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The construct of problem solving in higher level neuropsychological assessment and rehabilitation☆

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Abstract

Three inter-related studies examine the construct of problem solving as it relates to the assessment of deficits in higher level outpatients with traumatic brain injury (TBI). Sixty-one persons with TBI and 58 uninjured participants completed measures of problem solving and conceptually related constructs, which included neuropsychological tests, self-report inventories, and roleplayed scenarios. In Study I, TBI and control groups performed with no significant differences on measures of memory, reasoning, and executive function, but medium to large between-group differences were found on timed attention tasks. The largest between-group differences were found on psychosocial and problem-solving self-report inventories. In Study II, significant-other (SO) ratings of patient functioning were consistent with patient self-report, and for both self-report and SO ratings of patient problem solving, there was a theoretically meaningful pattern of correlations with timed attention tasks. In Study III, a combination of self-report inventories that accurately distinguished between participants with and without TBI, even when cognitive tests scores were in the normal range, was determined. The findings reflect intrinsic differences in measurement approaches to the construct of problem solving and suggest the importance of using a multidimensional approach to assessment.

Keywords: Neuropsychological assessment; Rehabilitation; Traumatic brain injury

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A major target of neuropsychological rehabilitation is the remediation of problem-solving deficits (Cicerone et al., 2000), a significant obstacle to the community integration of traumatic brain injury (TBI) survivors (Ben-Yishay & Prigatano, 1990). The most complex of all intellectual functions (Goldstein & Levin, 1987), *problem solving* has been defined as a goal-directed cognitive activity that arises in situations for which no response is immediately apparent or available (Luria, 1966). In such situations, the individual must use cognitive skills to go beyond the information given in order to find a solution to the problem at hand (Bruner, Goodnow, & Austin, 1956).

Problem-solving deficits have been characterized as deficiencies in purposeful, logical, analytical thought brought about by brain damage (von Cramon & Matthes-von Cramon, 1992). Such deficits may be thought of as part of a disturbance in executive function, a widely used concept in clinical neuropsychology (Burgess, Alderman, Evans, Emslie, & Wilson, 1998), but one that is not well defined (Benton, 1994). In an inpatient rehabilitation sample, executive function measures were predictive of post-discharge psychosocial functioning (Hanks, Rapport, Millis, & Deshpande, 1999). However, among higher level outpatients with brain injury, relatively intact performance on conventional neuropsychological measures may belie significant functional impairments (e.g., Eslinger & Damasio, 1985; Hart & Hayden, 1986; Shallice & Burgess, 1991; von Cramon & Matthes-von Cramon, 1994). In this regard, deficits due to orbital-frontal cortex injuries are particularly elusive to assessment with neuropsychological tests, yet often lead to disabling functional problems (Varney & Menefee, 1993). In such cases, normal-range test scores do not rule out problem-solving deficits, but rather reflect challenges in the assessment of such deficits (Levine, Dawson, Boutet, Schwartz, & Stuss, 2000).

Clinical neuropsychologists (e.g., Goldstein & Levin, 1987; Lezak, 1995; Luria, 1963) typically acknowledge the importance of motivational factors, but traditionally have relied on an analysis of cognitive processes as a template for the steps in problem solving (e.g., realization and statement of an objective, analysis of the situation, actual behavior, and feedback and self-correction; Lezak, 1995). Such an analysis, focused on the cognitive infrastructure of problem solving, involves finding fixed solutions to well-defined, emotionally neutral problems (Rath, Simon, Langenbahn, Sherr, & Diller, 2000). Although useful in laboratory studies, this approach is of limited utility in clinical practice, which deals with multidimensional real-life problems.

Especially among those with above average premorbid functioning, persons with brain injury may perform well on highly structured, affectively neutral tasks (cf. Eslinger & Damasio, 1985; Rath et al., 2000; von Cramon & Matthes-von Cramon, 1994). Nonetheless, these same individuals may still have diminished self-regulatory resources available for dealing with unstructured, emotionally laden everyday problems (Fordyce, Roueche, & Prigatano, 1983; Tate, 1999). Researchers (Levine et al., 2000) have addressed limitations imposed by the structure inherent in conventional executive function measures by devising tasks that more closely approximate the demands of real-life problems. However, such research has not formally assessed the role of motivational, attitudinal, and affective factors in problem solving.

In an approach with relevance for clinical neuropsychology, cognitive-behavioral psychologists (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982, 2001) have refined the construct of problem solving to emphasize factors that may disrupt intent and motivation and thereby impede actual problem-solving performance. This *social problem-solving* approach contrasts markedly with the structured, emotionally neutral analysis typically applied in clinical neuropsychological research (n.b., the adjective *social* does not restrict problem solving to any particular domain, but rather is meant to indicate that all problem solving, whether intra- or interpersonal, occurs in the everyday social environment; D'Zurilla & Maydeu-Olivares, 1995). Social problem solving is conceptualized as comprising two components, *problem-solving skills* and *problem orientation*.

Similar to the steps proposed by neuropsychologists such as Lezak (1995, described above), problem-solving skills include (a) problem definition and formulation, (b) generation of alternatives, (c) decision making, and (d) solution implementation and verification (D'Zurilla & Goldfried, 1971; D'Zurilla & Nezu, 1982). These skills are the goal-directed tasks that, *if successfully implemented*, would enable a person to resolve a particular problem.

In contrast, problem orientation includes the beliefs, assumptions, and expectations that arise when an individual is confronted with a problematic situation (D'Zurilla & Nezu, 2001). Problem orientation, then, constitutes an affective, attitudinal, and motivational component of problem solving, not formally addressed in neuropsychological approaches to assessment. Deficits in this self-regulatory aspect of problem solving may lead to impulsive reactions or avoidance, which may disrupt or inhibit implementation of the more purely cognitive problem-solving skills.

Ownsworth, McFarland, and Young (2000) noted a long line of studies which indicate that deficits in self-regulatory processes can result in low self-confidence, depression, anxiety, and anger management problems in persons with TBI. Such concerns go beyond cognitive skills, yet play a crucial role in real-life problem solving. For example, Montgomery, Kern, Lund, and Patterson (1999) found that Beck Depression Inventory and Symptom Rating Scale scores predicted eventual job placement and correlated so highly as to suggest "a common dimension of confidence-distress over neuropsychological functioning" (p. 794). Rath, Hennessy, and Diller (2003) found that confidence in problem-solving ability was more robust than either WCST Perseverative Responses or social problem-solving performance in its relationship to community integration. Such findings suggest that it may be productive to broaden clinical neuropsychology's conceptualization of problem solving to more directly address problem orientation; a focus on objective cognitive skills alone may be too narrow.

