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Understanding health-related quality of life of caregivers of civilians and service members/veterans with Traumatic Brain Injury: Establishing the reliability and validity of PROMIS social health measures

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Abstract

Objective: To examine the reliability and validity of the short form (SF) and computer adaptive test (CAT) versions of the Patient Reported Outcomes Measurement Information System (PROMIS) measures of social health of caregivers of civilians and service members/veterans (SMVs) with traumatic brain injury (TBI).

Design: Self-report questionnaires administered through an on-line data collection platform.

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Setting: Hospital and community-based outreach at three TBI Model Systems rehabilitation hospitals, an academic medical center, and a military medical treatment facility

Participants: 560 (344 civilians and 216 military) caregivers of individuals with a documented TBI

Intervention: N/A

Main Outcome Measures: 5 PROMIS Social Health Measures

Results: All five PROMIS social health measures exceeded the *a priori* criterion for internal consistency reliability (≥ 0.70); most PROMIS measures met the criterion for test-retest reliability (≥ 0.70) in the civilian sample; in the SMV sample, test-retest reliability was generally below this criterion, except for Social Isolation. For both samples, convergent validity was supported by moderate correlations between the 5 PROMIS social health measures and related measures, and discriminant validity was supported by low correlations between PROMIS social health measures and measures of dissimilar constructs. Most PROMIS scores indicated significantly worse social health in both samples of those caring for individuals who were low functioning. Finally, impairment rates in social health were elevated for those caring for low functioning individuals, especially in the SMV sample.

Conclusions: The PROMIS computer adaptive test and short form social health measures have potential clinical utility for use in caregivers of civilians and SMVs with TBI.

Keywords

Psychometrics; Self-Report; Caregivers; Veterans; Patient Reported Outcome Measures; Surveys and Questionnaires, Brain Injuries, Traumatic; Social Support

Traumatic brain injury (TBI) can be associated with many long-term problems with physical, mental, and/or cognitive functioning.^{1–3} These long-term difficulties can be exacerbated by changes in personality, mood (lability or symptoms of depression or anxiety), aggressive behavior, or irritability.^{4–7} Such changes can result in a loss of independence and life-long care. Family members often assume primary responsibility for providing assistance to the individual with TBI.⁸ Caregivers also may experience problems with social HRQOL.^{9–13} Caregivers report having limited assistance to help care for the person with the TBI, and they often feel that they must be constantly available for the person with TBI.¹⁴ Caregiver social roles and activities (SRA; i.e., the interactions with friends, family, and in work and leisure contexts¹⁵) can be profoundly impacted.¹⁶ Feelings of social isolation and loss of intimacy (especially for spousal caregivers) are common.^{17–19} Inadequate social support is also common, which is associated with negative outcomes.^{20–22}

Caregiver social health remains an understudied area in TBI research, in part because no comprehensive measures of social health currently exist for caregivers of people with TBI. Many existing measures (Caregiver Burden Scale,²³ Caregiver Burden Inventory,²⁴ Zarit Burden Interview [ZBI])²⁵ focus solely on perceived burden and do not include content coverage for social health. Even more comprehensive measures (Caregiver Appraisal Scale [CAS],²⁶ Medical Outcomes Study Short Form-36,²⁷ Sickness Impact Profile²⁸), lack a comprehensive assessment of social health.

The Patient-Reported Outcomes Measurement Information System (PROMIS) addresses this gap by including multiple measures of social HRQOL. PROMIS measures can be administered as a computer adaptive test (CAT), where each individual item is selected based on the response to the previous item; this allows clinicians and researchers to ascertain a person's level of functioning using only a minimal number of items without losing the precision of a longer measure. While PROMIS provides a comprehensive assessment,²⁹ it was developed for use in chronic conditions and lacks data to support its use in caregivers.

We examined reliability and validity of the PROMIS¹⁵ social health item banks in caregivers of civilians with TBI and caregivers of service members and veterans (SMVs) with TBI. We hypothesized that PROMIS social health measures would demonstrate adequate reliability (i.e., internal consistency and test-retest reliability), would be free of floor and ceiling effects, and would demonstrate appropriate convergent and discriminant validity. We also hypothesized that caregivers of high-functioning individuals would report better HRQOL for themselves compared to those who cared for low-functioning individuals, and that they would be at greater risk than the general population for social health impairments.

