

Abstract

Objective: Traumatic brain injuries (TBIs) affect millions of Americans each year, and have significant human and economic costs. Executive functioning and social problem solving (SPS) are known to impact clinically-relevant outcomes among patients who have experienced mild TBIs. The purpose of the presents study was to examine these relationships in a sample of individuals with severe TBIs. We tested the relationship between SPS and a specific clinical outcome (quality of life), and whether SPS mediated the relationship between executive functioning and community integration (a second outcome).

Design: Individuals with severe TBIs (N=35) were recruited from a day treatment center to participate in a brief assessment. Participants completed the following measures: Wisconsin Card Sorting Task (executive functioning), Social Problem Solving Inventory Revised-Short Form, Community Integration Questionnaire, and the WHO Quality of Life-BREF. Hierarchical regression analyses were used to test the hypotheses.

Results: As hypothesized, participants who scored higher in social problem solving abilities reported significantly higher levels in their quality of life ($F[3,33] = 7.66, p=.001$). However, social problem solving did not appear to mediate the relationship between executive functioning and community integration ($F[1,33]= 0.35, p=.558$).

Conclusions: The results of this study supported the hypothesis that social problem solving is positively correlated with quality of life in patients who have suffered a TBI. Rehabilitation programs for severe traumatic brain injury might benefit from considering the effect social problem solving orientation and style might have on the quality of life of their patients.

Background

- Each year approximately 1.7 million Americans incur a traumatic brain injury (TBI).
- Estimated financial costs associated with medical care and rehabilitation services exceed \$50 billion annually, and this number is expected to increase with time
- Individuals experience impairments in cognitive functioning, interpersonal relationships, and quality of life (Faul, Xu, Wald, & Coronado, 2010), and many experience declining life satisfaction over time (Johnston & Miklos, 2002).
- Researchers have had difficulty studying variables that significantly influence recovery efforts, **especially in individuals who have suffer severe TBIs**.
- Two potential factors of treatment success among individuals with severe injuries include executive functioning and social problem solving.



Executive Functioning

Executive dysfunction has been repeatedly documented in traumatic brain injury, and is reported as one of the more common difficulties facing this population (Bamdad, Ryan, & Warden, 2003).

Deficits in executive functioning (i.e., the integration of several cognitive skills required to adapt to novel situations and pursue life goals; Lezak, 1982) limit an individual's ability to modify behavior to suit environmental demands.

Executive dysfunction thus creates a major obstacle to the development of independent living skills and community re-entry, and has been implicated in poor social outcomes following a brain injury – specifically, difficulty reentering the work force (Tate, Fenelon, Manning, & Hunter, 1991).

Previous findings have shown that executive functioning does not explain a large proportion of the variance in social outcomes (e.g., Fordyce, Roueche, & Prigatano, 1983).

Some authors have suggested that social problem solving might better predict social outcomes, as it may be the unrecognized mediator between executive functioning and social skill deficits (Muscara, Catroppa, & Anderson, 2008; Yeates, Swift, Taylor, Wade, Drotar, & Stancin, 2004).

Social Problem Solving

Whereas executive functioning refers to the integration of several cognitive skills, social problem solving (SPS) refers to how those skills are used, and how individuals manage their own emotional responses to a problem.

Social problem solving consists of two partially independent components (D'Zurilla & Nezu, 2007; D'Zurilla, Nezu, & Maydeu-Olivares, 2002; Nezu, 2004).

Problem orientation refers to the set cognitive and emotional schemas people have about the problems they face, and how they will be able to cope with them. Individuals with a positive problem orientation (PPO) usually view problems as challenges, and are confident in their ability to overcome or face those challenges. Importantly, they understand the utility of negative emotions. In contrast, individuals with a negative problem orientation (NPO) tend to view problems as threats, expect problems to be unsolvable, and doubt their ability to successfully cope with problems.