The current paper presents the results of three inter-related studies designed to investigate the construct of problem solving as it relates to the understanding and assessment of deficits in *higher level outpatients with TBI*, a population in which relatively intact performance on conventional neuropsychological tests may misrepresent actual levels of functional impairment (Rath et al., 2000; von Cramon & Matthes-von Cramon, 1994). In Study I, a multidimensional test battery was used to compare TBI outpatients with uninjured controls. The intent was to determine if problem-solving measures contribute unique information to the identification of deficits. In Study II, relationships among different problem-solving assessment methods were investigated using three information sources, (a) TBI patients, (b) their significant others, and (c) healthy controls. The intention was to determine both the relationship among various methods for assessing what typically is presumed to be a single construct and the validity of self-reported problem solving in higher level TBI outpatients. Finally, in Study III, the goal was to determine a combination of measures that maximally discriminates between outpatients with TBI and healthy controls.

1. Study I

The objective was to determine if problem-solving measures enhance the identification of deficits in persons with TBI. The extent to which various measures discriminate between higher level TBI outpatients and uninjured comparison subjects was examined.

1.1. Method

1.1.1. Subjects

The TBI group ($n = 61$), drawn from a large outpatient cognitive rehabilitation program at a major metropolitan medical center, was *selected according to current higher level of functioning*, relative to other outpatients with brain injury. *Higher level* was defined as meeting minimum "basic skill" criteria required for participation in more cognitively demanding (i.e., Level 4 or 5 in a five-tiered program) Basic Skill Groups (Sherr & Langenbahn, 1992). These criteria include competence in five basic skills: awareness, attention and concentration, note taking and organization, giving and receiving feedback, and social-emotional interaction skills (Langenbahn, Sherr, Simon, & Hanig, 1999). Specifically, patients who meet higher level basic skill criteria are able to (a) state cognitive strengths and weaknesses, (b) sustain attention for an hour-long session, (c) take organized notes for remembering information, (d) give and receive feedback as a means of self-evaluation, and (e) relate to others with adequate social skills, as assessed using a clinician rating form (Adjunct Skills Questionnaire; Hanig et al., 1993).

Additional inclusion criteria for the present study included age between 20 and 65 years and English language skills sufficient for testing (approximately ninth-grade reading level). Those whose records indicated psychoses, active substance abuse, other neurological conditions, or severe lateralized deficits (i.e., left visual neglect or aphasia) were ineligible for participation.

The TBI group consisted of 23 men (38%) and 38 women (62%), with a mean age of 43.3 (S.D. = 11.3; range 22–64) and a mean educational level of 15.7 years (S.D. = 2.4; range 11–20). Verbal IQ scores were available for 52 of the participants with TBI; the mean score was 105.3 (S.D. = 13.5; range 76–144). Prior to injury, all were productive community members, either employed, in college, or homemakers. Premorbid occupations included attorney, investment banker, librarian, podiatrist, and professor. Injury characteristics (i.e., severity and cause) are reported in Table 1.

As can be seen in Table 1, severity of injury ranged from mild to severe using established classification systems for mild (American Congress of Rehabilitation Medicine, 1993) and moderate to severe (Geffen, Hinton-Bayre, Geffen, & Geffen, 1998) TBI. Average age and gender characteristics (i.e., older than typically reported for moderate to severe TBI samples, predominately female) were consistent with those previously reported for mild TBI samples (e.g., Donders, Tulsky, & Zhu, 2001; Paniak, Toller-Lobe, Reynolds, Melnyk, & Nagy, 2000). Consistent with previous reports in the literature (e.g., Eslinger & Damasio, 1985; Levine et al., 2000; Rath et al., 2000; von Cramon & Matthes-von Cramon, 1994), normal-range IQ scores were not reflective of actual levels of functional impairment. All participants with TBI had documented impairments in psychosocial functioning (job loss, marital discord, difficulty maintaining a household, etc.) and presented for treatment with a variety of post-concussive complaints.

Table 1
Injury characteristics for TBI group

Characteristic	*n*
Loss of consciousness (severity)	
Less than 30 min (mild)	34
30 min to 6 h (moderate)	4
6 h to 1 week (severe)	6
1–4 weeks (severe)	11
4 weeks+ (severe)	3
Not available in medical record	3
Cause of injury	
Traffic accident	31
Fall	10
Assault	6
Sporting accident	6
Other type of impact (falling object, etc.)	8

Note. Loss of consciousness (severity) classification from ACRM (1993; mild) and Geffen et al. (1998; moderate to severe).

Participants in the uninjured comparison group ($n = 58$) included friends of those in the TBI group, as well as students, staff members, and trainees recruited from various programs at a major metropolitan medical center. They were paid $50 each for their participation. None of these individuals exhibited neurological problems, psychiatric conditions, or active substance abuse. The group consisted of 22 men (38%) and 36 women (62%), with a mean age of 35.5 (S.D. = 10.1; range 24–62) and a mean educational level of 16.9 years (S.D. = 2.3; range 12–20).

The TBI and comparison groups were well equated in terms of gender. Although both groups were well educated, the difference in education (16 years vs. 17 years) was statistically significant, $t(115) = -2.75$, $P = .007$. In addition, there was a significant difference in age (43 years vs. 35 years), $t(115) = 4.07$, $P < .001$. Thus, in all subsequent between-group comparisons, analysis of covariance (ANCOVA) procedures were used to control for the effects of age and education.

1.1.2. Measures

The test battery consisted of various methods for assessing problem solving and conceptually related constructs. Neuropsychological tests, self-report inventories, and roleplayed scenarios were used to assess: (a) *cognitive skills* (attention, memory, reasoning, and executive function), (b) *psychosocial functioning* (community integration, symptom complaints, and self-esteem), and (c) *social problem solving* (problem-solving self-appraisal and performance on roleplayed scenarios).

Cognitive skills were assessed using four groups of neuropsychological tests.

1.1.2.1. Attention. Weinberg Visual Cancellation Test, Time (in seconds) and Error scores (Diller & Weinberg, 1993); Stroop Color-Word Task (Trenerry, Crosson, LeBoe, & Leber, 1989), number correct; FAS (Spreen & Benton, 1977); and Will-Temperament Scale (Downey, 1923), Fast and Inhibition of Response scores were used. On the Will-Temperament Scale, participants are timed as they write a phrase under normal conditions, as fast as they can, and then again as slowly as possible. The Inhibition of Response score is calculated by subtracting performance time (in seconds) under the normal condition from performance time in the slow condition.

