times more likely to return to work compared to people of color 12-months after burn injury [29].

Consistent with Thombs and colleagues, researchers have noted a relationship between satisfaction with appearance and community integration, such that greater satisfaction with appearance is positively related to better community integration [9, 30] among burn

survivors and non-burn populations [31-32]. It might be that with injury, an individual may develop dissatisfaction with appearance, which might be related to increased self-consciousness, perceived stigma, self-isolation and reduced social engagement [33-34]. Alternatively, an individual may develop higher satisfaction with appearance and gradually re-engage with their community. However, less is known if the relationship between satisfaction with appearance and community integration persists while including race and ethnicity as a covariate.

Current Study

Despite that racial and ethnic minority individuals are disproportionally affected by burn injury [2], further work is needed to understand the psychological factors related to burn injury among racial and ethnic minority persons residing in the U.S. Because people of color in the U.S. experience individual, organizational, and institutional racism, it is important to identify the inequities and disparities in outcomes. A better understanding of the relationship of how racial and ethnic minority status may relate with the framework outlined by Thombs and colleagues regarding satisfaction with appearance and community integration, may provide avenues for clinicians and researchers to address inequities among burn survivors of color. The aims and hypotheses among this study of participants recruited from multiple BMS across the U.S. were:

a. to explore whether racial and ethnic minority status is related to satisfaction with appearance and social community integration. It was hypothesized that racial and ethnic minority burn survivors would endorse greater dissatisfaction with appearance and lower social community integration compared to the European American group at each time point assessed (baseline, 6-month, 12-month, and 24-month).

b. to explore whether satisfaction with appearance relates to social community integration. It was hypothesized based on previous literature that satisfaction with appearance would be related to greater social community integration even after controlling for demographics, such as self-reported race and ethnicity, at each time point.

Material and Methods

Participants and Procedure

Participants include 1318 adults (M_{age} = 40.2, SD = 12.7, range: 18 to 65), the majority were male (72.1%), from the multi-site National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) funded Burn Model System (BMS) National Database [35]. Participants sustained moderate to severe burn injuries and were treated between 2006 and 2015 at one of four Burn Model System centers: Boston-Harvard Burn Injury Model System, Pediatric Burn Injury Rehabilitation Model System, North Texas Burn Rehabilitation Model System, North Texas Burn Rehabilitation Model System, and Northwest Regional BMS at the University of Washington Medicine Regional Burn Center, Seattle. Data from BMS participants were included in this analysis if they had completed at least one self-report survey and had sustained an injury within one of the following groups:

- ≥ 10% Total Body Surface Area (TBSA) for those age 65 years or older;
- ≥ 20% TBSA burn for those age 0-64 years;
- high-voltage electrical injury to include lightning
- injury of any size to the face, hand, or feet;

AND required burn surgery for wound closure.

Exclusionary criteria included those unable to provide informed consent (e.g., medically incapable of informed consent, deceased during the acute, index hospitalization). After providing informed consent to complete questionnaires and have information extracted from their medical records, they completed a series of study measures via in-person or telephone interview, mail or via a secure online survey at several study time-points (baseline [i.e., discharge], 6-months, 12-months, and 24-months post-injury). The study was approved by the institutional review boards at each participating institution.

Measures

Demographic information.—Information about age, sex, burn (location, burn size) and insurance status were collected via medical record abstraction. As a proxy for disability, we used a single-self report item (e.g., “Do you have a pre-existing disability?”).

Race and ethnicity.—For the present study, participants were stratified into two groups based on their self-reported race and ethnicity within their medical record. Participants that identified their ethnicity as “Hispanic or Latino” and/or their race as a) Black, African American b) Asian c) Native American, d) Alaskan Native or American Indian, e) Native Hawaiian or Other Pacific Islander, f) multiple races, g) or an unlisted category were coded into a people of color group (i.e., racial and ethnic minority person). Participants that identified as White were coded into another group. While we acknowledge that further separation of racial and ethnic groups would provide unique findings, it would limit the power required for analyses of interest.

Satisfaction with Appearance Scale (SWAP).—The SWAP [12] is a 14-item self-report measure that assesses subjective satisfaction with appearance and the social-behavioral impact of burn scars. Participants indicated at each time point (baseline, 6-, 12-, and 24-month post-injury) how much each item (e.g., “Because of changes in my appearance caused by my burn, I am uncomfortable in the presence of strangers,” “I am satisfied with the appearance of my face”) aligned with their current thoughts and feelings about their burn injury on a scale ranging from 1 *strongly disagree* to 7 *strongly agree*. Higher scores indicate greater dissatisfaction with appearance and poorer body image. The scale was developed and validated with a racially and ethnically diverse sample of individuals (e.g., 65% European American, 32% African American, and 3% identified as another racial and ethnic minority group) with burn injury.

Community Integration Questionnaire (CIQ).—Participants completed the Social Integration subscale, which is 6-items from the CIQ [23], a measure that examines integration into the community among persons after sustaining a traumatic brain injury.

