Article

JHP

Journal of Health Psychology
1–6

DOI: 10.1177/1359105316669583
hpq.sagepub.com
SAGE

Social comparisons and long-term rehabilitation for traumatic brain injury: A longitudinal study

Danielle Arigo[1] and Kyle Haggerty[2]

Abstract

Little is known about social influences on long-term rehabilitation outcomes for traumatic brain injury, particularly social comparisons (i.e. self-evaluations relative to others). Patients in long-term rehabilitation ($n = 31$) completed assessments at baseline and 1 year. Self-reported social comparison orientation was comparable to existing samples and showed stability over 1 year; affective responses to comparisons (e.g. frustration) were less stable. Social comparison orientation and affective responses were related to baseline executive and psychosocial functioning ($rs = 0.34$–0.53) and predicted worse impairment and depression at 1 year ($ds = 0.67$, 1.39). Greater attention to comparisons in long-term rehabilitation could improve outcomes.

Keywords

rehabilitation outcomes, self-report, social comparison, social functioning, traumatic brain injury

Introduction

Traumatic brain injury (TBI) occurs when an external force produces alteration in brain function, resulting in deficits such as difficulty organizing information, planning, and abstract thinking (i.e. executive functioning; Menon et al., 2010). Although self-report is a common method of gathering information among patients with TBI, long-term deficits may impede patients' ability to report on their experiences (Faul et al., 2010), and there is a need for research on the performance of self-report measures in this population (Dijkers, 2004). *Social comparisons* (Festinger, 1954) are common among individuals with TBI and related disabilities and have implications for TBI treatment outcomes (Buunk et al., 2006). One existing study examined the social comparisons among individuals in short-term rehabilitation for TBI (Arenth et al., 2006), but individuals with longer-term deficits may use and respond to comparisons in distinct ways.

Individuals in long-term TBI rehabilitation may compare themselves to caregivers, family, friends, or other patients in treatment (Arigo et al., 2014b; Buunk et al., 2006). Individual instances of comparing oneself to a patient who is functioning well (i.e. *upward comparison*)

[1]The University of Scranton, USA
[2]Bancroft NeuroRehab, USA

Corresponding author:
Danielle Arigo, Department of Psychology, The University of Scranton, 800 Linden Street, 205 Alumni Memorial Hall, Scranton, PA 18510, USA.
Email: danielle.arigo@scranton.edu

could be inspiring (positive), or could make one's own deficits more salient (negative). Conversely, an instance of comparing to a patient who is functioning poorly (i.e. *downward comparison*) could result in either satisfaction with one's own situation (positive) or anxiety about becoming like that patient (negative; Buunk et al., 1990). Individuals also may differ with respect to their overall interest in and tendency to make social comparisons, termed *social comparison orientation* (SCO), which may not correspond to their reaction in a given instance of comparison. Participants in short-term TBI rehabilitation showed scores on a validated SCO self-report measure comparable to those of healthy individuals and patients with chronic illnesses (Arenth et al., 2006), but it is not clear to what degree patients with more persistent TBI deficits can report on their comparison tendencies. As upward orientation has been shown to prospectively predict the onset of clinically meaningful mental health symptoms (e.g. depression; Arigo and Cavanaugh, 2016; Arigo et al., 2014a), examining upward orientation in TBI could be clinically useful.

Previous investigation of comparisons in TBI compared distinct groups of patients at a single point in time (within 1 month of discharge and discharged 6 months previously). The stability of social comparison responses over time in patients with persistent TBI deficits is unknown; social comparison is thought to be context-dependent, and changes in the treatment setting or a patient's level of adjustment to their immediate circumstances may influence the comparison activity or response. Also unknown are relations between social comparison and outcomes relevant to TBI rehabilitation: executive functioning (Muscara et al., 2008), community integration (Williams et al., 2014), and depression (Bombardier et al., 2010).

This study was designed to address the key questions about social comparison among individuals in long-term TBI rehabilitation. First, we examined the extent of self-reported comparison orientation and reports of affective responses to specific types of comparisons. Second, we tested the stability of these reports over 1 year. Third, we examined the relations between social comparisons and treatment outcomes, both cross sectionally and prospectively.

Method

Participants

Participants were attending a long-term rehabilitation program for TBI ($n=31$; years since injury: $M=20.47$, $SD=9.68$; years in treatment: $M=7.14$, $SD=5.65$); their ages ranged from 27 to 70 years ($M=44.35$, $SD=10.38$). Of the 31 participants who participated at baseline, 26 remained available at 1 year; clinical outcomes were available for 29 participants at follow-up. Reasons for unavailability included transfer to other rehabilitation facilities (4) and patient death (1). (See online Supplemental Material (available at: http://hpq.sagepub.com/) for additional information.)