Methods

Participants

Five hundred and sixty (344 civilian, 216 SMV) caregivers of individuals with a documented TBI were included in this study; 145 (56 civilian, 89 SMV) caregivers completed a retest at ~3 weeks after the initial study assessment. Kessler Foundation (n=51), Rehabilitation Institute of Michigan (n=50), TIRR Memorial Hermann Rehabilitation Hospital (n=171), and University of Michigan (UM; n=72) recruited caregivers of civilians with TBI through existing TBI caregiver databases and medical record data capture systems.³⁰ Walter Reed National Military Medical Center (WRNMMC; n=85) recruited caregivers of SMVs with TBI through hospital-based and community outreach efforts and UM recruited caregivers of SMVs with TBI through community outreach efforts (n=131). Retest participants were recruited solely through UM. Local institutional review boards reviewed and approved the study; study participants provided consent prior to participation.

Caregivers were at least 18 years old, English-speaking, and caring for an individual who had a medically documented TBI. For caregivers of civilians, medical record confirmation required the individual with TBI to be ≥ 1 year post-injury and meet TBI model system criteria for a complicated mild, moderate or severe TBI.³¹ For caregivers of SMVs, the individual with TBI had to be ≥ 1 year post-injury and medical record confirmation required that the individual received a diagnosis of a mild, moderate, severe, or penetrating TBI from a military or Veteran Affairs treatment facility. All caregivers were required to be providing physical assistance, financial assistance, and/or emotional support to an individual with TBI. Caregivers of SMVs had to endorse a response of ≥ 1 on the following question: "On a scale of 0–10, where 0 is "no assistance" and 10 is "assistance with all activities", how much assistance does the person you care for require from you to complete activities of daily living due to problems resulting from his/her TBI? Activities could consist of personal hygiene, dressing and undressing, housework, taking medications, managing money, running

errands, shopping for groceries or clothing, transportation, meal preparation and cleanup, remembering things, etc.?”

Measures

Five PROMIS measures (version 2.0) were used to assess social HRQOL: Emotional Support (reassurance in times of stress),³² Informational Support (helpful advice),³² Social Isolation (feeling excluded from other people),³² Ability to Participate in SRA (ability to perform one’s typical SRAs),³³ and Satisfaction with SRAs (satisfaction with one’s SRAs).³³ All participants completed measures as CATs plus SFs; CAT administration was followed by additional SF items that were not included as part of the CAT (to prevent participants seeing duplicate items). Scores are on a T-metric (M=50, SD=10); higher scores represent better social health, except for Social Isolation (where higher scores represent poorer social health).

The RAND-12 Health Status Inventory³⁴ (12 items) was used to measure generic HRQOL. The RAND-12 assesses physical health (Physical Health Composite) and mental health (Mental Health Composite). Scores range from 0 (low health) to 100 (highest level of health).

Caregiver HRQOL was measured using the CAS²⁶ and the ZBI.³⁵ The CAS includes four subscales: perceived burden, caregiver relationship satisfaction, caregiving ideology (beliefs about why the caregiver role is valued), and caregiving mastery (belief in one’s ability to provide good care); scores were calculated using published recommendations (higher scores indicate better functioning).³⁶ The ZBI³⁵ is 22 item self-report measure of caregiver burden. Scores range from 0 (low burden) to 88 (high burden).

The Mayo-Portland Adaptability Inventory-Fourth Edition (MPAI-4)³⁷ is a 35-item measure that was used to assess the caregivers’ perception of the functional ability of the person with the TBI. Scores are on a T-metric (M=50, SD=10); lower scores indicate higher functioning.

Data Capture

PROs were completed through <https://www.assessmentcenter.net>.

Data Analysis

Bulmer’s criteria³⁸ indicated that the data were normally distributed supporting the use of parametric analyses.

Reliability.—Cronbach’s alphas were calculated for SFs and item response theory-based reliabilities were calculated for CATs; minimal acceptable reliability was specified as 0.70.^{39,40} Three-week test-retest reliability was examined to establish measure stability.