1.1.2.2. Memory. Wechsler Memory Scale—Third Edition (WMS-III; Wechsler, 1997b), Logical Memory, Immediate and Delayed Recall; and Visual Reproduction, Immediate and Delayed Recall scaled scores were used.

1.1.2.3. Reasoning. Watson–Glaser Critical Thinking Appraisal (Watson & Glaser, 1980), Recognition of Assumptions (Test 2) + Evaluation of Arguments (Test 5) composite score; and Wechsler Adult Intelligence Scale—Third Edition (WAIS-III; Wechsler, 1997a), Comprehension scaled scores were used.

1.1.2.4. Executive function. Wisconsin Card Sorting Test (WCST; Heaton, Chelune, Talley, Kay, & Curtis, 1993), Perseverative Response score was used. One of the most widely used neuropsychological instruments in clinical practice (Butler, Retzlaff, & Vanderploeg, 1991; Rabin, 2001/2002), the WCST has been used extensively as an indicator of problem-solving ability (Daniel, Webster, & Scott, 1986; King & Snow, 1982; Wiegner & Donders, 1999). Perseverative Responses, the most useful diagnostic measure derived from the WCST (Heaton, 1981), has been used in recent research with outpatient TBI samples (Rath et al., 2000; Rath, Hennessy, et al., 2003; Rath, Simon, Langenbahn, Sherr, & Diller, 2003). Although a number of WCST scores are known to be useful (Heaton et al., 1993), given the limitation imposed by statistical power concerns on the number of variables examined, Perseverative Responses was chosen as a representative score for inclusion in the present study.

Psychosocial functioning was measured using three groups of self-report inventories.

1.1.2.5. Community integration. Sickness Impact Profile (SIP; Bergner, Bobbitt, Carter, & Gilson, 1981), Recreation + Social Interaction composite scores; and Community Integration Questionnaire (CIQ; Willer, Ottenbacher, & Coad, 1994) total scores were used.

1.1.2.6. Symptom complaints. Problem Checklist (PCL; Kay, Cavallo, Ezrachi, & Vavagiakis, 1995), Cognitive, Affective, and Physical Severity scores; and Brief Symptom Inventory (BSI; Derogatis, 1990), Depression, Anxiety, and Hostility *T* scores were used.

1.1.2.7. Self-esteem. Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) scores were used.

Social problem solving was assessed using two types of measures.

1.1.2.8. Problem-solving self-appraisal. Problem-Solving Inventory (PSI; Heppner, 1988) total scores were used. The PSI consists of 32 six-point Likert-type items, generated to fit D'Zurilla and Goldfried's (1971) social problem-solving model, in which participants rate statements describing their own problem-solving behaviors and attitudes. Items represent three factors: (a) *Problem-Solving Confidence* (self-assurance while engaged in problem solving), (b) *Approach-Avoidance Style* (tendency to approach or avoid different types of problem-solving activities), and (c) *Personal Control* (control over emotions and behavior while problem solving; Heppner, 1988).

The PSI has high discriminant validity with measures of intelligence and social desirability and convergent validity with behaviors and attitudes typically associated with problem solving (Heppner, 1988). The PSI is internally consistent (alpha = .90) and temporally stable ($r = .89$) over 2 weeks. It distinguishes higher level outpatients with TBI from healthy controls, and it is sensitive to improvements following cognitive rehabilitation (Rath et al., 2000; Rath, Simon, et al., 2003).

Problem-Solving Questionnaire (PSQ; Sherr, Langenbahn, Simon, Rath, & Diller, 1996b), Self-regulation and Clear Thinking subscales also were used. The PSQ is a 34-item self-report inventory, developed and validated for the present research program to make D'Zurilla and Nezu's (1982, 2001) two-factor approach (problem orientation vs. problem-solving skills) relevant for a TBI population. Addressing emotional self-regulation and logical thinking, typical items include rating the frequency of such difficulties as "Having emotional reactions that are out of proportion to situations, such as crying easily or yelling over minor problems," or "Starting to act on a possible solution to a problem without first thinking about if it will work."

The PSQ's construct validity was supported by its significant moderate correlation with the PSI, $r(129) = -.43$, $P < .001$.[1] The measure demonstrated expected independence from intelligence and a small correlation with social desirability, $r(125) = -.27$, $P = .002$. Internally consistent (alpha = .94) and temporally stable at 2 weeks for individuals with and without TBI, $r(26) = .88$, $P = .001$; $r(26) = .97$, $P = .001$, respectively, the PSQ is divided into Emotional Self-regulation and Clear Thinking subscales.

1.1.2.9. Roleplayed scenarios. Problem-Solving Roleplay Test (PSRPT; Sherr, Langenbahn, Simon, Rath, & Diller, 1996a) scores were used. The PSRPT, an objective observer-rating measure developed and validated for the present research program, assesses responses when confronted with face-to-face interpersonal problems. In five brief scenarios, representing the domains of family, work/school, and friendship, key information crucial to resolving the problem must elicited from a trained interviewer.

Tapping functional problem-solving behaviors such as gathering information, defining goals, generating alternative solutions, and utilizing feedback, the PSRPT resembles a naturalistic situation because it is interactive, with the interviewer providing standardized cues and feedback. The interaction is videotaped and later scored by an independent rater. The PSRPT has high inter-rater reliability, $r(25) = .97$, $P < .05$, and temporal stability at 16 weeks, $r(25) = .92$, $P < .05$. The PSRPT's construct validity was supported by its significant correlation with psychologists' global ratings of patients' functional problem-solving ability, $r(10) = .79$, $P < .05$ (Sherr et al., 1998).

[1] Direction of correlation is negative because lower PSI scores indicate more positive self-appraisal of problem-solving abilities.

1.1.3. Data analysis

To detect meaningful between-group differences on the dependent variables, *while controlling for the effects of age and education*, comparisons were conducted using ANCOVA methods. To reduce the likelihood of type I error, critical alpha levels were adjusted within each domain (i.e., cognitive skills, psychosocial functioning, and social problem solving) using Bonferroni corrections to set family wise error rates (alpha $= .05$) for each variable cluster (e.g., attention, memory, reasoning, executive function). To aid in interpretation of the results, f (the effect size [ES] index for ANCOVA) was calculated using procedures delineated by Cohen (1988). Reflecting the magnitude of observed between-group differences (i.e., ratio of effect variance to total variance), ES conventions for f are: small $= 0.10$, medium $= 0.25$, large $= 0.40$.