Measures

Descriptive information was extracted from clinical records. Executive functioning was assessed at baseline and 1-year follow-up with two tests: (1) the Number–Letter Trails from the Delis–Kaplan Executive Function System (Delis et al., 2001), which measures the ability to shift attention and (2) the Word Generation subtest of the Neuropsychological Assessment Battery (NAB; Stern and White, 2003), which measures verbal novel problem-solving ability. Clinician-rated functioning was assessed at baseline and 1-year follow-up with the Mayo-Portland Adaptability Inventory (MPAI-4; Malec and Lezak, 2008), a 29-item measure of functional outcomes in patients following TBI; we included overall functioning and participation scores (e.g. community engagement, employment). At 1-year follow-up, patients completed the seven-item Beck Depression Inventory-Fast Screen (BDI-FS; Beck et al., 2000).

Social comparison. The Iowa-Netherlands Comparison Orientation Measure is a 23-item questionnaire on SCO. In all, 11 items assess general

tendency toward comparisons; possible scores range from 11 to 55 and available norms indicate means of ~35.0. Upward and downward orientation scales include six items each; possible scores range from 6 to 30 and means are ~18.0. For all scales, higher scores indicate stronger orientation. This measure has shown high internal consistency in healthy and patient samples although stability estimates over 4–6 months are modest (e.g. 0.65–0.70; Gibbons and Buunk, 1999). The authors note that interest in social comparisons is dependent on contextual factors, and that moderate stability is likely to accurately reflect small global changes in comparison orientation. For consistency with existing work in mild TBI, patients also were given scenarios used by Arenth et al. (2006; e.g. "How often have you felt *lucky or grateful* in response to worse-off others?"). Items were rated from 1 (never) to 4 (often).

Procedure

All procedures were approved by the Institutional Review Board at a non-profit rehabilitation center in the United States. Participants were recruited and consented by a researcher while attending day treatment services. They were asked to complete the SCO and affective responses to comparisons measures, and relevant outcome data were collected from their clinical record. After 12 months, participants completed both social comparison measures and the BDI-FS, and outcomes were again taken from their clinical record.

Data analysis

Descriptive statistics were used to estimate the average SCO and affective responses to particular comparison types. Change in SCO and affective responses over 1 year was estimated with paired *t*-tests between baseline and follow-up scores and intraclass correlation coefficients (ICCs). Bivariate correlations were used to test the relations between baseline social comparison (SCO and affective responses) and participant outcomes: executive functioning (NAB and Trails) and clinician-rated functioning (MPAI). General linear models were used to test the value of baseline social comparison for predicting future outcomes. Social comparison predictors were selected based on the pattern of relations between comparison scores and functioning at baseline. With the exception of depressive symptoms (for which baseline values were not available), each model controlled for baseline outcome scores. Given the small sample size, we focused on results with moderate-to-large effect sizes (r or $d \geqslant 0.30$).

Results

The average overall SCO score was 36.04 ($SD = 8.80$) out of a possible 55; average scores were 19.04 ($SD = 5.90$) for upward and 15.48 ($SD = 5.17$) for downward scales, indicating moderate orientation toward both types of comparison (Table 1). However, scores for upward SCO were significantly greater than those for downward SCO ($t(29) = 2.48$, $p = 0.02$, $d = 0.52$). The average participant recalled instances of positive and negative affect in response to both comparison types. Positive affect was more common than negative affect after both upward ($t(29) = 1.80$, $p = 0.09$, $d = 0.38$) and downward ($t(29) = 2.73$, $p = 0.01$, $d = 0.57$) comparisons.

ICCs showed that approximately 50 percent of the variability between baseline and follow-up SCO scores was due to within-person change. Scores for all three comparison scales decreased over 1 year, with moderate effect sizes (ds = 0.37–0.43; see Table 1). Self-reported affective responses were less consistent over time; the majority of variability in affective responses was due to within-person change (ICCs = 0.06–0.14). Scores for positive and negative affective responses decreased, with the exception of a slight increase for positive responses to downward comparison ($M = 0.09$, $SD = 1.38$). Only decreases in affective responses to upward comparisons were significant, however (ds = 0.45–0.59).

Baseline associations between SCO and treatment outcomes were weak, although relations with specific affective responses

Table 1. Mean social comparison scores and change statistics for full sample at baseline and 1-year follow-up.