Floor and Ceiling Effects.—Floor and ceiling effects were calculated (acceptable rates were defined as those 20% of participants).^{41,42}

Administration time.—Mean administration times were examined.

Convergent and Discriminant Validity.—Evidence supporting convergent and discriminant validity was established by examining correlations between similar and dissimilar traits.⁴³ Evidence for convergent validity is established when scores from measures of the same domain are correlated, but not so large as to be redundant (r 's between 0.4 and 0.8).⁴⁴ Evidence for discriminant validity is established when correlations between scores of different traits are less robust ($r < 0.3$).⁴⁴ We expected to see the strongest relationships among the five PROMIS social health measures (r 's between 0.6 and 0.8), followed by moderate correlations between each of the five PROMIS social measures and measures of burden (CAS-perceived burden and ZBI) and mental health (Rand-12 Mental Health Composite; r 's between 0.4 and 0.59), and the weakest correlations between each of the five PROMIS measures and physical health (Rand-12 Physical Health Composite) and positive aspects of caregiving (CAS caregiver ideology, mastery, and satisfaction; $r < 0.39$).

Known groups validity.—Individuals with TBI with MPAA-4 scores < 60 (as rated by caregivers) were considered “high functioning,” and those with scores ≥ 60 (as rated by caregivers) were considered “low functioning.”⁴⁵ Low and high functioning groups were compared using t -tests. We hypothesized that caregivers of high-functioning individuals would report better HRQOL than those who cared for low-functioning individuals.

Impairment Rates.—Clinical impairment (scores that were > 1 SD below the general population PROMIS normative sample mean [$n=2208$; $M=50$, $SD=10$]³²) was examined to determine if caregivers of individuals with TBI had higher rates of social health impairments than the general population. A single-tailed Z -test for two proportions was used to identify significant differences in impairment rates across the caregiver and PROMIS normative samples (effect sizes were computed using Cohen's d).⁴⁶ We hypothesized that impairment rates for caregivers for both caregiving groups would be higher than rates in the general population, (i.e., $> 16\%$ of caregivers would be impaired⁴⁷).

Group Differences.—A series of analyses of covariance (ANCOVAs) were conducted to determine if there were group differences between civilians and SMVs for each of the five PROMIS Social Health measures after controlling for the functional status (MPAA-4) of the person with the TBI. We hypothesized that caregivers of SMVs would report worse HRQOL than caregivers of civilians.

Missing Data.—If participants had a small amount of missing data ($< 10\%$ of items), scores were imputed using expectation maximization^{48,49} ($n=39$ for the MPAA-4 and $n=15$ on the CAS); those with $\geq 10\%$ missing items were excluded ($n=2$).

Results

A detailed description of the sample (as well as sample size justification) is reported elsewhere.⁵⁰ Briefly, caregivers of SMVs were younger, more likely to be female, married, and caring for someone who was low functioning than caregivers of civilians; caregivers of civilians were more likely to be parents or other family members than caregivers of SMVs. There were no group differences in the number of years that caregivers provided care or for time since injury (for the person with the TBI). Caregivers of SMVs were caring for

individuals who were younger than caregivers of civilians. The majority of the TBIs incurred by the SMV sample were deployment-related.

With regard to injury severity, 17.7%, 20.9%, and 56.1% of caregivers of civilians with TBI were caring for a complicated mild injury, moderate, or severe TBI, respectively (5.2% were unknown). Among caregivers of SMVs, 19.2% were caring for someone with an uncomplicated mild, 1.9% complicated mild, 2.3% moderate, 1.9% severe, 15.4% 'equivocal' mild, 1.4% were penetrating TBI. TBI severity data were unavailable for the SMVs recruited by UM (57.9% of the SMV sample); since these individuals were recruited from the community, it is assumed that the majority of the individuals with TBI in this sample (i.e., >80% of the SMV sample) would be classified as mild TBI (per existing prevalence rates of TBI severity in the military).⁵¹ The retest participants were significantly younger, $t(704)=3.07$, $p=.002$, had higher educational attainment, $\chi^2(2)=15.65$, $p<.001$, were more likely to be caring for someone who was younger, $t(700)=2.52$, $p=.01$, and were caring for someone who was more impaired, $t(690)=2.36$, $p=.02$.