1.2. Results

Table 2 summarizes means, standard deviations, and range of scores for the TBI and comparison groups. Significant between-group differences, and corresponding ESs, *controlling for the effects of age and education using ANCOVA methods*, are noted at the Bonferroni-corrected level. Results are reviewed in detail below.

1.2.1. Cognitive skills

1.2.1.1. Attention. Compared with healthy controls, individuals with TBI performed more poorly on Visual Cancellation, Time; Stroop; and Will-Temperament Scale, Fast scores; $F(1, 115) = 8.47$, $P = .004$; $F(1, 112) = 11.03$, $P = .001$; $F(1, 115) = 12.69$, $P = .001$, respectively.

1.2.1.2. Memory, reasoning, and executive function. There were no significant differences between TBI and comparison groups on measures of memory, reasoning, and executive function (WAIS-III, Comprehension; Watson–Glaser Critical Thinking Appraisal, composite score; all four WMS-III memory subtests; and WCST Perseverative Responses).

1.2.2. Psychosocial functioning

1.2.2.1. Community integration. SIP composite and CIQ scores discriminated between TBI and comparison groups, $F(1, 85) = 49.54$, $P < .001$; $F(1, 108) = 34.89$, $P < .001$, respectively.

1.2.2.2. Symptom complaints. On the PCL, the TBI group endorsed more severe cognitive, affective, and physical/somatic symptoms than did the comparison group, $F(1, 103) = 196.15$, $P < .001$; $F(1, 102) = 75.68$, $P < .001$; $F(1, 103) = 110.82$, $P < .001$, respectively. On the BSI, individuals with TBI reported more depression, anxiety, and hostility, $F(1, 105) = 16.53$, $P < .001$; $F(1, 105) = 35.32$, $P < .001$; $F(1, 105) = 17.70$, $P < .001$, respectively.

1.2.2.3. Self-esteem. On the RSES, the TBI group reported lower self-esteem, $F(1, 103) = 21.63$, $P < .001$.

Table 2
Scores for TBI and comparison groups

Measure	TBI		Comparison		ES(*f*)
	Range	*M* (*SD*)	Range	*M* (*SD*)	
Cognitive skills					
Attention					
Visual Cancellation, Time	98–654	182.69 (94.92)	73–280	140.00 (44.12)**	0.27
Visual Cancellation, Errors	0–24	9.35 (7.59)	0–39	8.87 (6.62)	0.10
Stroop (number correct)	9–112	86.76 (24.40)	62–112	104.74 (12.80)*	0.31
FAS	13–77	41.28 (14.22)	16–78	44.28 (13.11)	0.05
Will-Temperament, Fast	5–38	11.79 (5.73)	5–16	8.69 (2.07)**	0.33
Inhibition of Response	0–50	10.44 (13.62)	0–43	8.43 (8.73)	0.15
Memory					
Verbal Memory, Immediate	3–17	10.07 (2.89)	4–16	11.28 (2.43)	0.21
Verbal Memory, Delayed	3–17	10.98 (3.06)	6–18	12.00 (2.65)	0.18
Visual Memory, Immediate	2–17	9.44 (3.66)	3–17	9.93 (3.35)	0.05
Visual Memory, Delayed	1–18	10.79 (2.82)	2–19	2.51 (3.21)	0.24
Reasoning					
WAIS-III, Comprehension	2–18	12.20 (2.99)	5–19	12.86 (3.04)	0.08
Watson–Glaser	8–32	23.75 (5.25)	12–32	25.85 (4.25)	0.18
Executive function					
WCST, Perseverative Responses	2–61	13.17 (13.90)	1–42	9.33 (9.06)	0.07
Psychosocial functioning					
Community integration					
SIP	0–26	11.48 (5.37)	0–18	3.72 (4.23)**	0.78
CIQ	5–27	16.67 (5.66)	9–29	22.79 (4.16)**	0.58
Symptom complaints					
PCL, Cognitive Severity	0.22–7.00	4.33 (1.65)	0–2.00	.48 (.63)**	1.41
PCL, Affective Severity	0.21–6.57	2.85 (1.62)	0–3.08	.63 (.85)**	0.88
PCL, Physical Severity	0.25–6.75	2.97 (1.61)	0–4.00	.31 (.68)**	1.06
BSI, Depression	13–80	63.53 (14.18)	41–78	54.82 (10.49)**	0.40
BSI, Anxiety	41–80	64.95 (11.55)	37–76	51.67 (11.19)**	0.58
BSI, Hostility	39–80	60.37 (11.36)	37–80	52.10 (11.35)**	0.41
Self-esteem					
Rosenberg Self-Esteem Scale	10–39	22.60 (6.64)	10–29	17.88 (5.06)**	0.46
Social problem solving					
Problem-solving self-appraisal					
Problem-Solving Inventory	35–169	101.11 (35.15)	31–112	76.06 (18.53)**	0.45
PSQ, Clear Thinking	25–114	74.20 (22.28)	54–114	94.57 (14.27)**	0.55
PSQ, Emotional Self-regulation	16–88	56.16 (17.50)	44–90	75.00 (12.72)**	0.63
Roleplayed scenarios					
Problem-Solving Roleplay Test	22–166	117.41 (30.73)	74–192	125.90 (26.72)	0.06

Note. Watson–Glaser: Watson–Glaser Critical Thinking Appraisal, composite (Test 2 + Test 5); WCST: Wisconsin Card Sorting Test; SIP: Sickness Impact Profile, composite (Recreation + Social Interaction); CIQ: Community Integration Questionnaire; PCL: Problem Checklist; BSI: Brief Symptom Inventory, *T* scores; PSQ: Problem-Solving Questionnaire. ES conventions for *f* are: small = 0.10, medium = 0.25, large = 0.40 (Cohen, 1988).

* $P < .01$.

** $P < .001$.

1.2.3. Social problem solving

1.2.3.1. Problem-solving self-appraisal. PSI and PSQ, Clear Thinking subscale scores distinguished individuals with TBI from uninjured participants, $F(1, 104) = 21.10$, $P < .001$; $F(1, 105) = 32.28$, $P < .001$, respectively. On the PSQ, Emotional Self-regulation subscale, the TBI group reported poorer emotional self-regulation skills, $F(1, 105) = 42.25$, $P < .001$.

1.2.3.2. Roleplayed scenarios. There was no significant difference between TBI and comparison groups in performance on the PSRPT.

