

Social integration and life and family satisfaction in survivors of injury at 5 years postinjury

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Abstract—This study assessed the relationship of social integration (SI) to life satisfaction and family satisfaction among survivors 5 years after injury. Thirty-four matched pairs of injured patients were interviewed by telephone 60 months after initial discharge from the acute care setting. Respondents were matched according to sex, race, education, injury severity, and employment status before comparing high and low socially integrated persons on measures of family and life satisfaction. High and low SI groups were formed based on the Craig Handicap Assessment and Reporting Technique (CHART) SI Scale. The former consisted of patients scoring 100; the latter consisted of patients scoring 50 or less. Analyses of covariance, with age and injury type as covariates, were used to test for group differences. The high and low SI groups differed on both the life and the family satisfaction measures, with the high SI group reporting greater life and family satisfaction.

Key words: CHART, disability, family satisfaction, FSS, injury, life satisfaction, LSI-A, social integration.

INTRODUCTION

A primary goal of rehabilitation is to restore, to the greatest extent possible, the physical functioning of an individual after illness or injury. However, for physical rehabilitation efforts to succeed, restoration of psychological functioning is essential, often being considered the most important of all rehabilitation goals. Research has consistently

demonstrated that the overall quality of life among the physically injured is associated more strongly with healthy psychological functioning than with the degree of residual physical impairment [1–3]. Rehabilitation professionals strive to restore the constellation of conditions that hold the most promise of helping an individual lead a normal or near-normal life. Therefore, identifying those factors contributing to greater life satisfaction as soon after injury as possible is critically important, so they may be integrated into a comprehensive rehabilitation process.

Abbreviations: AIS = Abbreviated Injury Scale, ANCOVA = analysis of covariance, CHART = Craig Handicap Assessment and Reporting Technique, FSS = Family Satisfaction Scale, IAF = intra-articular fracture, ICRC = Injury Control Research Center, LSI = Life Satisfaction Index, SB = severe burn, SCI = spinal cord injury, SD = standard deviation, SI = social integration, TBI = traumatic brain injury, UAB = University of Alabama at Birmingham.

This material was based on work supported in part by grant No. R49/CCR403641 from the U.S. Department of Health and Human Services Center for Disease Control and Prevention, National Center for Injury Prevention and Control to the University of Alabama at Birmingham, Injury Control Research Center.

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Social integration (SI), partaking in and continuing customary social relationships [4,5], is a vital component of life satisfaction for persons in the general population [1,4,6]. SI includes both the number of persons in an individual's social network and satisfaction with the amount of time spent with others [6]. If SI is associated with greater life satisfaction in the general population, one can reasonably hypothesize that the same would be true among people who experience debilitating injuries [1].

SI is an important concern for all rehabilitation professionals, especially those working with traumatic brain injury (TBI) patients, a group known for experiencing a variety of physical, psychological, emotional, and social sequelae. Individuals sustaining TBI may experience impediments in the fulfillment of accepted social roles, or they may be incapable of fulfilling such roles [7]. Depending on location and extent of injuries, those persons may experience social role impediments because of deficits in social skills, self-awareness, anger control, judgment, or any combination of these deficits [7]. Rehabilitation of those with TBI should help with building the skills needed to maintain social relationships and to foster new relationships to replace those lost after injury. With the loss of social relationships and impaired ability to create new ones, persons with TBI may become isolated, become dissatisfied with life, and develop a myriad of additional psychological problems [7].

Rehabilitation efforts that target deficits in SI have helped numerous people who have sustained TBI regain social skills and develop new social relationships. In fact, these rehabilitation strategies have been employed successfully with both those who have experienced TBI and spinal cord injury (SCI) [1,2,4,7-9]. Other severe injuries, such as burns or intra-articular fractures (IAFs), may be disfiguring, may affect mobility, and may also compromise social functioning, but the impact of these injuries on SI has been studied less frequently than the impact on SI in individuals with TBI or SCI.