	Baseline *M* (*SD*)	Follow-up *M* (*SD*)	Paired *t* (change baseline to follow-up)	Cohen's *d* (change)	ICC (95% CI)
Overall SCO	36.04 (8.80)	32.78 (8.08)	$t(25) = 2.06$*	0.43	0.52 (0.21, 0.72)
Upward SCO	19.04 (5.90)	16.83 (6.21)	$t(25) = 1.98$*	0.41	0.58 (0.29, 0.76)
Downward SCO	15.48 (5.17)	13.61 (4.21)	$t(25) = 1.79$*	0.37	0.48 (0.15, 0.70)
Positive response to upward SC	3.00 (1.06)	2.35 (0.98)	$t(25) = 1.75$*	0.59	0.14 (−0.26, 0.45)
Negative response to upward SC	2.29 (1.01)	1.91 (0.90)	$t(25) = 2.21$**	0.45	0.42 (0.07, 0.66)
Positive response to downward SC	2.97 (1.02)	3.04 (0.96)	$t(25) = -0.30$	0.07	0.06 (−0.34, 0.39)
Negative response to downward SC	2.42 (0.89)	2.04 (1.15)	$t(25) = 0.76$	0.16	0.06 (−0.34, 0.39)

*$p \leq 0.10$; **$p \leq 0.05$.

were noteworthy. Participants who endorsed more frequent negative responses to downward comparisons showed *better* ability to generate novel solutions (NAB; $r=0.37$, $p=0.04$), less severe impairment in community participation ($r=-0.34$, $p=0.05$), and less overall impairment (MPAI; $r=-0.34$, $p=0.05$). Those with more frequent negative responses to upward comparisons demonstrated *worse* impulse control (Trails; $r=0.37$, $p=0.05$), and more severe participation and overall impairment (rs$=-0.34$ and 0.33, ps$=0.06$ and 0.07, respectively). (See online Supplemental Material (available at: http://hpq.sagepub.com/) for additional information.)

More frequent positive responses to downward comparisons at baseline showed a meaningful effect size for predicting *better* problem-solving ability at 1 year ($\beta=0.35$, $p=0.11$, $d=0.74$). In contrast, more frequent negative responses to upward comparisons at baseline showed a meaningful effect size for predicting *worse* overall clinician-rated impairment at 1 year ($\beta=0.06$, $p=0.08$, $d=0.67$), and stronger upward SCO predicted worse depression at 1 year ($\beta=0.58$, $p=0.001$, $d=1.39$). More negative responses to upward comparisons, which was associated with baseline impulse control, were not related to follow-up impulse control performance ($p=0.35$; $d=0.20$). Associations between negative responses to downward ($\beta=0.08$, $p=0.08$, $d=0.20$) and upward ($\beta=0.07$, $p=0.10$, $d=0.14$) comparisons at baseline were not associated with community participation at 1 year.

Discussion

Despite suffering from a variety of deficits, individuals in long-term rehabilitation for TBI provided responses to a measure of SCO similar to that of the general population and other medical samples (Gibbons and Buunk, 1999; Michinov and Michinov, 2011; Petersen et al., 2012), including a TBI sample assessed 6 months after injury (Arenth et al., 2006). Participants endorsed greater interest in upward comparisons than downward, and reported experiencing immediate positive consequences more often than negative in response to either type. SCO showed moderate stability over 1 year; change indicated decreases in SCO, as well as in the frequency of affective responses. To our knowledge, the only previous test among patients with TBI showed that SCO was *higher* for those who were 6 months into treatment versus those assessed immediately after injury (Arenth et al., 2006).

Although the previous study contrasted different groups of TBI patients (rather than change in the same patients over time), it is

reasonable to predict a quadratic change in SCO over the long term. Immediate concerns following a TBI are likely to be self-focused; if comparison occurs, it may be toward the pre-injury self rather than toward others (Brown et al., 2011). Social comparisons may become more meaningful and more informative as patients adjust to their new circumstances, particularly for those who live in group settings or attend group treatment. As long-term treatment progresses, however, social comparisons may become less interesting or useful.

Results of this study indicated moderate concurrent relations with several outcomes: patients who endorsed more frequent negative responses to downward comparisons showed better executive and clinician-rated functioning at baseline. Those who endorsed more frequent negative responses to upward comparisons showed worse impulse control (at baseline) and clinician-rated impairment (at baseline and follow-up). A similar pattern of baseline and prospective relations between upward *SCO* and outcomes indicates that upward comparisons may be of concern, particularly for depression. Engaging in upward comparisons may be associated with greater awareness of one's own deficits, which prompts other negative self-evaluations and depressed mood. This finding must be interpreted with caution, as we were unable to control for baseline depression. As upward comparisons have shown prospective relations with depressive symptoms over 6–24 months in other samples; however (Arigo and Cavanaugh, 2016; Peck and Merighi, 2007), the present findings suggest that the risk associated with upward SCO may extend to individuals with TBI. If replicated, these results indicate that attending to patients' upward comparisons in long-term rehabilitation may help clinicians identify risk for depression.