1.3. Discussion

The TBI and uninjured comparison groups performed with no significant between-group differences on measures of memory, reasoning, and executive function. However, measures of attention involving processing speed (Visual Cancellation, Time; Stroop; Will-Temperament Scale, Fast score) were sensitive to between-group differences, with medium to large ESs. Such findings are consistent with work reported over the past decade by van Zomeren and colleagues (Spikman, Deelman, & van Zomeren, 2000; Spikman, Timmerman, van Zomeren, & Deelman, 1999; van Zomeren & Brouwer, 1994; Veltman, Brouwer, van Zomeren, & van Wokffetkaa, 1996), who found slowed information processing to be a pervasive effect of closed head injury.

Compared to healthy controls, the TBI group also had (a) poorer psychosocial functioning, indicated by self-report inventories of cognitive, affective, and somatic symptoms (PCL and BSI subscales), self-esteem (RSES), and community integration (SIP, CIQ); and (b) more impaired social problem solving, indicated by measures of problem-solving self-appraisal (PSI; PSQ, Clear Thinking and Emotional Self-regulation subscales). These between-group differences were all significant with large ESs.

The current findings are consistent with previous reports (e.g., Eslinger & Damasio, 1985; Rath et al., 2000; von Cramon & Matthes-von Cramon, 1994) which indicate that relatively intact performance on conventional neuropsychological measures may misrepresent the level of functional impairment experienced by persons with brain injury. Such findings suggest the importance of using measures sensitive to deficits in well-educated outpatients with TBI; typically used measures may be too narrow.

1.3.1. Effects of depression

Consistent with earlier findings that depression is common following TBI (Hibbard, Uysal, Kepler, Bogdany, & Silver, 1998; Kreutzer, Seel, & Gourley, 2001), individuals in the TBI group were significantly more depressed than healthy controls. Other researchers have reported that post-concussive slowing may be due to the effects of depression, rather than brain injury (e.g., Lovejoy et al., 2001), and that depressed TBI patients may complain beyond the scope of their actual deficits (cf. Seel et al., 2003). To address such concerns in the current sample, ANCOVA methods were used in a post hoc analysis to covary for level of depression. After controlling for the effects of depression (as well as age and education), all between-group differences reported in Table 2, with the exception of BSI Hostility, $F(1, 107) = 4.43$, $P < .04$, remained significant at the Bonferroni-corrected level.

2. Study II

Two factors must be considered when examining the assessment of problem-solving deficits in persons with TBI: (a) problem solving can be measured using a variety of methods, and (b) multiple sources of information can be considered. Different methods and information sources may tap different aspects of this inherently complex construct, yielding different judgments as to the presence or absence of deficits (cf. Campbell & Fiske, 1959; Meyer et al., 2001). In the present study, relationships among three different problem-solving assessment methods (neuropsychological tests, self-report inventories, and roleplayed scenarios) were investigated using three different information sources, (a) TBI patients, (b) their significant others (SOs), and (c) healthy controls. The objectives were to examine both the relationship between various methods for assessing what typically has been presumed to be a single construct and the validity of self-reported problem solving in higher level outpatients with TBI.

2.1. Method

2.1.1. Subjects/measures/procedures

Data from Study I were re-examined. In addition, data were obtained from 50 SOs (i.e., spouse, other family member, etc.), who rated the brain-injured individual's problem-solving and psychosocial functioning using the SIP, CIQ, PCL, PSI, and PSQ.

2.1.2. Data analysis

Relationships among and between measurement methods and information sources were examined in four ways: (a) intercorrelations between various problem-solving measures, (b) correlations of patient scores on neuropsychological tests, self-report inventories, and role-played scenarios with SO ratings of patient psychosocial functioning, (c) correlations between patient self-report and SO ratings on problem-solving and psychosocial inventories, and (d) correlations between problem-solving inventories and neuropsychological measures of attention, memory, and reasoning.

2.2. Results

2.2.1. Correlations between problem-solving measures

Intercorrelations between scores on an executive function test, problem-solving inventories, and roleplayed scenarios were examined for persons with TBI, their SOs, and healthy controls. Problem-solving inventories (PSI, PSQ) were related to each other, but executive function (WCST) and roleplay (PSRPT) measures were unrelated to the inventories (PSI, PSQ), as well as to each other. As can be seen in Tables 3–5, this pattern was consistent for (a) TBI patients, (b) their SOs, and (c) healthy controls.

2.2.2. Correlations of patient scores on problem-solving measures with SO ratings of patient psychosocial functioning

The relationship of patient scores on three types of problem-solving measures with SO ratings of patient psychosocial functioning was examined. As can be seen in Table 6, pa-

Table 3
Intercorrelations between problem-solving measures: TBI Group (maximum $n = 61$)

	PSI	PSQ-ESR	PSQ-CT	WCST
PSQ-ESR	−.54**	–		
PSQ-CT	−.71**	.79**	–	
WCST	.04	.17	.17	–
PSRPT	.10	.21	−.03	−.08

Note. Negative correlations were obtained because higher scores indicate better functioning on PSQ and PSRPT, and lower scores indicate better functioning on PSI and WCST. PSI: Problem-Solving Inventory; PSQ-ESR: Problem-Solving Questionnaire, Emotional Self-regulation subscale; PSQ-CT: Problem-Solving Questionnaire, Clear Thinking subscale; WCST: Wisconsin Card Sorting Test, Perseverative Responses; PSRPT: Problem-Solving Roleplay Test. ES conventions for Pearson correlations are: small = 0.10, medium = 0.30, large = 0.50 (Cohen, 1988).

** $P < .01$.

Table 4
Intercorrelations between problem-solving measures: comparison group (maximum $n = 58$)

	PSI	PSQ-ESR	PSQ-CT	WCST
PSQ-ESR	−.32*	–		
PSQ-CT	−.35*	.79**	–	
WCST	.17	−.01	−.02	–
PSRPT	−.15	−.17	−.15	−.23

Note. Negative correlations were obtained because higher scores indicate better functioning on PSQ and PSRPT, and lower scores indicate better functioning on PSI and WCST. PSI: Problem-Solving Inventory; PSQ-ESR: Problem-Solving Questionnaire, Emotional Self-regulation subscale; PSQ-CT: Problem-Solving Questionnaire, Clear Thinking subscale; WCST: Wisconsin Card Sorting Test, Perseverative Responses; PSRPT: Problem-Solving Roleplay Test. ES conventions for Pearson correlations are: small = 0.10, medium = 0.30, large = 0.50 (Cohen, 1988).