Problem-solving style, refers to the cognitive and behavioral activities used to solve problems (D'Zurilla, Nezu, & Maydeu-Olivares, 2002). Individuals who use an avoidant style attempt to escape their problems, or look for others to solve the problems they face. An impulsive style is associated with hurried decisions, with the individual often using the first solution that comes to mind without examining other potential solutions. A rational/planful problem-solving style entails the systematic use of skills to approach a problem and to carefully and thoughtfully discover a solution (D'Zurilla & Nezu, 2007; Nezu, 2004; D'Zurilla, Nezu, & Maydeu-Olivares, 2002)..

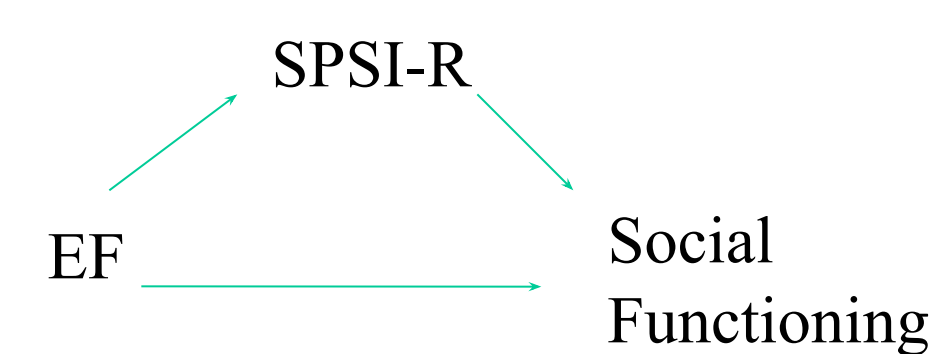
Social Problem Solving and TBI

Much of the early research on problem solving in TBI viewed social problem solving as a cognitive skill, and focused on the problem-solving style of clients.

Meta-analytic reviews of Problem-Solving Therapy show that applications without a specific focus on problem orientation generate less efficacious outcomes, relative to applications that include problem orientation (Bell & D'Zurilla, 2009; Malouff, Thorsteinsson, & Schutte, 2007).

One previous study did include the emotional/motivational components of problem solving, and directly examined whether SPS mediated the relationship between executive functioning and community integration (a marker of social functioning; Muscara, Catroppa, & Anderson, 2008).

In their study, social problem-solving skills did mediate relationship between executive functioning and social outcome. It should be noted, however, that the study examined these variables in children with TBI, and it is not clear whether similar relationships can be expected in adults.



Purpose of Proposed Study

1. To establish the relationship between social problem solving and quality of life in patients with severe TBIs.
2. To replicate the finding that social problem-solving skills mediate the relationship between executive functioning and social outcome in an adult population with severe TBIs.

Hypotheses

Hypothesis 1: SPS and Quality of Life. It was predicted that total social problem solving score (as measured by the Social Problem Solving Inventory-Revised, Short Form) would explain a significant amount of the variance in quality of life. We also predicted that total social problem solving score would be positively associated with quality of life, and that the specific component of negative problem orientation would be negatively correlated with quality of life. This hypothesis was tested using a hierarchical linear regression.