Participants completed the Social Integration subscale (e.g., “Approximately how many times a month do you participate in the following activities outside your home: leisure activities such as movies, sports, restaurants?”) at several time points (preburn, 6-, 12-, and 24-month follow-up post-injury). Their responses were summed (range: 0 to 12), such that higher scores indicate greater social integration into the community. The CIQ has been validated for use with adult burn survivors [36] and previously used with racially and ethnically diverse individuals after burn injury [28].

Calculation

To assess univariate differences between people of color and White persons, Chi-square and Wilcoxon Mann Whitney tests due to non-parametric data were used (for categorical and continuous variables, respectively). For each aim, a series of four cross-sectional linear regressions at four time points (baseline, and 6-, 12-, and 24- months post-burn) were used. The first two series of regressions tested whether racial and ethnic minority status were related to satisfaction with appearance and social community integration while controlling for age, sex, burn size, and physical disability. The final series of regressions tested whether satisfaction with appearance related to social community integration after controlling for race and ethnicity, age, sex, burn size, and physical disability. Observations that were missing for any predictor variable were dropped from the regression analyses. Robust standard errors were used to control for mild violation of underlying assumptions [37]. Non-response analyses were conducted to assess whether the group included in the regression analyses at each assessment differed by age, sex, % TBSA burn size, and length of hospital stay from those who were not included in the regression analyses (i.e., we examined demographic and clinical characteristics of those that were followed as compared to those that dropped out of the study or who didn’t have data at follow-up for any other reason). Wilcoxon-Mann-Whitney tests were used for age, % TBSA, and length of stay due to non-parametric distribution of these variables. Chi-square tests assessed differences in sex at each time point, and chi-square goodness of fit tests were used to test whether the proportion of White and burn survivors of color was different at each time point as compared to the proportion at baseline.

Results

A total of 1,318 burn survivors participated in the study and completed the SWAP and social integration subscale from the CIQ measures at a minimum of one time point. To briefly summarize attrition, approximately 61.8%, 58.6%, and 52.3% of people with hospital discharge data had SWAP scores at 6-, 12-, and 24-months, respectively. Thirty-one percent (n = 414) of burn survivors with baseline data have SWAP scores at all time points.

Mean TBSA for participants in the study was 19.5% (SD = 18.0%, median 15.0%, IQR: 5%-29%) with an average length of hospitalization of 31.4 days (SD = 41.5). About half of the sample (53%) had a head and/or neck burn and 71.9% sustained hand(s) burn. Additionally, most participants identified as White (63.6%, n = 830). Of the remaining participants, 16.6% (n = 217) identified as Black or African American, 14.0% (n = 183) as Hispanic or Latino, 2.1% as Alaskan Native or American Indian (n = 27), and 1.3% as

Asian (n = 17) with the remainder identifying as more than one race (1.3%, n = 17), Native Hawaiian or Other Pacific Islander (0.7%, n = 9), or unknown race (0.5%, n = 6). To reflect socioeconomic status, insurance coverage was used as a proxy: 26.6% of participants had Medicaid, were self-pay, or given public support (n = 333), 40.1% had Medicare, HMO, PPO, or Managed Care (n = 502), 19.4% were covered by Workers' compensation (n = 243), and 14% had other insurance (n = 175). Means, standard deviations, and statistical comparisons of the sample stratified by people of color and White persons are shown in Table 1.

Multiple cross-sectional linear regression models were used to determine whether racial and ethnic minority status predicted SWAP and social integration from the CIQ scores while controlling for age, sex, physical disability, and burn size (measured as percent TBSA burn) at each time point. At each time point, racial and ethnic minority status significantly predicted SWAP scores, (baseline: $F(5, 1103) = 26.64$, $p = <0.0001$, $R^2 = 0.1052$; 6-months: $F(5, 797) = 18.11$, $p = <0.0001$, $R^2 = 0.1047$; 12-months: $F(5,759)=18.57$, $p = <0.0001$, $R^2 =0.1189$; 24-months: $F(5,670)=15.68$, $p = <0.0001$, $R^2 =0.1084$) (see Table 2). As noted in Table 1, people of color had significantly lower satisfaction with appearance (demonstrated by higher SWAP scores) at each time point (baseline, 6-, 12-, and 24-months postburn) compared to White persons. To explain, racial and ethnic minority status significantly predicted lower satisfaction with appearance (coefficient = −7.03, $p < .001$) at 24-months.

The second set of cross-sectional linear regression models provide support that identifying as a racial and ethnic minority significantly predict social integration from the CIQ, (baseline: $F(5, 929) = 9.71$, $p <0.0001$, $R^2 = 0.047$; 6-months: $F(5, 801) = 15.83$, $p <0.0001$, $R^2 = 0.085$; 12-months: $F(5, 749) = 10.55$, $p <0.0001$, $R^2 = 0.059$; 24-months: $F(5,652)=6.21$, $p <0.0001$, $R^2 = 0.042$). Again, racial and ethnic minority status was predictive of significantly lower social community integration at each time point compared to White individuals (see Table 3).