Family satisfaction is affected by the rewards derived from exchanges among family members—the more positive exchanges that pass among family members, the higher the level of overall family satisfaction. In turn, increased family satisfaction generally contributes to a higher quality of life [10]. Family satisfaction has been shown to be important to those who have sustained a severe injury [11-13]. Thus, it is reasonable that family satisfaction must be addressed during the rehabilitation process. For example, many persons sustaining severe

injuries require a caregiver, often a family member, to help them with activities of daily living. Kosciulek and Pichette surveyed primary caregivers of individuals with TBI who identified several factors that enhance care: supportive friends; positive family outlook; availability of family support; and family unity, loyalty, and cooperation [14]. Problems that detract from care include unavailability of respite services, an absence of vocational and rehabilitation services, limited assistance for meeting day-to-day needs, inappropriate living situations, and emotional and behavioral problems in the injured family member. These findings illustrate that family members who care for loved ones who have sustained TBI also require a spectrum of family, community, and professional support if they are to be able to continue providing high quality of care over a protracted period. Family satisfaction may possibly enhance quality of life and indirectly lead to positive rehabilitation outcomes.

This research project assessed the relationship of SI to life satisfaction and family satisfaction for a mixed injury group of patients who had suffered TBI, SCI, severe burn (SB), or IAF 5 years postinjury. Persons experiencing severe burn and IAF have been studied less often than have persons experiencing SCI and TBI, especially longitudinally, hence their inclusion in this study. Random assignment to conditions was not possible, and we wanted to demonstrate, as clearly as possible, the relationship between SI and family and life satisfaction. Therefore, we used a matched sample design with some additional variables controlled using an analysis of covariance (ANCOVA) procedure. We hypothesized that increased SI will be associated with greater life and family satisfaction.

METHODS

In 1989, the University of Alabama at Birmingham's Injury Control Research Center (UAB-ICRC) received approval from the UAB Institutional Review Board to begin conducting an ongoing, prospective, longitudinal study of persons with one or more of the following injuries: SCI, TBI, IAFs of the lower limbs, or SBs.

Criteria for inclusion in the study were—

- Having sustained one or more of the aforementioned injuries between 1989 and 1992.
- Having a documented acute care stay of 3 or more days because of that injury.

- Residing and having been injured in Alabama.
- Being at least 18 years old when injured.
- Participating in regularly scheduled telephone follow-up interviews conducted by UAB-ICRC personnel.

The initial database contained 3,132 cases.

The present study used a selected subset from the ongoing, longitudinal study of injury outcomes. All participants in the present study were selected from the 5-year postinjury cohort. Although the initial database contained 3,132 cases, deaths and other causes of attrition had reduced that number to 804 cases after 5 years. Inclusion criteria for the present study were having—

- Abbreviated Injury Scale (AIS) score at the time of injury [15].
- Craig Handicap Assessment and Reporting Technique (CHART) Social Integration Scale [16].
- Life Satisfaction Index (version A) (LSI-A) [17].
- Family Satisfaction Scale (FSS) 5 years postinjury [18].

The CHART is a six-domain instrument that is commonly used to quantify the effects of injuries and other conditions on daily life activities [16]. Each domain is scored on a 100-point scale, with a score of 100 representing a level of performance typical of a nondisabled person. The CHART's 1-week test-retest reliability has been shown to be 0.93 [16]. SI was measured using the SI Scale domain of the CHART. The SI Scale measures ability to participate in and maintain customary social relationships through questions addressing issues such as Do you live alone? Are you involved in a romantic relationship? How many friends do you visit at least once a month? This portion of the CHART has been shown to have a 1-week test-retest reliability of 0.81 [16].

The LSI-A is a 20-item instrument of demonstrated reliability and validity designed to measure enthusiasm for life, mood, and congruence between desired and achieved goals [17]. Two studies of the LSI-A have examined the capability of items to discriminate between high and low scorers. These studies produced item discriminative values that range from 16.0 to 75.4 percent, with means of 42.0 and 58.7 percent [19,20]. An aggregate of 157 studies of LSI validity yielded an average internal consistency coefficient of 0.79, with score reliability unrelated to a variety of sample characteristics [21]. The LSI-A is also positively correlated with a variety of instruments that measure life satisfaction, adjustment, and morale [22].

The FSS is a single-dimension instrument that yields a total score indicative of global family satisfaction [18].

The scale consists of 14 items assessing dimensions of adaptability and cohesion. More specifically, the FSS measures constructs such as emotional bonding, family boundaries, decision making, assertiveness, discipline, negotiation, roles, and rules. The FSS has excellent internal consistency with Chronbach's Alpha = 0.95 for our sample of patients ($n = 741$ cases with complete FSS data) who completed this scale 5 years after injury. In the past, the FSS has been used to assess family satisfaction in the general population, as well as in individuals with SCI and TBI [13,23–25].