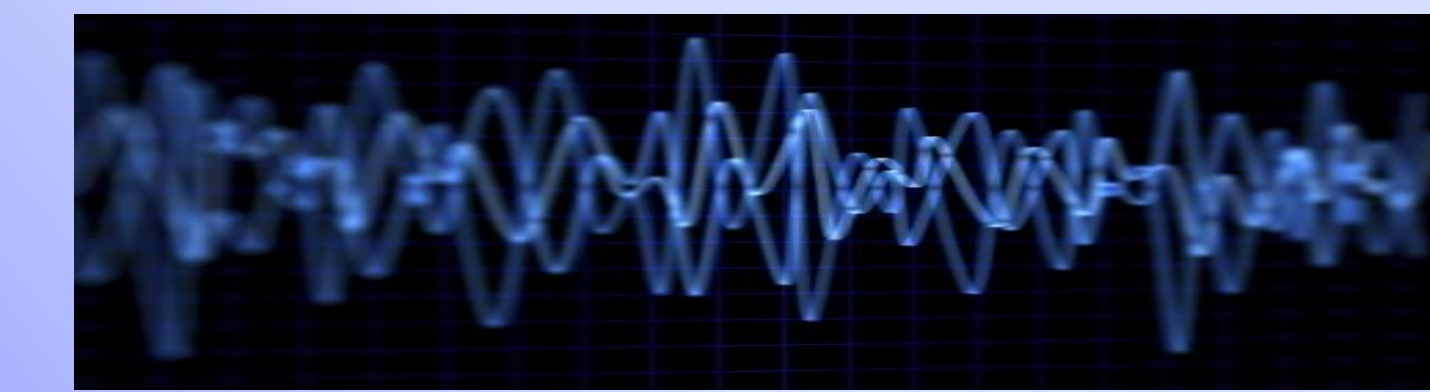
Hypothesis 2: Mediation Effect of SPS. It was hypothesized that total social problem solving score would mediate the relationship between executive functioning (as measured with the Wisconsin Card Sorting Task) and community integration, as seen in previous research (Muscara, Catroppa, & Anderson 2008). This hypothesis was tested using the method proposed by Baron & Kenny (1986).

Participants

- 35 participants were recruited from the day treatment services of a long term rehabilitation program.
- Participants (N=35) ranged in age from 25-66, with a mean age of 44 (SD=11.38)
- Most participants had completed high school or had received a GED (86%)
- All were at least 1 year post-injury, and had suffered injuries that were classified as severe, based upon the criteria described earlier for Glasgow Coma score, duration of loss of consciousness, and duration of post-traumatic amnesia.

Procedure

Once informed consent had been given through signature, participants completed the following measures: demographic questionnaire, brief cognitive status exam, the Wisconsin Card Sorting Test (WCST) to measure executive functioning, the Social Problem-Solving Inventory-Revised, Short Form (SPSI-R:S) to assess the problem orientation and style of participants, the Community Integration Questionnaire (CIQ), and the WHO Quality of Life-BREF (WHOQOL-BREF).



Results

There was a significant difference in the SPS scores for male (M=.94, SD=.16) and female (M=.77, SD=.15) participants ($t[33]=2.9, p=.007, 95\% \text{ CI } [.05, .285], d=1.01$).

Participant age was negatively associated with self-reported quality of life ($r=.38, p=.025$).

- As a result, gender and age were included as covariates in subsequent hierarchical regressions.

Hypothesis 1

Together, gender, age, and SPS score explained 43.4% of the variance observed in the quality of life measure ($F[3,33]=7.66, p=.001$). The regression for NPO also showed that NPO negatively correlated with quality of life ($\beta= 0.02, t[33]=2.26, p=.031$), supporting our first set of hypotheses.