Reliability (Table 1).

For both caregiver groups, all of the PROMIS measures exceeded *a priori* criteria for internal consistency reliability. All PROMIS measures except Informational Support (CAT and SF) and the Ability to Participate in SRA SF met the criterion for good test-retest reliability for caregivers of civilians. With regard to caregivers of SMVs, all measures fell short of this criterion for test-retest reliability except PROMIS Social Isolation (CAT and SF).

Floor and Ceiling Effects (Table 1).

All PROMIS measures had acceptable floor and ceiling effects in both caregiver samples, except for the Emotional Support SF in caregivers of civilians (22% of respondents had the highest score possible).

Administration Time (Table 1).

Average administration times were 41 seconds for each PROMIS measure.

Convergent and Discriminant Validity (Table 2).

With regard to convergent validity, correlations among the five PROMIS Social Health measures were moderate to high, but were generally below what was hypothesized. Consistent with hypotheses, discriminant validity was supported by negligible to small correlations between the five PROMIS Social Health measures and RAND-12 Physical Health in both samples. Correlations between the five PROMIS measures and the two measures of caregiver burden were generally moderate but in some cases were slightly larger than anticipated (i.e., Social Isolation and Ability to Participate in SRA). Finally, correlations between the five PROMIS Social Health measures and positive aspects of caregiving from the CAS were small, in accordance with our hypotheses for discriminant validity. Given that the pattern and magnitude of correlations were very similar for both CAT and SF administrations, we only present findings for the CAT administrations.

Known Groups Validity and Impairment Rates (Table 3).

There were significant group differences between the caregiving groups for all PROMIS Social Health measures except for Emotional Support in caregivers of civilians, and Emotional Support and Informational Support in caregivers of SMVs. Impairment rates for caregivers of high-functioning SMVs were generally comparable to those for the general population (except for Ability to Participate in SRA for civilian caregivers). Impairment rates were elevated for all caregivers of low-functioning individuals (relative to the normative sample) with the exception of Social Isolation (for caregivers of civilians).

Group Differences.

ANCOVAs indicated that caregivers of SMVs consistently reported lower HRQOL than caregivers of civilians for all PROMIS measures except Social Isolation (Table 4).

Discussion

The reliability and validity of the PROMIS Social Health measures were evaluated using caregivers of civilians with TBI and caregivers of SMVs with TBI. The PROMIS Social Health measures exceeded the criterion level for internal consistency reliability, and floor and ceiling effects generally met *a priori* criteria for both samples. For test-retest reliability, the criterion was met for the civilian caregiver sample but not the SMV caregiver sample. One possible explanation for this finding is that the 3-week time frame may have been too long to establish strong reliability coefficients (in general, an acceptable reliability criterion is specified as 0.70^{39,40} for administrations that are close together in time). Thus, it is plausible that large variability in the baseline and retest visits may have contributed to this finding. It also seems plausible that the greater variability in scores for caregivers of SMVs (especially for lower HRQOL scores where previous work indicates increased measurement sensitivity^{52–55}) may also explain the less robust correlations relative to civilian caregivers. It is also possible that demographic differences between the participants who completed only the baseline and the participants who completed both baseline and retest may have accounted for this finding. Data on test-retest reliability over a shorter time frame is warranted.

PROMIS Social Health measures also demonstrated relationships with other measures that supported convergent and discriminant validity for both civilian- and SMV-caregivers. Scores among the PROMIS Social Health measures demonstrated moderate relationships among themselves, with the highest correlations generally being demonstrated among the most similar measures (i.e., between Emotional and Informational Support and between Ability to Participate in SRA and Satisfaction with SRA). Discriminant validity was also supported by negligible to small correlations among the PROMIS Social Health measures and our physical health measure, as well as among the PROMIS Social Health measures and positive aspects of caregiving. While findings were generally consistent with the proposed hypotheses, the interrelationships among the five PROMIS Social health measures was generally lower than expected. This suggests that these measures assess overlapping, but distinct components of social health. Further, the expected relationships between two of the PROMIS social measures (Social Isolation and Ability to Participate in SRA) and measures

of caregiver burden were greater than expected, and indicate that these social measures may also assess a component of mental health (i.e., burden); this is consistent with other reports that have examined PROMIS measures.^{56,57}