ANALYSIS

Participants in this study were selected on the basis of scores on the CHART Social Integration Scale, with participants earning the maximum score of 100 (the high SI group) being compared to those scoring 50 or less (the low SI group). Using the data for participants still in the database 5 years postinjury, we matched participants one-to-one according to sex, ethnicity, employment status at 60 months, maximum educational level at time of injury, and injury severity as measured by the AIS. Participants were matched on these variables because previous research has indicated that these variables may influence life satisfaction [8,9].

Two matched groups of 34 participants each were formed on the basis of CHART scores and matching variables. **Table 1** reveals that the groups consisted primarily of unemployed white males with less than a high school education. The AIS, the most widely used anatomic injury severity scale in the world [26], has values ranging from 1 (mild injury) to 6 (unsurvivable injury). In this study, the participants had AIS values indicative of moderate to severe injury severity (range = 2 to 4). The sample of 68 participants was also compared to the larger sample ($n = 804$) from which they were drawn. Educational attainment data were unavailable for a majority of the larger sample, so comparison with the smaller sample was not possible. **Table 1** shows that the smaller sample differed from the larger sample only on the employment status variable. Our sample of 68 participants was less likely to be employed than the larger group of participants. Otherwise, no significant differences were found between the groups on any of the variables measured.

A paired sample *t*-test revealed a significant difference between the two groups on the age variable ($t_{(33)} = -2.54$,

Table 1.
Summary of sample characteristics for matching variables.

Sample Variable	Matched Sample n = 68		Complete Sample n = 804		Significance Test	
	n	%	n	%	χ^2	<i>p</i>
Sex					1.89 df = 1	0.17
Male	42	62.0	561	69.8	—	—
Female	26	38.0	243	30.2	—	—
Ethnicity					0.17 df = 1	0.68
White	50	74.0	572	71.1	—	—
Nonwhite	18	26.0	232	28.9	—	—
Education						
< High School	44	65.0	—	—	—	—
High School/GED	10	15.0	—	—	—	—
> High School	14	20.0	—	—	—	—
Employment					22.5 df = 3	0.0001
Employed	8	12.0	325	40.4	—	—
Unemployed	42	62.0	343	42.7	—	—
Retired	14	20.0	114	14.2	—	—
Unknown	4	6.0	22	2.7	—	—
Abbreviated Injury Scale Score					3.9 df = 2	0.14
2	24	35.0	303	37.7	—	—
3	36	53.0	291	36.2	—	—
4	8	1.0	120	15.0	—	—
Injury Type					2.9 df = 4	0.57
Spinal Cord	4	6.0	85	10.6	—	—
Traumatic Brain	30	44.8	363	45.1	—	—
Intra-articular Fracture	17	25.4	166	20.7	—	—
Burn	13	19.4	162	20.1	—	—
Multiple/Unknown	4	6.0	28	3.5	—	—

GED = General Equivalency Diploma

df = degrees of freedom

$p = 0.0158$). The high SI group was, on average, younger than the low SI group (42.2 years versus 50.9 years). Additionally, participant matching on injury type was not possible because this would have greatly restricted the sample size and adversely affected power. ANCOVA, with age and injury type as covariates, was used to analyze the data. ANCOVA was used to determine if the data supported the hypothesized relationships of SI with life and family satisfaction while ruling out the influence of age and injury type (the selected covariates) as possible alternative explanations for the results.

RESULTS

Table 2 summarizes the results of the ANCOVA for the life satisfaction variable. A significant difference was found between the high and low SI groups on the Life Satisfaction measure while controlling for the effects of age and injury type. In this model, age was significantly related to SI, but injury type was not. The high SI group had a higher average score (13.2 out of a possible 20.0, standard deviation [SD] = 4.4) on the Life Satisfaction Index than the low SI group (9.3 out of a possible 20.0,

Table 2.
Analysis of covariance results for life satisfaction variable.

Source	SS	df	MS	F Test	<i>p</i> Value
Social Integration Group	267.11	1	267.11	13.2	0.0006
Age	96.51	1	96.51	4.8	0.03
Injury Type	5.84	1	5.84	0.3	ns
Error	1,274.73	63	20.23	—	—
Total	1,644.19	66	—	—	—

SS = sum of squares
df = degrees of freedom
MS = mean square
ns = nonsignificant

SD = 4.7). The squared multiple correlation coefficient for the model was $R^2 = 0.22$ ($p = 0.001$).