* $P < .05$.

** $P < .01$.

Table 5
Intercorrelations between problem-solving measures: significant-other (SO) ratings and patient test scores (maximum $n = 50$)

	PSI (SO)	PSQ-ESR (SO)	PSQ-CT (SO)
PSQ-ESR (SO)	−.55**	–	
PSQ-CT (SO)	−.61**	.89**	–
WCST	−.13	−.10	−.12
PSRPT	−.20	−.16	−.08

Note. Negative correlations were obtained because higher scores indicate better functioning on PSQ and PSRPT, and lower scores indicate better functioning on PSI and WCST. PSI: Problem-Solving Inventory; PSQ-ESR: Problem-Solving Questionnaire, Emotional Self-regulation subscale; PSQ-CT: Problem-Solving Questionnaire, Clear Thinking subscale; WCST: Wisconsin Card Sorting Test, Perseverative Responses; PSRPT: Problem-Solving Roleplay Test. ES conventions for Pearson correlations are: small = 0.10, medium = 0.30, large = 0.50 (Cohen, 1988).

** $P < .01$.

Table 6
Relationship of patient scores on problem-solving measures to significant-other (SO) ratings of patient community integration (SIP) and symptoms (PCL) (maximum $n = 50$)

	SIP (SO)	PCL-Cog (SO)	PCL-Aff (SO)	PCL-Phy (SO)
PSI	.28*	.27	.10	.31*
PSQ-ESR	−.52**	−.48**	−.40**	−.50**
PSQ-CT	−.35*	−.47**	−.27	−.42**
WCST	−.14	−.17	.01	−.09
PSRPT	−.22	.03	−.13	−.18

Note. Negative correlations were obtained because higher scores indicate better functioning on PSQ and PSRPT, and lower scores indicate better functioning on PCL, PSI, and WCST. SIP: Sickness Impact Inventory composite score; PCL: Problem Checklist, Cog (cognitive), Aff (affective), and Phy (physical/dependency) severity subscale; PSI: Problem-Solving Inventory; PSQ-ESR: Problem-Solving Questionnaire, Emotional Self-regulation subscale; PSQ-CT: Problem-Solving Questionnaire, Clear Thinking subscale; WCST: Wisconsin Card Sorting Test, Perseverative Responses; PSRPT: Problem-Solving Roleplay Test. CIQ was not included in table; the only significant correlation with the CIQ (SO) was the PSRPT, $r(50) = .30$, $P < .05$. ES conventions for Pearson correlations are: small = 0.10, medium = 0.30, large = 0.50 (Cohen, 1988).

* $P < .05$.

** $P < .01$.

Table 7
Agreement between patient self-report and significant-other ratings (maximum $n = 50$)

Construct	Measure	*r*	*P*
Community integration	Sickness Impact Profile, composite score	.41	.003
	Community Integration Questionnaire	.87	.001
Symptom complaints	PCL, Cognitive Severity	.43	.002
	PCL, Affective Severity	.49	.001
	PCL, Physical Severity	.43	.002
Problem-solving self-appraisal	Problem-Solving Inventory	.40	.005
	PSQ, Clear Thinking	.33	.03
	PSQ, Emotional Self-Regulation	.51	.001

Note. PCL: Problem Checklist; PSQ: Problem-Solving Questionnaire. ES conventions for Pearson correlations (r) are: small = 0.10, medium = 0.30, large = 0.50 (Cohen, 1988).

tient self-reported problem solving (PSI, PSQ subscales) was related to various SO ratings of patient community integration (SIP) and post-concussive symptoms (PCL subscales). In contrast, patient performance on an executive function measure (WCST) and roleplayed scenarios (PSRPT) was not significantly related to any of these SO ratings.

2.2.3. Correlations of patient self-reported functioning with SO ratings of patient functioning

Agreement between TBI patients and their SOs about the patient's level of functioning was examined for all the problem-solving and psychosocial inventories. As can be seen in Table 7, there was a significant correlation between patient self-report and SO ratings for all measures. As might be expected, agreement was higher for observable behaviors, such as those rated using the CIQ, and lower for internal problem-solving processes, such as those rated using the PSQ, Clear Thinking subscale.

2.2.4. Correlations of problem-solving inventories with neuropsychological measures

In an exploratory analysis, relationships between problem-solving inventories and neuropsychological measures of attention, memory, and reasoning were examined for three information sources (TBI patients, their SOs, and healthy controls). Although the number of significant correlations did not exceed that expected by chance, the pattern of correlations suggests directions for future research. For illustration purposes, only significant correlations involving the PSI are reported below.

2.2.4.1. Attention. For both patient and SO reports, PSI scores were significantly related to FAS scores. That is, there was a significant relationship between TBI patients' self-reported problem solving (PSI scores) and FAS scores, $r(58) = -.30$, $P < .02$; and a significant relationship between SO ratings of patient problem solving (SO-PSI scores) and patient FAS scores, $r(48) = -.32$, $P < .02$. For both patient and SO reports, PSI scores also were significantly related to patient Will-Temperament Scale, Fast scores, $r(58) = .26$, $P < .05$; $r(49) = .34$, $P < .02$, respectively. For SO ratings only, PSI scores also were related to patient Stroop scores, $r(47) = -.31$, $P < .03$. For patient self-report only, PSI scores also were related to patient Visual Cancellation, Error scores, $r(58) = .27$, $P < .04$. Thus, for both patient self-report and SO ratings, there was a pattern of relationships between problem-solving inventory scores and patient performance on timed attention tasks.

2.2.4.2. Memory and reasoning. For SO ratings only, PSI scores were related to all four of the patients' memory scores (WMS-III, immediate and delayed Verbal and Visual Memory), $r(49) = -.32$, $P < .03$; $r(49) = -.32$, $P < .03$; $r(49) = -.31$, $P < .03$; $r(49) = -.36$, $P < .01$, respectively. For both the TBI and comparison groups' self-report, there were no significant relationships between PSI scores and any objective measures of memory or reasoning.

2.3. Discussion

Four types of information were obtained about the nature of problem-solving deficits in higher level outpatients with TBI: (a) the independence of three problem-solving assessment methods (i.e., an executive-function test, self-report inventories, and roleplayed scenarios) was consistent for TBI patients, their SOs, and healthy controls, (b) SO ratings of patient psychosocial functioning were consistent with patients' self-reported problem solving, (c) there was significant agreement between TBI patients and their SOs for all problem-solving and psychosocial inventories (d) for both patient self-report and SO ratings, there was a pattern of relationships between PSI scores and performance on measures of attention involving processing speed.