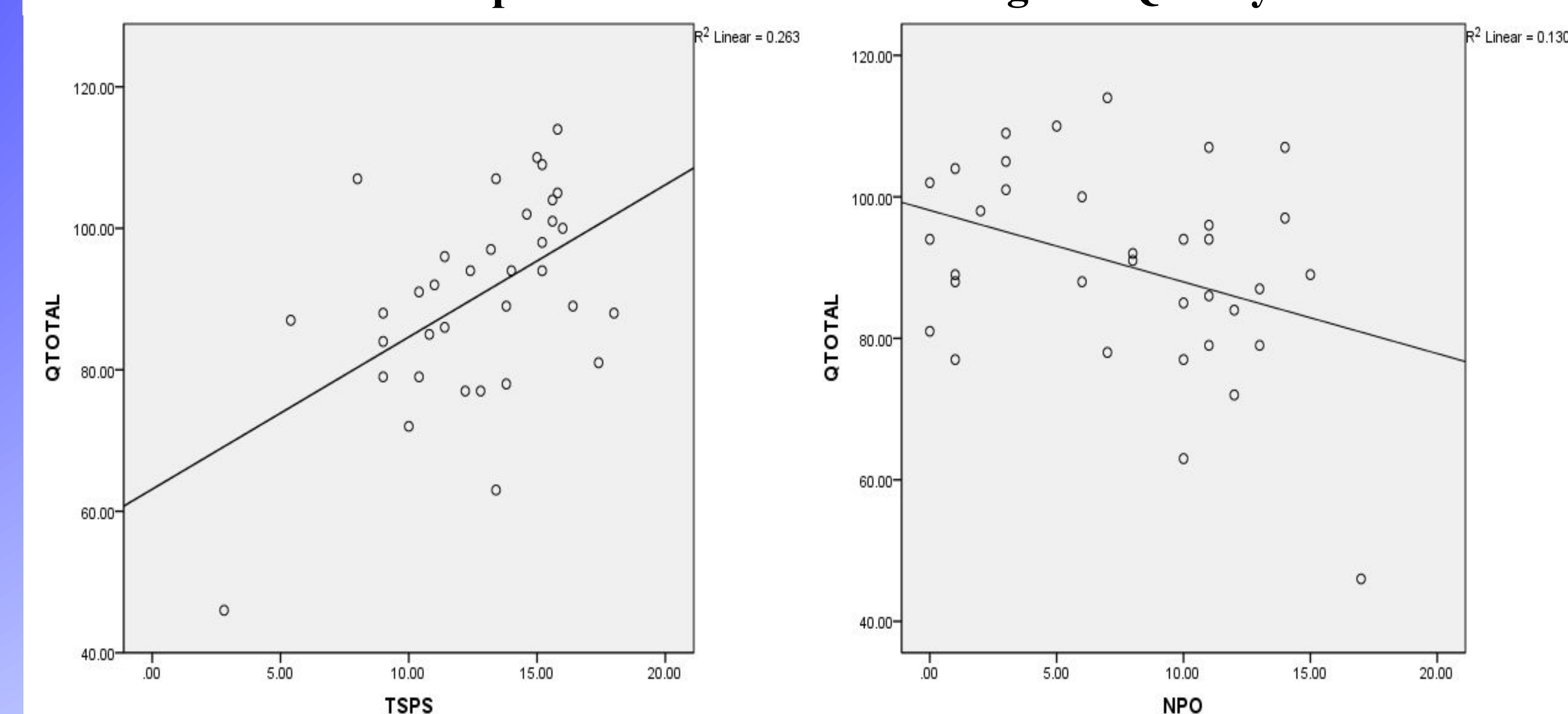
Hypothesis 2

Categories completed on the WCST (executive functioning) explained 12% of the variance in CIQ ($F[1,33]=4.33, p=.046$). To test the second condition of mediation, SPS was regressed on Categories score. Categories score explained 1% of the variance in SPS and was not a significant predictor ($F[1,33]= 0.35, p=.558$).

Conclusion

The results of this study support the hypothesis that social problem solving, or the ability to approach problems positively in a rational and planned manner, is positively associated with self-reported quality of life in patients who have suffered a TBI. However, findings in this study did not replicate previous work (e.g., Muscara, Catroppa, & Anderson, 2008), as social problem solving did not mediate the relationship between executive functioning and community integration in our sample.

The Relationship Between Problem Solving and Quality of Life



Impact

Poor problem solving effectiveness is known to influence adults' quality of life. The present study extends previous findings by demonstrating that social problem solving ability – and specifically, one's emotional response to problems – predicts quality of life among individuals with severe traumatic brain injury.

These results suggest that rehabilitation programs might benefit from considering the effects of social problem solving orientation and style on patients' quality of life. Future research designed to identify methods for improving the social problem solving among individuals who have suffered severe TBIs is warranted, as it may offer rehabilitation programs a way to improve clients' quality of life.

This study also indicates that after a severe traumatic brain injury and consequent marked deficits in executive functioning, executive functioning remains a strong predictor of community integration (an indicator of quality of life).