Fostering hope: The role of hope in treatment methods for adults with traumatic brain injury

Rebecca Christine Wilbur
Pacific University
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Abstract

[Introduction]

Approximately 1,400,000 people sustain traumatic brain injury (TBI) in the United States each year (Langlois, Rutland-Brown, & Wald, 2006). Of these, 1.1 million will be treated for their injuries and released, 50,000 will die, and 235,000 will require hospitalization. Additionally, the rise of war veterans who sustain brain injuries is increasing (Defense and Veterans Brain Injury Center, 2005). According to recent TBI screenings, the number of active military personnel who have sustained a brain injury has risen far beyond the usual 14-20%. Other populations at high risk for TBI include children from infancy to four years old and adults 75 years of age and older (Langlois et al., 2006). Falls are the leading cause of brain injury across all age groups and levels of injury severity, accounting for 28% of the annual number of TBIs in the United States, with motor vehicle collisions accounting for an additional 20%. The annual cost of direct medical care and loss of productivity as a result of TBI in the United States is estimated at 60 billion dollars per year (Finkelstein, Corso, Miller, & Associates, 2006).

Severe to moderate TBI frequently leads to long-term deficits, involving changes in the physical, emotional, behavioral, cognitive, occupational, social, and familial functioning of survivors (Draper, Ponsford, & Schonberger, 2007; Roebuck-Spencer & Sherer, 2008). Physical effects of TBI may include weakness or spasticity in one or more parts of the body, difficulties with balance, breathing, swallowing, damage to parts of vision, fatigue, sleep disturbance, incontinence, and difficulty controlling body movements (Murphy & Carmine, 2012; World Health Organization [WHO], 2004). Emotional and behavioral effects often include irritability, lability, difficulty controlling one's anger, depression, anxiety, agitation or belligerence, and destructive behavior (Babin, 2003; Draper et al., 2007; Thurman, Alverson, Dunn, Guerrero, & Sniezek, 1999; WHO, 2004). Additionally, persons with a history of moderate to severe TBI often experience significant impairment in their cognitive abilities, which frequently interferes with work performance and may lead to job loss (Ylvisaker, Todis, & Glang, 2001). Additionally, persons with TBI may experience difficulty in making or understanding speech, (WHO, 2004). Due to deficits in planning and organization as well as motor impairments, many TBI survivors also experience difficulties with basic decision making, driving, maintaining financial independence, and living independently (Mateer & Sira, 2006; Mazaux & Richer, 1998). As a result of these changes and the impact across multiple domains of functioning, TBI survivors frequently experience problems in coping, lowered quality of life, and difficulty maintaining strong social connections and employment.

Rehabilitative interventions to address the functional, cognitive, and emotional sequelae of brain injury are provided by professionals in occupational therapy, rehabilitation nursing, physical therapy, speech therapy, psychology, and therapeutic recreation (Defense and Veterans Brain Injury Center, 2005; Draper et al., 2007; Mateer, & Sira, 2006; Pickelsimer, Selassie, Gu, & Langlois, 2006; Tomberg, Toomela, Ennok, & Tikk, 2006). However, even after rehabilitation treatments, many survivors continue to experience debilitating symptoms (Draper et al., 2007; Lee, LoGalbo, Banos & Novack, 2004; Mazaux & Richer, 1998).