2.3.1. Validity of self-report data in persons with TBI

Given issues of minimization and exaggeration of deficits following brain injury (Zasler & Martelli, 2003), the accurate assessment of deficits in individuals with TBI poses a challenge.

On the one hand, impaired awareness may result in an under-reporting of symptoms (Prigatano, 1991). On the other hand, external incentives such as compensation may result in a bias toward magnification of problems (Binder & Willis, 1991; Miller & Donders, 2001). In the present study, individuals in the TBI group were required to meet minimum “basic skill” criteria (described above), which included a relatively high awareness of strengths and limitations, in comparison to other TBI outpatients. This select group demonstrated awareness of difficulties as indicated by their self-report of problems and symptoms; their perceptions were consistent with reports by SOs.

In terms of exaggeration of deficits, the TBI group performed within normal limits on measures of memory, reasoning, and executive function. In addition, after participating in treatment for problem-solving deficits, these patients self-reported improvements in problem solving, while those in a comparison treatment did not (see Rath, Simon, et al., 2003). Although malingering was not assessed directly, such findings suggest that participants were not deliberately magnifying symptoms.

2.3.2. Independence of assessment methods

Problem-solving inventories were related to each other, but were not related to an executive function measure or performance on roleplayed scenarios. For both the TBI and comparison groups, there was virtually no concordance between three methods for assessing what typically is treated as a unitary construct. Such a disconnect between self-report and performance measures has been observed in other neurological disorders. For example, in contrast to healthy controls, persons with multiple sclerosis reported increased physical and mental fatigue following cognitive activity, despite objective performance on grip strength, learning, and vigilance that was unchanged from baseline (Paul, Beatty, Schneider, Blanco, & Homes, 1998). Several explanations for such findings can be considered:

1. Self-reported characteristics are essentially unrelated to conceptually similar constructs measured by performance tests, even in individuals without brain injury (Meyer et al., 2001). Researchers (e.g., Heppner, 1988; Ronan, Colavito, & Hammontree, 1993) consistently have found no significant relationship between problem-solving inventories and other measurement methods in a variety of uninjured samples. The current discrepancy between performance measures and self-report inventories is consistent with the complex nature of problem-solving and past research involving uninjured individuals. Campbell and Fiske (1959) noted that such findings can point to inherent complexities in the construct under investigation and suggested that assessment include a variety of measurement methods.
2. Perceived problem-solving difficulties may be more related to tests of processing speed than to tests of thinking. Similarly, it has been reported that measures of cognitive interference such as the Stroop are more sensitive than memory tests to reports of post-concussive symptoms following mild head injury (Bohnen, Twijnstra, & Jolles, 1992).
3. The findings are consistent with the observation that, over time, psychosocial deficits tend to overshadow neuropsychological indicators of brain damage in mild TBI (Kay, 1993; Paniak et al., 2002). In the current sample, many of the residual problem-solving deficits appear to be in the domain of problem orientation (e.g., impaired emotional

self-regulation skills, low self-confidence, depression, anxiety, and anger-management problems). Such deficits may occur independently of sometimes elusive deficits in more purely cognitive skills.

3. Study III

In Study I, within the limitations of the assessment battery, normal-range scores on measures of memory, reasoning, and executive functioning were inconsistent with the level of functional impairment experienced by the TBI group. For example, using WCST Perseverative Responses, only 49% of the TBI group fell below the median score of the comparison group. In contrast, using the PSQ and PSI, 86 and 72% of participants with TBI, respectively, fell below the median scores of uninjured participants. Similarly, using SO ratings on the PSQ and PSI, 64 and 69% of the TBI group, respectively, fell below the median scores of the comparison group. The objective in the current analysis was to determine a combination of measures that maximally discriminates between higher level TBI outpatients and uninjured persons.

3.1. Method

3.1.1. Subjects/measures/procedure

Data from Studies I and II were re-examined. In addition, PCL Cognitive, Affective, and Physical Experience scales, PSI subscales, and PSQ total scores were used.

3.2. Results

With group membership (TBI vs. comparison group) defining the dependent variable, a logistic regression model ($n = 85$) was developed using measures from the test battery, which were selected by virtue of their predictive accuracy, ratio of correct to false predictions, and variance explained. The final model consisted of the PCL Cognitive Experience scale and two PSI subscales. The overall predictive accuracy of this model was 93% (correct prediction of individuals with TBI was 94%; correct prediction of comparison subjects was 92%), with a ratio of correct to false predictions of 13:1. The model was cross-validated on a representative sample ($n = 19$), with a predictive accuracy of 95%. The ratio of correct to false classifications was 18:1.

3.3. Discussion

The current findings suggest that normal-range performance on WCST Perseverative Responses does not rule out problem-solving deficits, but rather, may reflect challenges in the assessment of such deficits in well-educated, higher level outpatients with TBI. The combination of the PCL Cognitive Experience scale and two PSI subscales discriminates between healthy controls and higher level TBI outpatients, even when scores on typically used neuropsychological measures such as the WCST (see Rabin, 2001/2002) are in the normal range. Such findings suggest the importance of addressing brain-injured persons' confidence in their ability to solve problems; a focus on objective test data alone may be too narrow (cf. Meyer et al., 2001; Montgomery et al., 1999).

4. General discussion

Higher level outpatients with TBI performed with no significant differences from healthy controls on 10 out of 13 neuropsychological measures, as well as on ratings of roleplayed scenarios, yet reported a variety of post-concussive complaints and psychosocial deficits. The only significant between-group differences on neuropsychological measures involved timed attention tasks, which were sensitive with medium to large ESs. The most sensitive measures, with large between-group ESs, were community integration, symptom complaints, self-esteem, and problem-solving self-appraisal. Using a logistic regression model, it was determined that a combination of self-report inventories, including problem-solving, can accurately discriminate between healthy controls and TBI outpatients, even when scores on typically used measures of memory, reasoning, and executive function are in the normal range.

Two lines of evidence point to a relationship between processing speed and self-reported problem solving: (a) timed attention tasks, along with problem-solving and psychosocial inventories, were the only measures that distinguished between the TBI and comparison groups, and (b) there was a theoretically meaningful pattern of correlations between problem-solving inventory scores and timed attention tasks. Such findings are consistent with the work of Fasotti, Kovacs, Eling, and Brouwer (2000), who argued that due to deficits in speed-of-information processing, persons with brain injury experience “information overload” in daily tasks. Given the probable subjective experience of this overload, it would be natural for individuals with slowed processing to self-report difficulties in problem solving and an array of complaints including low self-esteem, limited community integration and participation, and mood disturbances.