Consistent with hypotheses, caregivers of high-functioning individuals reported better HRQOL for themselves compared to those who cared for low-functioning individuals, demonstrating support for known groups validity. All measures demonstrated significant functional status group differences, except for Emotional Support for civilian caregivers with TBI and for Emotional Support and Informational Support for SMV caregivers. Group differences on the remaining social health measures were generally consistent with the literature, suggesting that caregivers of individuals with more functional impairments have poorer social HRQOL than those caring for individuals with greater functional abilities.^{58–61} While the absence of group differences for the two support measures might suggest that these measures are less sensitive to caregiver HRQOL, it is also possible that these factors typically serve to moderate the impact of TBI-related characteristics on caregiver distress, rather than directly impact caregiver HRQOL.^{21,22} In addition, with one exception (Social Isolation for the civilian group), social health “impairment” rates for caregivers of low-functioning individuals were elevated relative to the general population. For caregivers of individuals that were high-functioning, we did not see elevations in impairment rates. This may suggest that caregivers of individuals with fewer functional impairments do not differ in their social HRQOL relative to the general population. It is also possible that the inclusion of caregivers that were providing minimal levels of care (especially among the caregivers of SMVs) may explain the resemblance to the general population. Caregivers of SMVs generally indicated more social HRQOL problems than caregivers of civilians. This is consistent with literature that indicates that caregivers of SMVs may have worse outcomes given common comorbid mental health problems.^{62–64}

Study Limitations

While this study provides important psychometric data for the PROMIS Social Health measures, it is important to acknowledge several study limitations. First, both samples were primarily white with a higher educational attainment than the US average;⁶⁵ further research should be done to investigate the validity of the PROMIS Social Health measures in minority groups and those with less education. Furthermore, while standardized definitions for TBI severity were used in both samples, the SMV sample included caregivers of individuals with uncomplicated mild TBI and equivocal TBI, whereas the civilian sample did not include such participants. In addition, the SMV eligibility question about assistance was designed specifically for this study; given that reliability and validity data is not available, the clinical utility of this criterion is unknown. Finally, TBI severity was unknown for a large portion (60%) of our SMVs, limiting our ability to better characterize this sample.

Conclusions

The PROMIS Social Health measures provide brief (~ 41 seconds per measure), reliable scores of emotional support, informational support, social isolation, and the ability to participate in and gain satisfaction from social roles and activities in TBI caregivers. Future

studies are needed to establish responsiveness and change over time. Ultimately, these measures address the need for a comprehensive assessment of social health in caregivers of individuals with TBI.

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List of abbreviations:

ANCOVA	Analysis of Covariance
CAS	Caregiver Appraisal Scale
CAT	Computer Adaptive Test
HRQOL	Health-Related Quality of Life
MHC	Mental Health Composite of the RAND-12
MPAI-4	Mayo-Portland Adaptability Inventory-Fourth Edition
PHC	Physical Health Composite of the RAND-12
PRO	Patient-Reported Outcome
PROMIS	Patient-Reported Outcomes Measurement Information System
SF	Short Form
SMV	Service Member / Veteran
SRA	Social Roles and Activities
TBI	Traumatic Brain Injury
UM	University of Michigan
WRNMMC	Walter Reed National Military Medical Center
ZBI	Zarit Burden Inventory

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Highlights:

- PROMIS Social Health measures are both reliable and valid in caregivers
- PROMIS Social Health measures are brief (less than 45 seconds for each measure)
- Caring for an individual with a brain injury can significantly impact social health