Many studies have examined the long term effects of TBI and have concluded that advances in rehabilitation are needed to improve the lives of persons living with disabling effects of TBI (Ciceroni, 2004; Dickmen, Machamer, Powell, & Temkin, 2003; Dickmen, Machamen, Temkin, & Mclean, 1990; Draper, et al., 2007; Mazaux & Richer, 1998). These studies measured lasting effects of brain injury and emphasized a need to develop and improve treatments to improve the quality of life for survivors of brain injury and help alleviate residual impairments. Additionally, there is support for the idea that patients with acquired brain injuries are capable of setting self-identified goals, and this should be used to direct client-
centered treatment practices (Turner, Ownsworth, Turpin, Fleming, & Griffin, 2008). Further, there is some evidence that persons with acquired injuries who are able to maintain high levels of goal-stability and motivation show significantly lower levels of depression and greater well-being than those who do not (Elliott, Uswatte, Lewis, & Palmatier, 2000; Elliott, Witty, Herrick, & Hoffman, 1991; Jackson, Taylor, Palmatier, Elliott, & Elliott, 1998). An initial review of the literature did not provide any manualized treatments to address lowered quality of life in persons with TBI, which include but are not limited to community integration, occupational performance, and subjective well-being (Cicerone, 2004; Cicerone & Azulay, 2007; Londos et al., 2008). However, there is support that a goal-oriented manualized treatment could improve quality of life for persons with TBI and others with mild cognitive impairments (Londos, et al., 2008). Hope, as operationally defined by C.R. Snyder (Snyder, 2000), is a goal-oriented cognitive process that may be used in problem solving to improve daily functioning. Five studies provide preliminary evidence suggesting that higher levels of hope and goal-oriented thinking result in significantly improved outcomes in populations with acquired injuries including brain injuries, spinal cord injuries, stroke, and visual impairments (Elliott, et al., 2000; Elliott, et al., 1991; Gum, Snyder & Duncan, 2006; Jackson, et al., 1998; Webb & Glueckauf, 1994). Additionally, there is some evidence to suggest that hope as a goal-oriented treatment may significantly improve treatment outcomes by reducing depression, maximizing cognitive and physical abilities, increasing treatment participation, and increasing personal goal attainment in brain injured patients (Gum, et al., 2006; Webb & Glueckauf, 1994, Wilbur & Parenté, 2008). The purpose of this study was to test a new manualized hope-based treatment for persons with TBI to determine if hope treatment significantly improves daily functioning over wait-list controls.

First, a general overview of the constructs and structure involved in hope and other goal-related theories will be provided in order to compare Snyder’s hope theory (Snyder, 2000) to other goal-oriented theories. Secondly, a general overview of the constructs in Snyder’s hope theory will be provided. Finally, a critical analysis of previous studies using hope and goals as a treatment modality for TBI will be reviewed.

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>iv</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>v</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Hope Theory and Related Constructs</td>
<td>4</td>
</tr>
<tr>
<td>Definition of Hope</td>
<td>8</td>
</tr>
<tr>
<td>Pathways Thinking</td>
<td>8</td>
</tr>
<tr>
<td>Agency Thinking</td>
<td>8</td>
</tr>
<tr>
<td>Producing Hope</td>
<td>9</td>
</tr>
<tr>
<td>Goals</td>
<td>9</td>
</tr>
<tr>
<td>Hope in Treatment</td>
<td>10</td>
</tr>
<tr>
<td>Research Studies of Goal-Oriented Treatment, Hope, and Medical</td>
<td>13</td>
</tr>
<tr>
<td>Research Studies of Goal-Oriented or Hope Treatment and TBI</td>
<td>18</td>
</tr>
<tr>
<td>METHODS</td>
<td>20</td>
</tr>
<tr>
<td>Research Design</td>
<td>20</td>
</tr>
<tr>
<td>Eligibility Criteria</td>
<td>21</td>
</tr>
<tr>
<td>Participants</td>
<td>22</td>
</tr>
<tr>
<td>Procedure and Recruitment</td>
<td>23</td>
</tr>
<tr>
<td>Treatment</td>
<td>24</td>
</tr>
<tr>
<td>The Hope Scale</td>
<td>26</td>
</tr>
<tr>
<td>The Perceived Quality of Life Scale</td>
<td>27</td>
</tr>
<tr>
<td>The Center for Epidemiologic Studies Depression Scale</td>
<td>27</td>
</tr>
<tr>
<td>TABLE</td>
<td>Title</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Overlap of Related Constructs in Hope and Goal Oriented Theories</td>
</tr>
<tr>
<td>2</td>
<td>Demographics and Covariates</td>
</tr>
<tr>
<td>3</td>
<td>Hope-Based Interventions</td>
</tr>
<tr>
<td>4</td>
<td>Session Structure and Time Allotment for Hope Intervention Treatment</td>
</tr>
<tr>
<td>5</td>
<td>Pre- and Post-Test Scores for Hope and PQOL</td>
</tr>
<tr>
<td>6</td>
<td>Hope Mixed Model Results from Permutation Test (1000 Repetitions)</td>
</tr>
<tr>
<td>7</td>
<td>PQOL Mixed Model Results from Permutation Test (1000 Repetitions)</td>
</tr>
<tr>
<td>8</td>
<td>Two-Month Follow-Up Phone Screen</td>
</tr>
</tbody>
</table>
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Fostering hope: The role of hope in treatment methods for adults with traumatic brain injury