A final set of cross-sectional linear regressions tested whether SWAP scores predict the CIQ social integration subscale after adjusting for race and ethnicity, age, sex, physical disability, and burn size at each time point. These models significantly predicted social integration subscale scores from the CIQ, (baseline: $F(6, 901) = 7.92$, $p <0.0001$, $R^2 = 0.049$; 6-months: $F(6, 744) = 25.63$, $p <0.0001$, $R^2 = 0.1623$; 12-months: $F(6, 709) = 20.68$, $p <0.0001$, $R^2 = 0.142$; 24-months: $F(6, 514) = 13.18$, $p <0.0001$, $R^2 = 0.1273$). As hypothesized, higher SWAP scores significantly predicted lower social integration subscale scores from the CIQ after adjusting for covariates at three of the four time points: 6-, 12-, and 24- months. As an example, higher SWAP at 6-months predicted lower social integration at 6-months and so forth. See Table 4 for full results.

The non-response analyses showed that participants at each time point were not significantly different than those at baseline with regards to sex or length of hospital stay. The age of participants who were followed was significantly different at 6 months and 12 months compared to those who dropped out, with those who were followed being older than those who dropped out. Percent TBSA burn size was significantly higher for those included in the analyses as compared to those who dropped out at every time point. Finally, length of

hospital stay was longer for those included in the analyses compared to those who dropped out. These findings are consistent with the analysis of drop-out rates in the BMS as a whole [38]. Additionally, dropout rates were not significantly different at any time point for burn survivors of color as compared to White burn survivors (p=0.826 at 6-months, p=0.345 at 12-months, p=0.948 at 24-months).

Discussion

Our cross-sectional study on the relationship between satisfaction with appearance and social community integration among burn survivors sampled from the NIDILRR-funded Burn Model System National Database extend the burn health disparities literature. In sum, the current study reveals that people of color reported higher dissatisfaction with appearance and lower social community integration at baseline, 6-, 12-, and 24-months following injury while controlling for age, sex, burn size, and physical disability. Moreover, dissatisfaction with appearance was uniquely linked to social community integration at 6-, 12-, and 24-month follow-ups while controlling for age, sex, burn size, physical disability, and self-reported race and ethnicity, further emphasizing the role of satisfaction with appearance in social re-integration and functional outcomes. Of note, while about one-quarter of our sample had lower resources (i.e., insurance was Medicaid, self-pay or public support), we did not include socioeconomic status as a covariate. While socioeconomic status and race and ethnicity are uniquely interrelated, it important to understand how they are distinct from one another. As such, the purpose of this study was to further elucidate systemic inequities due to race; other studies have highlighted how socioeconomic status relates to burn outcomes [3].

Disparities in Outcomes

The first aim supports the notion that people of color in the U.S. face added burden and health disparities compared to White persons [39], including among burn survivors [2]. In this case, people of color reported higher dissatisfaction with appearance and lower social community integration, common correlates of lower quality of life and increased psychological distress [15], compared to White people. This finding demonstrates that there is an increased need to support racial and ethnic minority burn survivors with improving body image and social community re-integration.

Higher dissatisfaction with appearance and lower social community integration among people of color might be partially explained by increased stigma due to visible burn injuries [40] and racial or ethnic discrimination. Stigmatization due to burn injury, including lack of friendly behavior, increased attention and staring behaviors, and hostile behaviors, have been correlated with decreased social comfort [40]. Similarly, ethnic discrimination has been strongly linked to poor mental and physical health outcomes [41], and individual, structural, and internalized forms of racial or ethnic discrimination may contribute to increased underlying health conditions, increased medical complications, and delays in return to work associated with burn recovery [3, 28]. As an example, a previous study found that Latinx and Hispanic burn patients were less likely to be discharged at a higher level of rehabilitation compared to White and Black patients [42].

Differences among people of color persisted even though we included several relevant covariates with predictive utility based on previous studies concerning satisfaction with appearance and community integration [16]. Identifying as a female was linked to higher dissatisfaction with appearance at all time points. Likewise, increased burn size was related to increased dissatisfaction with appearance and lower community integration at all time points post-injury [43].

The Relationship between Body Image and Community Integration

The findings from our second aim were consistent with the framework outlined by Thombs and colleagues (2008) that body image and community integration are uniquely intertwined at various time points post-injury. The second aim was supported by the finding that if burn survivors are dissatisfied with their appearances, they are less likely to re-integrate into their communities. This finding has also supported by other studies in the past [30, 44-45]. Specifically, satisfaction with appearance, which is related to one's body image and self-esteem, uniquely relates to the likelihood that an individual will engage in social interactions [44]. Consistent with qualitative studies of burn survivors, MacLeod and Shepherd (2016) found that some burn survivors reported a tendency to avoid crowded settings to avoid the possibility that others would react negatively to their post-burn appearance [45]. However, our study was cross-sectional, meaning that the relationship between satisfaction with appearance and community integration might be bidirectional. However, there are mixed findings as to whether or not community integration predicts satisfaction with appearance [30, 44].