As a preliminary effort to understand the role of social comparisons in long-term rehabilitation for TBI, this study had several strengths: a prospective longitudinal design, emphasis on outcomes relevant to long-term TBI rehabilitation, and multimethod outcome assessment. Given the small-to-moderate effect sizes of these relations, additional information may be needed to appreciate the influence of social comparisons in this population. Consistent with many examinations of long-term functioning in TBI, however, our study was limited by a small sample size. Although this may limit the generalizability of our findings, this study highlights the need for future research. Additional limitations include the absence of depression scores at baseline and reliance on retrospective accounts of social comparison activity. Addressing these limitations will be essential avenues for future work.

Conclusion

This study represents a necessary, if preliminary, step toward understanding the role of social comparisons in long-term rehabilitation for TBI. Together with the broader evidence base demonstrating the importance of comparison processes in medical treatment (Arigo et al., 2014b), TBI rehabilitation programs may wish to consider intervention components designed to address negative social comparisons. Follow-up work that assesses behavioral demonstration of comparison target selection and/or response to experimentally induced comparisons may be particularly useful for refining the identification of individuals with long-term TBI deficits who are at highest risk for poor outcomes.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Arenth PM, Corrigan JD and Schmidt LD (2006) Exploring the use of social comparison by individuals recovering from traumatic brain injury. *Brain Injury* 20: 253–262.

Arigo D and Cavanaugh J (2016) Social perceptions predict change in women's mental health

and health-related quality of life during the first semester of college. *Journal of Social and Clinical Psychology* 35: 641–661.

Arigo D, Schumacher L and Martin LM (2014a) Upward appearance comparison and the development of eating pathology in college women. *International Journal of Eating Disorders* 47: 467–470.

Arigo D, Suls JM and Smyth JM (2014b) Social comparisons and chronic illness: Literature synthesis and clinical implications. *Health Psychology Review* 8: 154–214.

Beck AT, Steer RA and Brown GK (2000) *BDI-FastScreen for Medical Patients: Manual*. San Antonio, TX: Psychological Corporation.

Bombardier CH, Fann JR, Temkin NR, et al. (2010) Rates of major depressive disorder and clinical outcomes following traumatic brain injury. *JAMA* 303: 1938–1945.

Brown AD, Buckner JP and Hirst W (2011) Time, before, and after time: Temporal self and social appraisals in posttraumatic stress disorder. *Journal of Behavior Therapy and Experimental Psychiatry* 42: 344–348.

Buunk AP, Collins RL, Taylor SE, et al. (1990) The affective consequences of social comparison: Either direction has its ups and downs. *Journal of Personality and Social Psychology* 59: 1238–1249.

Buunk AP, Zurriaga R, Gonzalez P, et al. (2006) Targets and dimensions of social comparison among people with spinal cord injury and other health problems. *British Journal of Health Psychology* 11: 677–693.

Delis DC, Kaplan E and Kramer JH (2001) *Delis-Kaplan Executive Function System (D-KEFS)*. San Antonio, TX: Psychological Corporation.

Dijkers MP (2004) Quality of life after traumatic brain injury: A review of research approaches and findings. *Archives of Physical Medicine and Rehabilitation* 85: 21–35.

Faul M, Xu L, Wald MM, et al. (2010) *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002–2006*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, pp. 2–70.

Festinger L (1954) A theory of social comparison processes. *Human Relations* 7: 117–140.

Gibbons FX and Buunk AP (1999) Individual differences in social comparison: Development of a scale of social comparison orientation. *Journal of Personality and Social Psychology* 76: 129–142.

Malec JF and Lezak MD (2008) Manual for the Mayo-Portland Adaptability Inventory (MPAI-4) for adults, children, and adolescents. Available at: http://www.tbims.org/combi/mpai (accessed 17 July 2015).

Menon DK, Schwab K, Wright DW, et al. (2010) Position statement: Definition of traumatic brain injury. *Archives of Physical Medicine and Rehabilitation* 91: 1637–1640.

Michinov E and Michinov N (2011) Social comparison orientation moderates the effects of group membership on the similarity-attraction relationship. *The Journal of Social Psychology* 151: 754–766.

Muscara F, Catroppa C and Anderson V (2008) Social problem-solving skills as a mediator between executive function and long-term social outcome following paediatric traumatic brain injury. *Journal of Neuropsychology* 2: 445–461.

Peck MD and Merighi JR (2007) The relation of social comparison to subjective well-being and health status in older adults. *Journal of Human Behavior in the Social Environment* 16: 121–142.

Petersen S, Taube K, Lehmann K, et al. (2012) Social comparison and anxious mood in pulmonary rehabilitation: The role of cognitive focus. *British Journal of Health Psychology* 17: 463–476.

Stern RA and White T (2003) *NAB, Neuropsychological Assessment Battery: Attention Module Stimulus Book.* Form 2: Psychological Assessment Resources. Lutz, FL: PAR Publishing.

Williams MW, Rapport LJ, Millis SR, et al. (2014) Psychosocial outcomes after traumatic brain injury: Life satisfaction, community integration, and distress. *Rehabilitation Psychology* 59: 298–305.