Approximately 1,400,000 people sustain traumatic brain injury (TBI) in the United States each year (Langlois, Rutland-Brown, & Wald, 2006). Of these, 1.1 million will be treated for their injuries and released, 50,000 will die, and 235,000 will require hospitalization. Additionally, the rise of war veterans who sustain brain injuries is increasing (Defense and Veterans Brain Injury Center, 2005). According to recent TBI screenings, the number of active military personnel who have sustained a brain injury has risen far beyond the usual 14-20%. Other populations at high risk for TBI include children from infancy to four years old and adults 75 years of age and older (Langlois et al., 2006). Falls are the leading cause of brain injury across all age groups and levels of injury severity, accounting for 28% of the annual number of TBIs in the United States, with motor vehicle collisions accounting for an additional 20%. The annual cost of direct medical care and loss of productivity as a result of TBI in the United States is estimated at 60 billion dollars per year (Finkelstein, Corso, Miller, & Associates, 2006).

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Running head: HOPE AND TBI

First, a general overview of the constructs and structure involved in hope and other goal-related theories will be provided in order to compare Snyder’s hope theory (Snyder, 2000) to other goal-oriented theories. Secondly, a general overview of the constructs in Snyder’s hope theory will be provided. Finally, a critical analysis of previous studies using hope and goals as a treatment modality for TBI will be reviewed.

**Hope Theory and Related Constructs**

The term ‘hope’ as used by the general population is “a wish or desire accompanied by confident expectation of its fulfillment” (The American Heritage College Dictionary, 2004, p. 667). In the psychological community, lack of hope has long been associated with severe mental illnesses including depression and schizophrenia (Beck, Brown, & Steer, 1998; Beck, Weissman, Lester, & Trexler, 1974). Hopelessness has been found to be highly related to suicidal ideation, coping, and prognosis for outcome following psychiatric or psychological treatment (Cutcliffe, 2002; Kuyken, 2004; Vincent, Boddana, & MacLeod, 2004).

Many theories about hope have developed over the years. Perhaps one of the earliest and most recognizable hope constructs was developed by Aaron T. Beck (Beck et al., 1974). Beck and colleagues developed a theory about hopelessness based on a large body of research which demonstrated that hopelessness was associated with numerous psychological dimensions, including type of disorder, somatization and, suicidality. Beck et al. proposed that hopelessness is an index of a person’s negative expectancies. These negative expectancies reflect the level of pessimism that persons have about their future. Beck and colleagues also developed a questionnaire called the Beck Hopelessness Scale to measure this construct. More recently, C.R. Snyder developed a hope theory that incorporates a person’s perceptions not about negative
expectancies, but rather about the likelihood of attaining future goals (Snyder, 1995; Snyder, 2000).

Goal attainment and other constructs similar to Snyder’s hope theory, specifically goal orientation and goal attainment, have also developed in the psychological literature (Bandura, 1977; Rand, 2009). Albert Bandura (1977) developed a theory about self-efficacy and argued that there is a relationship between the degree of change in behavior when working towards goal attainment and doubt about one’s ability to achieve a goal, which he called “self-evaluative reaction(s),” (Bandura, 1977, pp. 193). These self-evaluative reactions have a negative impact on the likelihood of goal-oriented behavior. Scheier and Carver proposed a goal-oriented theory of optimism based on the idea that goals vary in value and expectancy (Rand, 2009). Like Bandura, Scheier and Carver found that the level of one’s doubt or certainty about achieving a goal was directly related to goal attainment behavior (Rand, 2009).