In addition, our study's findings show further utility of including subjective measures of burn injury in addition to objective measures for predicting functional outcomes among burn survivors of color. It is possible that satisfaction with appearance warrants further empirical attention as an underlying mechanism between burn injury and adaptive outcomes. For example, one study found that dissatisfaction with appearance was an underlying link between preburn psychosocial functioning and 12-month post-injury psychosocial functioning [9]. Both current and past findings suggest that creating and using targeted interventions to bolster satisfaction with appearance may lead to gains in functional outcomes.

Our included covariates also elicited interesting findings from the second aim. Even while including satisfaction with appearance, identifying as a person of color was still linked to worse community integration at 6- and 12-months post-injury. However, this finding was not true at 24-months suggesting that satisfaction with appearance (and not race-ethnicity) is a stronger correlate at this time point. Identifying as female was only significantly linked to lower community integration scores at 6- and 12-month postburn when satisfaction with appearance was included in the model. Future work should explore whether there is a moderating effect of one's sex on satisfaction with appearance predicting community integration. It might be that female burn survivors need support at different stages of their recovery (i.e., 6-12 month period). Older age was also linked to lower community integration at all time points, which is consistent with previous reports [28, 46-47]. Preburn physical disability was not related to satisfaction with appearance or community integration.

It might be that individuals with self-reported disabilities prior to injury have some level of resilience or coping strategies that may carry over to burn survivorship.

Clinical Implications

The findings from the current study indicate that institutions may need to implement: 1) early identification for dissatisfaction with appearance and 2) additional support to people of color to bolster the challenges associated with satisfaction with appearance and community reintegration post discharge. Our findings support that people of color, women, older adults, and individuals with larger burn size are at greater risk for dissatisfaction with appearance and/or lower rates of community integration. Early psychological intervention shows promising results for burn survivors through improving body image and providing burn survivors with social skills to be more equipped for community re-integration. Some examples include peer to peer support [48-49], social skills training (e.g., Changing Faces and Behavioral and Enhancement Tools) [50-51], cognitive behavioral therapy [51-52], and acceptance-based interventions [53-54]. While these interventions are shown to have benefit, further work needs to be done to make sure that they are accessible to burn survivors despite systemic inequities due to race and ethnicity. One example might be through culturally adapting these treatments, which has shown to increase therapeutic effectiveness [55]. On a broader scale, the findings of the current study provide evidence that continued work is needed from both within policy and clinical practice to de-construct the ways in which racism exists within individuals, institutions, and organizations.

Limitations and Future Directions

The current study utilized a dichotomous variable to examine differences between people of color and White individuals, which did not allow for greater exploration between different individuals within the people of color group. While separating the groups individually could have provided unique findings, it would have substantially limited the power of the analyses in the current study. In addition, limiting the study to Black, African American persons or people that identified as from African ancestry, the largest racial group within the current sample, would have excluded already underrepresented participants. Future research may consider examining whether these relationships are consistent or change when examined specifically among Latinx persons, Native American individuals and Asian American individuals or individuals from Asian descent. Rather than using racial and ethnic minority status as a proxy for racial inequities, future research may consider measuring forms of racism and ethnic discrimination since it is likely that people of color are at risk for greater body dissatisfaction and poor community integration due to the inequities and racism that they face, not because race or ethnicity itself is a risk factor. In efforts to continue recruiting populations from diverse backgrounds, researchers should adapt the SWAP and the CIQ for use with individuals with limited English proficiency that reside in the U.S. As an example, the SWAP has been successfully interpreted and modified for use with Swedish [57], Brazilian [58], and Pakistani [59] burn survivors. While the present paper was focused on the relationship between satisfaction with appearance and community integration at each time point, another extension of this work would be using mixed linear models to identify trajectories of both satisfaction with appearance and community integration among people of color versus White individuals. While Pierce et al. [27] has already conducted

similar analysis for community integration, further work could incorporate satisfaction with appearance.

Other limitations included our assessment of physical disability (i.e., self-reported yes or no). Future studies may consider a more multi-faceted assessment. Finally, we focused on the predictive utility of *subjective* measures of burn injury, specifically satisfaction with appearance, while controlling for burn size as our objective measure of burn injury. Future studies may consider how satisfaction with appearance links to functional outcomes while controlling for other important objective measures of burn injury, such as location of the burn injury, burn visibility, or a measure of scarring, such as the Vancouver Scar Scale [60].

Conclusions

This cross-sectional study furthers the research on health disparities among racial and ethnic minority burn survivors and informs future practical and theoretical research endeavors. The current study reveals that people of color reported lower satisfaction with appearance and community integration compared to White persons up to two years following injury. Moreover, satisfaction with appearance may be a relevant target of intervention because it is positively linked with social community integration even while controlling for racial and ethnic minority status, age, sex, burn size, and physical disability. Future research should build awareness of burn health disparities, identify underlying mechanisms between burn injury and poor outcomes, inclusion of subjective measures of injury, and ultimately develop interventions that reduce burn health disparities.

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Appendix

Table 1.