Similarly, the high and low SI groups differed in reported levels of family satisfaction, as shown in **Table 3**. Individuals in the high SI group reported greater average family satisfaction (54.2 out of a possible 70.0, SD = 10.5) than individuals in the low SI group (47.6 out of a possible 70.0, SD = 12.9). In this analysis, neither the age nor injury type covariates were significantly related to SI. The squared multiple correlation coefficient for the model was $R^2 = 0.14$ ($p = 0.03$).

DISCUSSION

We hypothesized that increased SI would be associated with greater life satisfaction and family satisfaction for the injury patients in our sample. Evidence for the role of SI in overall life satisfaction has been demonstrated in previous research for persons with TBI and SCI as well as geriatric populations [1,4,6]. For our study partici-

pants, SI is associated with greater life satisfaction and family satisfaction 5 years postinjury. The differences on these variables between the high and low SI groups are not attributable to between-group differences in sex, race, educational history, employment status, injury severity, injury type, or age. Matching controlled the first five of these variables, while the effects of age and injury type were controlled by the ANCOVA procedure.

This study has some important limitations. Specifically, self-reporting is always accompanied by the possibility that some individuals provided inaccurate answers. Further, a possible selection bias may have been introduced because patients were selected on the basis of the availability of a matching case, rather than stratified sampling of the injury population.

Limitations of this matched sample study include the possibility that some unmeasured variable other than SI may account for the observed differences. Also, because this small sample was not randomly drawn from the larger study sample, generalization of results to the population of injury cases may not be possible. Bias results of

Table 3.
Analysis of covariance results for family satisfaction variable.

Source	SS	df	MS	F Test	<i>p</i> Value
Social Integration Group	735.94	1	735.94	5.5	0.02
Age	481.14	1	481.14	2.6	ns
Injury Type	123.09	1	123.09	0.9	ns
Error	8,487.77	63	134.73	—	—
Total	9,827.94	66	—	—	—

SS = sum of squares
df = degree of freedom
MS = mean square
ns = nonsignificant

selected cases do not represent cases in general. Our sample was primarily white, male, unemployed, and limited in educational attainment. Thus, generalization of results to populations with different characteristics is not appropriate. Although the cases we studied were selected and matched on the basis of a variety of characteristics, the study sample was quite similar to the larger 5-year postinjury cohort. Variables that could not be used in matching were controlled statistically in the data analysis (age and injury type).

The study sample was mixed with respect to injury type. The number of each injury type was too small to permit comparisons among injury type groups. Therefore, generalization of results to groups with specific injury types is not possible. The results of this study, which demonstrate relationships between SI, life satisfaction, and family satisfaction, are sufficient to justify exploration of these relationships among larger samples of patients with specific injury types.

CONCLUSIONS

The results of this study add to the body of evidence suggesting that SI is associated with greater overall life satisfaction, and the results support that portion of the hypothesis from the current research. Furthermore, new data are introduced by the results of this study that support the second component of the original hypothesis: increased SI is associated with greater family satisfaction.

Research has consistently demonstrated that overall postinjury quality of life is more strongly related to healthy psychological functioning than to degree of physical impairment [1–3]. With this in mind, it is clear that “successful” rehabilitation following debilitating injury will restore both physical and psychological functioning. The results of this research suggest that the patient’s healthy psychological functioning can be restored if the rehabilitation professionals increase that patient’s repertoire of skills needed for successful SI or reintegration. Rehabilitation professionals working to increase an individual’s level of SI may expect greater postinjury adjustment to be reflected in greater life and family satisfaction. Additional research that will identify the most effective ways of socially reintegrating postinjury patients is needed to guide rehabilitation professionals to achieve desired outcomes.

ACKNOWLEDGMENT

We would like to thank Dr. Michael J. DeVivo for his comments, criticisms, and assistance in editing this manuscript.