4.1. Limitations

Reliance on subjective complaints and self-reported problem solving is a limitation of the present study. Subjective complaints may be prone to bias (Zasler & Martelli, 2003), with persons in distress tending to complain beyond the scope of their actual deficits (cf. Seel et al., 2003). However, individuals who present for outpatient cognitive rehabilitation tend be those in distress (cf. Hibbard et al., 1998; Kreutzer et al., 2001; Williams & Evans, 2003). In the present study, between-group differences (TBI vs. control) in performance on timed attention tasks, self-reported problem solving, and post-concussive complaints remained significant after covarying for level of depression. In addition, the current findings suggested a relationship between subjective complaints and objective deficits in processing speed. Nevertheless, future research should control for the effects of distress (e.g., post-traumatic stress, anxiety, and other mood disorders) on subjective complaints.

Omission of data about the litigation status of participants limits the present study. As noted by Babin and Gross (2002), individuals in litigation have been found to perform with (a) questionable motivation, (b) less consistency on cognitive tests, and (c) patterns of test scores that do not occur in non-litigating persons. Indeed, Trueblood (1994) found that on measures of memory and cognition, malingerers tended to score within the same range as those with documented brain injuries. In the present study, participants with TBI performed within normal limits on all administered measures of memory, reasoning, and executive function, and they self-reported improvements in problem-solving after receiving treatment. In addition, patterns of test-score correlations for the TBI group were consistent with those for healthy controls. Nonetheless, future research should incorporate information about litigation status and include malingering measures for purposes of exclusion.

Reliance on WCST Perseverative Responses limits any general statements that can be made about executive function. A broader range of tests might well have proven more sensitive to deficits. Burgess et al. (1998) found that self-ratings of executive functioning suggested several independent factors and that objective tests loaded differentially on the factors. Indeed, the WCST Perseveration score loaded on an "executive memory" factor, while the FAS loaded on "inhibition." Future research should incorporate more focused assessments of executive function.

The present sample is not representative of younger, predominately male, moderate to severe TBI samples. Despite a range of severity of injury, the current sample was relatively high functioning, with age and gender characteristics consistent with those previously reported for mild TBI samples (e.g., Donders et al., 2001; Paniak et al., 2000). Whereas most individuals with mild TBI experience resolution of post-concussive symptoms within 3 months (Dikmen, McLean, & Temkin, 1986; Levin, Eisenberg, & Benton, 1989), 10–15% of such individuals experience persistent deficits and impairments (Alexander, 1995; Rutherford, Merrett, & McDonald, 1979). Although the current findings may not be generalizable to persons with more severe injuries, they can be expected to be applicable to the 10–15% of individuals with mild TBI who experience persistent functional impairments.

4.2. *Construct of problem solving*

The differential utility of neuropsychological tests, roleplayed scenarios, and problem-solving inventories in the current studies is consistent with intrinsic differences in the assessment methods. Neuropsychological tests, such as the WCST, focus on the cognitive infrastructure of problem solving, but do not follow a template for the steps of problem solving described by clinical neuropsychologists (e.g., Goldstein & Levin, 1987; Lezak, 1995; Luria, 1963). Roleplayed scenarios, such as the PSRPT, follow a template similar to that described by Lezak (1995; see above), but do not directly assess problem orientation. In contrast, problem-solving inventories such as the PSI and PSQ emphasize problem orientation, affective/attitudinal/motivational factors not formally addressed in other assessment approaches. Because neuropsychological tests and roleplayed scenarios do not formally assess such "epi-cognitive" factors, they may be insufficient to fully evaluate this domain.

As elucidated by D'Zurilla and Nezu (2001), problem-orientation processes include (a) *problem perception* (recognizing problems as they occur, rather than avoiding, ignoring, or denying them), (b) *problem attribution* (accepting problems as normal and inevitable, rather than due to personal deficiencies), (c) *problem appraisal* (appraising problems as challenges, rather than threatening or harmful), (d) *perceived control* (belief that one is capable of solving problems and implementing effective solutions), and (e) *time/effort commitment* (ability to accurately estimate the time that it will take to solve a problem and willingness to devote the required time and effort).

Just as logical thinking or reasoning can be thought of as the infrastructure underlying problem-solving skills (Goldstein & Levin, 1987), emotional self-regulation can be thought of as the infrastructure underlying each of the problem-orientation processes. Although problem-orientation deficits can interfere with implementation of problem-solving skills even in uninjured persons with intact emotional self-regulatory resources (Nezu & Perri, 1989), persons with TBI may be especially vulnerable to such interference (cf. Fordyce, Roueche, & Prigatano, 1983; Tate, 1999). The current findings suggest that such deficits may be indirectly related to processing speed, rather than directly related to objective cognitive measures.

4.3. Implications for practice

Going beyond cognitive skills, problem solving involves regulation of cognitive, affective, and behavioral responses. The results suggest a need to broaden clinical neuropsychology's conceptualization of problem solving to incorporate factors related to problem orientation. It may be productive to supplement objective test scores with data from sources such as self-report inventories, especially in higher level outpatient settings. From an intervention standpoint, the virtue of problem-solving inventories is that they elicit the individual's acknowledgment of difficulties within a model that provides a framework for guiding remedial efforts.

Fasotti et al. (2000) suggested that neuropsychological remediation should reduce information overload by providing templates for cognitive structure. An alternative approach might argue that information overload due to slowed processing may be experienced as emotionally overwhelming or stressful, via flooding or numbness. Such emotional overflow might disrupt focus on the target task and inhibit or impede problem solving. A therapeutic approach would be to improve emotional self-regulation and address problem-orientation factors before engaging in remediation of problem-solving skills per se (see Rath, Simon, et al., 2003).

Neuropsychological rehabilitation that incorporates problem orientation would include (a) identifying and counteracting impediments (e.g., emotional over-reactions, cognitive distortions, misattributions) to effective use of problem-solving skills, (b) facilitating the individual's motivation to apply problem-solving skills to problematic situations, and (c) teaching the person to feel self-efficacious in so doing (see D'Zurilla & Nezu, 2001). Treatment gains in the cognitive-template approach proposed by Fasotti et al. (2000) appear to be confined to cognitive measures. Our findings suggest that an alternative therapeutic and assessment approach, incorporating both cognitive and problem-orientation factors, might yield improvements in both cognitive and psychosocial measures.

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