Clinical and demographic characteristics among the sample of interest

	People of color	White individuals	*p*-value
	mean (SD), n	mean (SD), n	
Age, mean years (*SD*)	38.3 (12.1), 476	41.3 (13.0), 830	<0.0001
Burn size	17.8 (17.9), 474	20.5 (18.0), 825	0.01
Length of stay, mean days (*SD*)	31.3 (47.5), 470	31.5 (37.9), 823	0.93
	% (n)	% (n)	
Male, percent (*n*) Insurance status	67.2 (320)	74.9 (622)	0.003
Medicaid/self-pay/public support	30.7 (138)	24.1 (191)	<0.0001
Medicare/HMO/PPO/Managed care	30.9 (139)	45.3 (359)	

	People of color	White individuals	*p*-value
	mean (SD), n	**mean (SD), n**	
Worker's compensation	20.0 (90)	19.0 (151)	
Other insurance	18.4 (83)	11.6 (92)	
	mean (SD), n	**mean (SD), n**	
Social Integration, preburn (baseline)	8.3 (2.2), 349	8.7 (2.2), 591	0.02
Social Integration, 6-month	7.3 (2.5), 299	8.1 (2.4), 514	<0.0001
Social Integration, 12-month	7.4 (2.3), 290	8.0 (2.5), 468	0.001
Social Integration, 24-month	7.6 (2.6), 244	8.2 (2.4), 418	0.004
SWAP, baseline	30.2 (18.5), 416	25.5 (18.1), 700	<0.0001
SWAP, 6-month	33.1 (19.3), 293	28.6 (18.1), 516	0.001
SWAP, 12-month	32.8 (20.6), 288	28.9 (18.2), 480	0.006
SWAP, 24-month	34.0 (19.7), 248	26.8 (18.3), 435	<0.0001

Note. Burn size measured as a percent of the Total Body Surface Area, SWAP indicates Satisfaction with Appearance Scale, and Social Integration indicates the Social Integration subscale from the Community Integration Questionnaire. Twelve people did not indicate their race or ethnicity.

Table 2.

Cross-sectional linear regression models with SWAP, race-ethnicity and covariates

	SWAP							
Time point	**Baseline (n = 1,109)**		**6-month (n = 803)**		**12-month (n = 765)**		**24-month (n = 676)**	
	Coeff	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**
Age	0.004	−0.08, 0.08	0.06	−0.03, 0.16	0.001	−0.10, 0.10	0.07	−0.04, 0.18
Sex	8.06**	5.68, 10.44	8.65**	5.80, 11.50	7.26**	4.36, 10.15	7.62**	4.57, 10.67
Burn size[1]	0.25**	0.19, 0.31	0.26**	0.19, 0.34	0.31**	0.23, 0.38	0.23**	0.15, 0.31
Other physical disability	−1.22	−3.03, 0.60	−0.002	−1.73, 1.73	−1.28	−3.01, 0.45	−1.31	−2.88, 0.26
Race-ethnicity	−4.70**	−6.85, −2.55	−4.66**	−7.25, −2.08	−4.30**	−7.11, −1.50	−7.03**	−9.96, −4.10

*p<0.05

**p<.01

[1]measured as a percent of the TBSA

Table 3.

Cross-sectional linear regression models with CIQ, race-ethnicity and covariates

	Community Integration							
Time point	**Preburn^ (n = 935)**		**6-month (n = 807)**		**12-month (n = 755)**		**24-month (n = 658)**	
	Coeff	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**
Age	−0.03**	−0.04, −0.02	−0.04**	−0.05, −0.03	−0.03**	−0.05, −0.02	−0.03**	−0.05, −0.02
Sex	−0.06	−0.39, 0.27	0.21	−0.15, 0.57	0.05	−0.32, 0.42	−0.01	−0.42, 0.40
Burn size[1]	−0.01	−0.02, 0.00	−0.02**	−0.03, −0.01	−0.02**	−0.03, −0.01	−0.003**	−0.05, −0.02

Community Integration								
Time point	**Preburn^ (n = 935)**		**6-month (n = 807)**		**12-month (n = 755)**		**24-month (n = 658)**	
	Coeff	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**
Other physical disability	0.25*	0.003, 050	−0.04	−0.28, 0.21	−0.01	−0.27, 0.26	0.05	−0.20, 0.31
Race-ethnicity	0.47**	0.18, 0.76	0.98**	0.64, 1.32	0.80**	0.46, 1.15	0.66**	0.27, 1.05

*p<0.05
**p<.01
^Preburn recall period assessed at hospital discharge.
1measured as a percent of the TBSA

Table 4.