REFERENCES

1. Corrigan JD, Bogner JA, Mysiw WJ, Clinchot D, Fugate L. Life satisfaction after traumatic brain injury. *J Head Trauma Rehabil* 2001;16:543–55.
2. Fuhrer MJ, Rintala DH, Hart KA, Clearman R, Young ME. Relationship of life satisfaction to impairment, disability, and handicap among persons with spinal cord injury living in the community. *Arch Phys Med Rehabil* 1992;73:552–57.
3. Heinemann AW, Whiteneck GG. Relationships among impairment, disability, handicap and life satisfaction in persons with traumatic brain injury. *J Head Trauma Rehabil* 1995;10:54–63.
4. Noreau L, Shephard RJ. Spinal cord injury, exercise and quality of life. *Sports Med* 1995;20:226–50.
5. Viitanen M, Fugl-Meyer KS, Bernspang B, Fugl-Meyer AR. Life satisfaction in long-term survivors after stroke. *Scand J Rehab Med* 1988;20:17–24.
6. Collette J. Sex differences in life satisfaction: Australian data. *J Gerontol* 1984;39:243–45.
7. Burleigh SA, Farber RS, Gillard M. Community integration and life satisfaction after traumatic brain injury: Long-term findings. *Am J Occup Ther* 1998;52:45–52.
8. Vogel LC, Klaas SJ, Lubicky JP, Anderson CJ. Long-term outcomes and life satisfaction of adults who had pediatric spinal cord injuries. *Arch Phys Med Rehabil* 1998;79:1496–503.
9. Dijkers MPJM. Correlates of life satisfaction among persons with spinal cord injury. *Arch Phys Med Rehabil* 1999;30:867–76.
10. Carruth AK, Tate US, Moffett BS, Hill K. Reciprocity, emotional well-being, and family functioning as determinants of family satisfaction in caregivers of elderly parents. *Nurs Res* 1997;46:93–100.
11. Brzuzy S, Speziale BA. Persons with traumatic brain injuries and their families: Living arrangements and well-being post injury. *Soc Work Health Care* 1997;26:77–88.
12. Perlesz A, Kinsella G, Crowe S. Psychological distress and family satisfaction following traumatic brain injury: Injured individuals and their primary, secondary, and tertiary caregivers. *J Head Trauma Rehabil* 2000;15:909–29.
13. Warren L, Wrigley JM, Yoels WC, Fine PR. Factors associated with life satisfaction among a sample of persons with neurotrauma. *J Rehabil Res Dev* 1996;33:404–8.

14. Kosciulek JF, Pichette EF. Adaptation concerns of families of people with head injuries. *J Appl Rehabil Couns* 1996; 27:8–13.
15. Committee on injury scaling, American association for automotive medicine. *Abbreviated injury scale, 1985 revision*. Arlington Heights, Illinois, American Association for Automotive Medicine; 1985.
16. Whiteneck G, Charlifue S, Gerhart K, Overholser J, Richardson G. Quantifying handicap: A new measure of long-term rehabilitation outcomes. *Arch Phys Med Rehabil* 1992; 73:519–26.
17. Neugarten BL, Havighurst RJ, Tobin SS. The measurement of life satisfaction. *J Gerontol* 1961;16:134–43.
18. Olson DH, Wilson M. *Family satisfaction*. St. Paul, Minnesota: Family Social Science. University of Minnesota; 1982.
19. Adams D. Analysis of life satisfaction index. *J Gerontol* 1969;24:470–74.
20. Rao VN, Rao VV. Life satisfaction in the black elderly: an exploratory study. *Int J Aging Hum Dev* 1981;14:55–65.
21. Wallace KA, Wheeler AJ. Reliability generalization of the life satisfaction index. *Educ Psychol Meas* 2002;62:674–84.
22. Lohmann N. Correlations of life satisfaction, morale and adjustment measures. *J Gerontol* 1977;32:73–75.
23. Amerikaner M, Monks G, Wolfe P, Thomas S. Family interaction and individual psychological health. *J Couns Dev* 1994;72:614–20.
24. Kennedy GE. Differences among college students' perceptions of family satisfaction. *Percept Mot Skills* 1989;68: 129–30.
25. Webb CR, Wrigley M, Yoels W, Fine PR. Explaining quality of life for persons with traumatic brain injuries 2 years after injury. *Arch Phys Med Rehabil* 1995;76:1113–19.
26. Garthe E, States JD, Mango NK. Abbreviated injury scale unification: the case for a unified injury system for global use. *J Trauma Inj Infect Crit Care* 1999;47:309–23.

Submitted for publication July 30, 2002. Accepted in revised form December 20, 2002.