Table 1

Descriptive Information and Reliability Data for Self-Report Measures

PROMIS SOCIAL HEALTH MEASURES	<i>n</i>	Internal Consistency ^a	3 Week Test-Retest Reliability	% at floor ^{***}	% at ceiling ^{***}	Measure Mean (SD)	Average Administration Time (sec)	Average Administration Time Per Item	Average #items
Civilian sample									
Emotional Support CAT [*]	235		.77	0	10.0	48.8 (8.9)	27.5	5.1	5.36
Emotional Support SF [*]	235	.92	.79	0.4	18.2	48.8 (8.3)	20.5	5.1	4
Informational Support CAT [*]	235		.75	1.3	7.8	49.3 (10.4)	32.9	6.8	4.87
Informational Support SF [*]	235	.93	.76	2.1	14.0	49.1 (9.8)	29.4	7.4	4
Social Isolation CAT	235		.83	0	11.7	48.8 (9.4)	28.3	5.1	5.60
Social Isolation SF	235	.86	.83	0.4	18.2	48.3 (8.8)	18.8	4.7	4
Ability to Participate in SRA CAT [*]	235		.67	0.4	10.4	50.2 (9.5)	34.4	6.6	5.18
Ability to Participate in SRA SF [*]	235	.91	.77	1.3	13.5	49.8 (8.6)	30.1	7.5	4
Satisfaction with SRA CAT [*]	235		.77	0.4	7.8	47.8 (8.9)	38.1	8.0	4.79
Satisfaction with SRA SF [*]	235	.91	.81	1.3	12.7	47.8 (8.3)	25.8	6.5	4
Military sample									
Emotional Support CAT [*]	199		.60	0	3.3	45.6 (8.9)	26.9	5.5	4.85
Emotional Support SF [*]	199	.94	.63	0.5	11.6	45.7 (8.5)	20.9	5.2	4
Informational Support CAT [*]	199		.64	1.7	3.3	47.2 (9.8)	21.9	4.7	4.69
Informational Support SF [*]	199	.93	.64	2.0	9.0	47.2 (9.5)	22.7	5.7	4
Social Isolation CAT	199		.71	1.7	0.8	54.6 (9.5)	21.5	4.5	4.80
Social Isolation SF	199	.91	.71	2.5	6.0	54.2 (9.2)	17.6	4.4	4
Ability to Participate in SRA CAT [*]	199		.70	2.5	1.7	44.6 (8.1)	24.1	5.3	4.52
Ability to Participate in SRA SF [*]	199	.90	.68	3.0	3.0	44.5 (7.4)	24.2	6.1	4

PROMIS SOCIAL HEALTH MEASURES	<i>n</i>	Internal Consistency	3 Week Test-Retest Reliability	% at floor ^{***}	% at ceiling ^{***}	Measure Mean (SD)	Average Administration Time (sec)	Average Administration Time Per Item	Average #Items
Satisfaction with SRA CAT [*]	199		.47	3.3	0.8	41.5 (6.6)	30.1	6.8	4.40
Satisfaction with SRA SF [*]	199	.88	.58	2.5	2.0	42.9 (6.5)	20.7	5.2	4

Note.

^{*} = higher scores = better functioning;

^o = internal consistency is reported as Cronbach's alpha for all measures except the computer adaptive tests which are reported as item response theory based (i.e., marginal) reliabilities;

^{**} Floor and ceiling indicates the % of participants responding "not at all" (floor) or "very much" (ceiling) for all items on each respective administration. PROMIS = Patient Reported Outcomes Measurement Information System; CAT = Computer Adaptive Test; SF = Short-Form; SRA = Social Role Activities.

Table 2

Convergent and discriminant validity of the PROMIS Social Health CATs

PROMIS SOCIAL HEALTH MEASURES (CATs)	Caregiver Appraisal Scale					Burden	Satisfaction	Ideology	Mastery	Zarit Burden Interview
	Emotional Support	Informational Support	Social Isolation	Ability to Participate in SRA	Satisfaction with SRA					
Civilian sample										
Emotional support	--	--	--	--	--	.40	.15	.04	.19	-.38**
Informational Support	.80**	--	--	--	--	.44**	.20**	.00	.20**	-.44**
Social isolation	-.49**	-.50**	--	--	--	-.62**	-.19**	.03	-.29**	.60**
Ability to Participate in SRA	.33**	.40**	-.60**	--	--	.67**	.19**	.04	.29**	-.68**
Satisfaction with SRA	.45**	.51**	-.56**	.68**	--	.58**	.16**	-.04	.29**	-.56**
SMV sample										
Emotional Support	--	--	--	--	--	.35**	.22**	-.04	.19**	-.36**
Informational Support	.86**	--	--	--	--	.33**	.23**	-.06	.15*	-.34**
Social Isolation	-.46**	-.39**	--	--	--	-.64**	-.28**	.17*	-.26**	.70**
Ability to Participate in SRA	.46**	.36**	-.71**	--	--	.68**	.28**	-.09	.27**	-.73**
Satisfaction with SRA	.42**	.35**	-.55**	.66**	--	.62**	.30**	-.02	.14	-.53**