Cross-sectional linear regression models with SWAP, CIQ, and covariates

Community Integration								
Time point	**Preburn^ (n = 908)**		**6-month (n = 751)**		**12-month (n = 716)**		**24-month (n = 521)**	
	Coeff	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**	**Coeff**	**95% CI**
Age	−0.03**	−0.04, −0.02	−0.04**	−0.05, −0.02	−0.03**	−0.05, −0.02	−0.03**	−0.05, −0.02
Sex	0.01	−0.33, 0.35	0.42*	0.06, 0.78	0.37*	0.01, 0.73	0.30	−0.15, 0.75
Burn size1	−0.01	−0.02, 0.001	−0.01*	−0.02, −0.001	−0.003	−0.01, 0.01	0.01	−0.004, 0.02
Other physical disability	0.37*	0.01, 0.73	−0.06	−0.28, 0.16	0.01	−0.39, 0.41	0.30	−0.10, 0.70
Race-ethnicity	0.42**	0.13, 0.72	0.83**	0.49, 1.17	0.64**	0.30, 0.98	0.42	−0.002, 0.85
SWAP	−0.003	−0.01, 0.01	−0.04**	−0.05, −0.03	−0.04**	−0.05, −0.03	−0.04**	−0.05, −0.03

*p<0.05
**p<.01
^Preburn recall period assessed at hospital discharge.
1measured as a percent of the TBSA

References

1. World Health Organization. Burns, https://www.who.int/violence_injury_prevention/other_injury/burns/en/, 2019 [accessed 14 September 2021].
2. Peck MD Epidemiology of burns throughout the world: Part I: Distribution of risk factors. Burns 2011;37:1087–1100. 10.1016/j.burns.2011.06.005 [PubMed: 21802856]
3. Bedri H, Romanowski KS, Liao J et al. A national study of the effect of race, socioeconomic status, and gender on burn outcomes. Journal of Burn Care Research 2017;38:161–8. 10.1097/BCR.00000000000416 [PubMed: 28423388]
4. Murphy S, Clark DE, & Carter DW Racial disparities exist among burn patients despite insurance coverage. The American Journal of Surgery 2019;218:47–50. 10.1016/j.amjsurg.2018.08.013 [PubMed: 30195836]

5. Holavanahalli R, Sanchez A, & Kowalske K Proceedings from the 48th Annual Meeting of the American Burn Association, May 2016, Las Vegas, NV.
6. Partridge J The psychological effects of facial disfigurement. Journal of Wound Care 1993;2:170–1. doi:10.12968/jowc.1993.2.3.168
7. Pellard S Body image and acute burn injuries: A literature review. Journal of Wound Care 2006;15:129–32. doi:10.12968/jowc.2006.15.3.26883 [PubMed: 16550668]
8. Roy M, & Payette H The body image construct among Western seniors: A systematic review of the literature. Archives of Gerontology & The Geriatrics 2012;55:505–21. . doi:10.1016/j.archger.2012.04.007
9. Thombs BD, Notes LD, Lawrence JW et al. From survival to socialization: A longitudinal study of body image in survivors of burn injury. Journal of Psychosomatic Research 2008; 64:205–12. 10.1016/j.jpsychores.2007.09.003 [PubMed: 18222134]
10. Thompson AR, Kent G, Smith JA Living with vitiligo: dealing with difference. Br J Health Psychol 2002; 7:213–25. doi:10.1348/135910702169457 [PubMed: 14596710]
11. Partridge J Survival, socialization, and advocacy. J Burn Care Rehabil. 2005; 64:205–212.
12. Lawrence JW, Heinberg LJ, Roca R et al. Development and validation of the satisfaction with appearance scale: Assessing body image among burn-injured patients. Psychological Assessment 1998; 10:64–70. 10.1037/1040-3590.10.1.64
13. Esselman PC, Thombs BD, Magyar-Russell G et al. Burn rehabilitation: State of the science. American Journal of Physical Medicine & Rehabilitation 2006; 85:383–413. 10.1097/01.phm.0000202095.51037.a3 [PubMed: 16554686]
14. Cleary M, Kornhaber R, Thapa DK et al. A quantitative systemic review assessing the impact of burn injuries on body image. Body Image 2020;33:47–65. doi:10.1016/j.bodyim.2020.02.008 [PubMed: 32109831]
15. Fauerbach JA, Heinberg LJ, Lawrence JW et al. Effect of early body image dissatisfaction on subsequent psychological and physical adjustment after disfiguring injury. Psychosomatic Medicine 2000; 62:576–82. Retrieved from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.513.7033&rep=rep1&type=pdf [PubMed: 10949104]
16. Ghriwati N, Sutter M, Pierce BS et al. Two-year gender differences in satisfaction with appearance after burn injury and prediction of five-year depression: A latent growth curve approach. Archives of Physical Medicine & Rehabilitation 2017; 98:2274–2279. 10.1016/j.apmr.2017.04.011 [PubMed: 28483656]
17. Huang YK, & Su YJ Burn severity and long-term psychosocial adjustment after burn injury: The mediating role of body image dissatisfaction. Burns 2020; 47:1373–80. doi:10.1016/j.burns.2020.12.015 [PubMed: 33413917]
18. Dahl O, Wickman M, Bjornhagen V et al. Early assessment and identification of posttraumatic stress disorder, satisfaction with appearance and coping in patients with burns. Burns 2016; 47:1373–80. 10.1016/j.burns.2013.08.036
19. Griffiths C, Guest E, White P et al. A systematic review of patient-reported outcome measures used in adult burn research. Journal of Burn Care & Research 2017; 38:e521–45. 10.1097/BCR.0000000000000474 [PubMed: 27893571]
20. Mikolajczyk RT, Iannotti RJ, Farhat T et al. Ethnic Differences in perceptions of body satisfaction and body appearance among U.S. school children: a cross-sectional study. BMC Public Health 2012; 12:1–9. 10.1186/1471-2458-12-425 [PubMed: 22214479]
21. Schwitzer JA, Albino FP, Mathis RK et al. Assessing demographic differences in patient-perceived improvement in facial appearance and quality of life following rhinoplasty. Anesthetic Surgery Journal 2015; 35:784–93. 10.1093/asj/sjv066
22. Fauerbach JA, McKibben J, Bienvenu OJ et al. Psychological distress after major burn injury. Psychosomatic Medicine 2007; 69:473–82. doi:10.97/psy.0b013e31806bf393 [PubMed: 17585064]
23. Willer B, Rosenthal M, Kreutzer JS et al. Assessment of community integration following rehabilitation for traumatic brain injury. The Journal of Head Trauma Rehabilitation 1993; 69:473–82. 10.1097/00001199-199308020-00009