Furthermore, many hope and goal-related theories emphasize relationships between positive and negative self-esteem and goal-directed behavior. The essential idea is that self-esteem is an assessment of one’s level of personal self worth and the accompanying desire to protect one’s self worth, leading to self-regulating behaviors (Crocker, Brook, Niiya, & Villacorta, 2006). In turn, the presence or absence of self-regulating behaviors influences whether or not one produces goal-oriented behaviors to attain personal goals (Crocker et al., 2006). Additionally, M.E. Seligman proposed the optimistic attributional style theory, which suggested that how one attributes negative consequences, whether to global or specific factors, leads to goal-blocked (learned helplessness) or non goal-blocked behavior (Alloy, Peterson, Abramson & Seligman, 1984; Anderson, Horowitz, & French, 1983).
Lastly, there is problem-solving theory, which emphasizes the strategies and processes used to overcome obstacles while working towards a solution (D’Zurilla, Chang, Nottingham & Faccini, 1998; Heppner, 2008). In problem-solving theory, an individual’s ingenuity is of primary importance in overcoming obstacles (D’Zurilla et al., 1998). A related problem-solving theory developed by Gary Latham (2008) generally is used in occupational settings. Latham’s theory states that one’s individual ability affects goal attainment in two ways. First is how effectively an individual executes learned goal-directed behavior. The second is how well one can learn the necessary skills to attain a particular goal. Latham also theorized that there is a positive relationship between perceived goal attainment difficulty and goal-directed behavior or performance (Latham et al., 2008). An overview of the constructs and theories relating to hope and goal orientation are shown in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Theory</th>
<th>Constructs</th>
<th>Goal Attainment</th>
<th>Goal Value/Expectancy</th>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The hope construct utilized in this study is the goal-oriented hope theory developed by C.R. Snyder, which defines hope as the result of two interacting goal-oriented cognitive processes called agency and pathways (Snyder, 2000). Snyder’s hope theory differs from the other previously mentioned hope and goal-oriented theories in several ways. First and most importantly, the construct of hope and its components are measurably and concretely defined by their operational definitions. Thus, it is believed that the ensuing research findings will be more easily understood and applied to clinical populations. Secondly, Snyder’s hope theory gives equal emphasis to each component of hope, making it possible to measure and attribute the precise influences of agency and pathways on goal-directed behavior. Third, having an equal emphasis allows for measurable changes in hope to move in either a positive or negative direction, as opposed to previously reviewed theories that emphasized doubt and goal blockage (Alloy et al., 1984; Anderson, et al., 1984; Bandura, 1977; Beck et al., 1974; Crocker, et al., 2006; D’Zurilla, et al., 1998; Heppner, 2008; Lantham et al., 2008; Rand, 2009). These differences allow Snyder’s hope theory a wider range of measurability and more comprehensive analyses of how higher hope affects goal attainment and well-being (Snyder, 2000). From a clinical perspective, the previously reviewed theories emphasized the dangers of hopelessness, doubt, and goal-blockage (Bandura, 1977; Beck, 1974; Rand, 2009), but Snyder’s hope theory provides an avenue to direct clients towards higher hope, with the potential benefits of unblocking goals and increasing coping abilities (Snyder, 2000). Finally, Snyder’s hope theory offers a way to measure changes in hope following therapeutic intervention, thus providing researchers a tool to apply hope interventions across multiple populations (Irving, et al., 2004; Gum, Snyder, & Duncan, 2006; Snyder, 2000).
Definition of Hope

In order to study hope, one must begin with a sound operational definition. Snyder stated that “hope is the sum of perceived capabilities to produce routes to desired goals, along with the perceived motivation to use those routes,” (Snyder, 2000; p. 8). Snyder asserted that the positive feelings associated with hope are actually the result of the two component cognitive processes. Hope therefore is not an emotion per se, but rather the byproduct of these two cognitive processes as they occur simultaneously. Hope, however, is associated with positive feelings such as optimism, self-efficacy, and the expectation of good things to come (Snyder et al., 1991). As operationally defined, these two cognitive processes involve an individual’s perception of his or her ability to enumerate avenues towards accomplishing goals, (pathways thinking; Snyder, 2000) and an individual’s perception of how likely or motivated he or she is to pursue one or more of these plans (agency thinking). Each of these processes will be described in more detail below.

Pathways thinking. Pathways thinking is the cognitive process that an individual engages in to map out the necessary course to reach a goal (Irving et al., 2004; Snyder, 1995; Snyder, 2000). According to Snyder, the more avenues a person can think of to reach a goal, the stronger his or her pathways thinking becomes, which in turn increases his or her level of hope. Pathways thinking also serves to maintain hope when the original path to a goal is blocked, and therefore hope encompasses the mental flexibility necessary to think of new ways to reach one’s goal.

Agency thinking. Agency thinking is a cognitive process that involves an individual’s perception of his or her probability of goal attainment, specifically his or her motivation to
engage in the necessary plans to reach a goal (Irving, et al., 2004; Snyder, 1995; Snyder, 2000). In short, agency thinking is the motivation and willpower to engage in goal-directed behavior.