Note. PROMIS = Patient Reported Outcome Measurement Information System; CAT = Computer Adaptive Test; SRA = Social Role Activities; SMV = service member/veteran;

*
p < .05**
p < .01

Table 3

Known Groups Validity and Impairment Rates for PROMIS Social Health CATs

PROMIS CATs	Caregiver for a High Functioning Individual (MPAI-4 <60)		Caregiver for a Low Functioning Individual (MPAI-4 >60)		<i>t</i>	<i>p</i>	<i>h</i>
	Mean (SD)	% Impaired ^a	Mean (SD)	% Impaired ^a			
Civilian sample	<i>n</i> = 293				<i>n</i> = 42		
Emotional Support	50.00 (8.89)	9.6	47.53 (10.88)	28.6 *	1.64	0.10	.32
Informational Support	50.79 (10.61)	16.7	46.81 (10.66)	28.6 *	2.10	0.04	.32
Social Isolation	47.19 (9.20)	6.5	53.39 (8.77)	19.0	4.10	<.0001	.08
Ability to Participate in SRA	52.92 (8.95)	24.2 *	44.43 (10.25)	33.3 *	5.64	<.0001	.41
Satisfaction with SRA	49.46 (8.74)	10.9	43.47 (8.87)	38.1 *	4.15	<.0001	.51
SMV sample	<i>n</i> = 104				<i>n</i> = 101		
Emotional Support	46.78 (8.71)	18.3	44.76 (9.28)	33.7 *	1.60	0.11	.42
Informational Support	48.37 (9.26)	19.2	46.43 (10.16)	34.7 *	1.43	0.15	.44
Social Isolation	51.02 (9.01)	12.5	57.68 (9.07)	34.7 *	5.28	<.0001	.44
Ability to Participate in SRA	47.35 (8.01)	10.6	42.36 (7.90)	40.6 *	4.49	<.0001	.56
Satisfaction with SRA	43.04 (6.72)	18.3	40.37 (6.55)	47.5 *	2.88	0.004	.70

Note. PROMIS = Patient Reported Outcome Measurement Information System; CATs = Computer Adaptive Tests; MPAI = Mayo-Portland Adaptability Inventory – Fourth Edition; SRA = Social Role Activities; SMV = service member/veteran;

^a impairment rates reflect individuals with T<40 for all measures except Social Isolation (T > 60);

* indicates p<.05 for z-tests of proportions comparing the rates of impairment for the different caregiver groups relative to rates of impairment in the general population (i.e., the PROMIS normative sample).

Group differences for PROMIS Social Health Scores after controlling for the functional status of the person with the TBI

Table 4

PROMIS CATs	Caregivers of Civilians with TBI		Caregivers of SMVs with TBI		F	p
	Mean (SD)		Mean (SD)			
Emotional Support	49.7 (9.2)		45.8 (9.0)		5.12	.02
Informational Support	50.0 (10.7)		47.4 (9.7)		0.55	.46
Social Isolation	48.0 (9.4)		54.3 (9.6)		13.19	<.001
Ability to Participate in SRA	51.9 (9.5)		44.9 (8.3)		14.36	<.001
Satisfaction with SRA	48.7 (9.0)		41.7 (6.8)		32.50	<.001

Note. PROMIS = Patient Reported Outcome Measurement Information System; CATs = Computer Adaptive Tests; TBI = traumatic brain injury; SMVs = service members/veterans; MPAL = Mayo-Portland Adaptability Inventory – Fourth Edition; SRA = Social Role Activities; lower scores indicate worse social health for all measures EXCEPT Social Isolation.