24. Blakeney P, Patridge J, & Rumsey N Community integration. Journal of Burn Care Research 2007;28:598–601. 10.1097/BCR.0B013E318093E493 [PubMed: 17665521]
25. Cromes GF, Holavanahalli R, Kowalske K et al. Predictors of quality of life as measured by the burn specific health scale in persons with major burn injury. Journal of Burn Care & Rehabilitation 2002;23:229–34. 10.1097/00004630-200205000-00016 [PubMed: 12032377]
26. Dyster-Aas J, Kildal M, & Willebrand M Return to work and health-related quality of life after burn injury. Journal of Rehabilitation Medicine 2007; 39:49–55. 10.2340/16501977-0005 [PubMed: 17225038]
27. Suzuki M, Amagai M Shibata F et al. Factors related to self-efficacy for social participation of people with mental illness. Archives of Psychiatric Nursing, 2011;27:359–365. doi:10.1016/j.apnu.2011.03.004
28. Pierce BS, Perrin PB, Pugh M et al. Racial/ethnic disparities in longitudinal trajectories of community integration after burn injury. American Journal of Physical Medicine & Rehabilitation 2019;25:359–65. 10.1097/PHM.0000000000001378
29. Wrigley M, Trotman BK, Dimick A et al. Factors relating to return to work after burn injury. Journal of Burn Care Rehabilitation 1995;16:445–50. 10.1097/00004630-199507000-00012 [PubMed: 8582926]
30. McAleavey AA, Wyka K, Peskin M et al. Physical, functional, and psychosocial recovery from burn injury is related and their relationship changes over time: A burn model system study. Burns 2018;44:793–99. 10.1016/j.burns.2017.12.011 [PubMed: 29395409]
31. Kirkcaldy BD, Shephard RJ, & Siefen RG The relationship between physical activity and self-image and problem behavior among adolescents. Soc Psychiatry Psychiatr Epidemiol 2002;37:544–50. doi:10.1007/s00127-002-0554-7 [PubMed: 12395145]
32. Mikula P, Nagyova I, Krokavcova M et al. Self-esteem, social participation and quality of life in patients with multiple sclerosis. J Health Psychol 2017;22:984–92. doi:10.1177/1359105315621778 [PubMed: 26764379]
33. Corry N Pruzinksy T Rumsey N Quality of life and psychosocial adjustment to burn injury: social functioning, body image, and health policy perspectives. Int Rev Psychiatry 2009;21:539–48. doi:10.3109/09540260903343901 [PubMed: 19919207]
34. Van Loey NE (2020). Psychological impact of living with scars following burn injury. In: Teot L, Mustoe Th.A., Middelkoop E, & Gauglitz GG, editors. Textbook on Scar Management. Springer, p. 429–434.
35. [dataset] Burn Model System National Longitudinal Database. 10.17605/OSF.IO/SWC2P.
36. Gerrard P Validation of the community integration questionnaire in the adult burn injury population. Quality of Life Research 2015;24:2651–55. doi:10.1007/s11136-015-0997-4. [PubMed: 25986908]
37. Cameron A, Trivedi P. Microeconometrics Using Stata. Vol 5.; 2010
38. Bamer AM, McMullen K, Gibran N et al. Factors associated with attrition of adult participants in a longitudinal database: A National Institute on Disability, Independent Living, and Rehabilitation Research Burn Model System Study. Journal of Burn Care & Research 2020;41:270–9. doi:10.1093/jbcr/irz186 [PubMed: 31738436]
39. Adler NE, & Rehkopf DH U.S. Disparities in health: Descriptions, causes, and mechanisms. Annual Review of Public Health 2008;29:235–52. 10.1146/annurev.ublhealth.29.020907.090852
40. Lawrence JW, Fauerbach JA, Heinberg LJ et al. The reliability and validity of the Perceived Stigmatization Questionnaire (PSQ) and the Social Comfort Questionnaire (SCQ) among adult burn survivor sample. Psychological Assessment 2006;18:106–11. http://doi.org/1040-3590.18.1.106 [PubMed: 16594819]
41. Williams DR, Neighbors HW, & Jackson JS Racial/ethnic discrimination and health: Findings from community studies. Racial/Ethnic Bias and Health 2003;93:200–208. 10.2105/AJPH.93.2.200
42. Bartley CN, Atwell K, Cairns B, & Charles A Racial and ethnic disparities in discharge to rehabilitation following burn injury. Journal of Burn Care & Research 2019; 40(2): 143–7. doi:10.1093/jbcr/irz001 [PubMed: 30698732]

43. McMullen K, Bamer AM, Gibran NS et al. Social integration in the first 2 years after moderate to severe burn injury: A Burn Model System National Database Study. Journal of Burn Care & Research 2020;41:S19–20. Doi:10.1093/jbcr/iraa024.029
44. Ajoudani F, Jasemi M, & Lofti M Social participation, social support, and body image in the first year of rehabilitation in burn survivors: A longitudinal, three-wave cross-lagged panel analysis using structural equation modeling. Burns 2018;44:1141–50. doi:10.1016/j.burns.2018.03.018 [PubMed: 29776862]
45. MacLeod R, Shepherd L, & Thompson AR Posttraumatic stress symptoms and appearance distress following burn injury: An interpretative phenological analysis. Health psychol 2016;35:1997–204. 10.1037/hea0000391
46. Esselman PC, Ptacek JT, Kowalske K et al. Community integration after burn injuries. The Journal of Burn Care & Rehabilitation 2001;22:221–27. 10.1097/00004630-2001050000-00007 [PubMed: 11403244]
47. Tan W-H, Goldstein R, Gerrard P et al. Outcomes and predictors in burn rehabilitation. J Burn Care Res 2012;33:110–117. 10.1097/BCR.0b013e318234d91a [PubMed: 21941195]
48. Cristall N, Kohja Z, Gawaziuk JP et al. Narrative discourse of burn injury and recovery on peer support websites: A qualitative analysis. Burns 2021;47:397–401. doi:10.1016/j.burns.2020.10.004 [PubMed: 33246671]
49. Won P, Bello MS, Soycos SA et al. The impact of peer support group programs on psychosocial outcomes for burn survivors and caregivers: A review of the literature. Journal of Burn Care & Research 2021; 42:600–609. doi:10.1093/jbcr.irab042 [PubMed: 33677491]
50. Partridge J Changing faces: Taking up Macgregor's challenge. J Burn Care Res. 1998;19:174–80. 10.1097/00004630-199803000-00017
51. Kammerer-Quayle B Behavioral skills and image enhancement training for burn survivors: Essential interventions for improving quality of life and community integration. In Sood R, & Achauer, editors, Burn Surgery: Reconstruction and Rehabilitation, Philadelphia: Elsevier; 2006, p. 396–409.
52. Jarry JL & Cash TF Cognitive behavioral approaches to body image change. In Jarry JL, Cash TF, & Smolak L, editors, Body Image: A Handbook of Science, Practice and Prevention, Guilford; 2011; p. 415–423
53. Newell R, & Clarke M Evaluation of self-help leaflet in treatment of social difficulties following facial disfiguration. International Journal of Nursing Studies, 2000;37:381–388. 10.1016/S0020-7489(00)00017-1 [PubMed: 10785529]
54. Hayes SC, Strosahl KD, & Wilson KG Acceptance and Commitment Therapy. Washington DC: American Psychological Association; 2011.
55. Segal ZV, & Teasdale J Mindfulness based cognitive therapy for depression. Guilford Publications; 2018.
56. Sue S, Zane N, Nagayama Hall GC et al. The case for cultural competency in psychotherapeutic interventions. Annual Review of Psychology 2009;60:525–48. 10.1146/annurev.psych.60.110707.163651
57. Dahl O, Wickman M, & Wenstrom Y The cultural adaptation and validation of a Swedish version of the satisfaction with appearance scale (SWAP-Swe). Burns 2014;.40:598–605. 10.1016/j.burns.2013.08.036 [PubMed: 24080124]
58. Caltran MP, Fretias NO, Dantas RAS et al. Satisfaction with appearance scale − SWAP: Adaptation and validation for Brazilian burn victims. Burns 2016; 42:1331–9. 10.1016/j.burns.2016.03.025 [PubMed: 27143340]
59. Chaudhary FA, Ahmad B, Butt DQ et al. The cultural adaptation and validation of an Urdu version of the satisfaction with appearance scale (SWAP-U) for Pakistani burn patients. Burns Open 2019; 3:83–8. 10.1016/j.burnso.2019.06.001
60. Baryza MJ & Baryza GA The Vancouver Scar Scale: An administrative tool and its interrater reliability. The Journal of Burn Care & Rehabilitation 1995; 16:535–8. 10.1097/00004630-199509000-00013 [PubMed: 8537427]

Highlights

- Racial-ethnic minority persons have significant burn disparities.
- Burn survivors of color were less satisfied with their appearance post-injury.
- Burn survivors of color had less community integration post-injury.
- Satisfaction with appearance was positively linked to community integration.