**Producing hope.** Developing a plan to reach one’s goal is not enough to produce hope, it is only when the steps to the goal appear realistic and the individual feels motivated to work towards the goal that hope is produced (Snyder, 2000). Thus pathways and agency thinking influence each other and must be engaged in tandem in order to produce hope and observable goal-directed behavior. An individual who is able both to think of many possible routes to achieve his or her goal and who is highly motivated to use one of these routes is considered to be a person with high hope. Furthermore, having high hope is associated with increased engagement in thinking encouraging thoughts regarding successful goal achievement.

**Goals.** Goal orientation is central to hope theory because without the need for goal attainment, there is no reason to engage in the cognitive processes involved in hope (Snyder, 2000). According to Snyder, as hope increases, so does goal-directed behavior that results from pathways and agency thinking. Since almost every act of human behavior is goal-oriented, hope and its cognitive processes are necessary components of nearly every aspect of human behavior. However, Snyder also points out that it is also important to assess goal attainability. Goals that are too difficult will diminish pathways and agency thinking, which will lead to increased feelings of hopelessness. Conversely, goals that are too easy to obtain will require little pathways and agency thinking, and therefore engaging in hope thinking will not be necessary. Therefore, the degree to which a goal is both realistic and attainable will directly affect an individual’s level of hope.

Snyder (2000) argued that, since goals are inherent in all planned behavior and since goals are the focus of mental action and subsequent actions, goals “anchor hope theory” (p. 13).
Furthermore, since goals are a concrete end product, hope theory can be applied using clearly defined parameters: agency and pathways. Goals also are central to what makes hope readily applicable to treatment outcomes. By teaching patients to generalize the constructs and applications of hope to their plans for goal achievement or towards blocked goals, it is believed that patients can better understand how to approach their goals and ultimately discover previously unexamined methods of goal attainment (Snyder et al., 2000; Irving et al. 2004.).

**Hope in Treatment**

Several models have been developed to apply hope theory and its principles to newly developed treatment programs for patients with depression, bereavement, anxiety, post-traumatic stress disorder, personality disorders, and eating disorders in children, elderly populations, and patients with acquired immunodeficiency syndrome (AIDS) and breast cancer (Barnett & Weston, 2008; Michael & Snyder, 2005; Moulden & Marshall, 2005; Snyder, 2005; Snyder, 2000; Stanton, Danoff-Burg & Huggins, 2002). While these models provide a framework for research into the application of hope treatment in diverse populations, few empirical studies to date have explored the efficacy of these models. The few empirical studies that have examined the efficacy of hope found that hope therapy is associated with increased feelings of hope in mental health and non-clinical populations during treatment, and significantly improved participant outcomes after treatment (Cheavens, Feldman, Gum, Michael, & Snyder, 2006; Irving et al. 2004; Klausner, Clarkin, Spielman, Pupo, Abrams, Alexopoulos, 1998; Prentorius, Venter, Temane & Wissing, 2008).

Klausner and colleagues (1998) were among the first to examine the efficacy of a goal-directed treatment in a clinical sample. In a pilot study, Klausner et al. administered a newly developed manualized goal-focused group treatment to elderly adults with depression using a
pre-test post-test control group design. Klausner and fellows randomly assigned 55 elderly adults to either goal-focused group psychotherapy (GFGP) or a reminiscence therapy group (RT), and measured symptoms of depression, anxiety, level of hope (using the State Hope Scale, a 6-item measure of current goal-directed thinking developed by Snyder, et al., 1996), hopelessness (using the Beck Hopelessness Scale; Beck et al., 1974), suicidal ideation, functional status of daily living, cognitive status, and social interaction. Results were analyzed using t-tests, and the researchers found that from pre-test to post-test, participants in the GFGP group reported less depressive symptoms, lower levels of anxiety, higher levels of hope, and increases in social functioning. Participants in the RT group also showed improvement in depressive symptoms and on several items measuring disability, but not on any other variable. Additionally, the improvements that were seen were not as large as those seen in the GFGP group. Overall these results indicate that a manualized goal-based treatment may be effective in reducing depression and improving quality of life in elderly adults (Klausner, et al., 1998; Klausner, Snyder, & Cheavens, 2000).

Irving and colleagues (2004) examined individual differences in level of hope at different stages of psychotherapy. Irving et al. measured level of hope using the State Hope Scale (Snyder et al., 1996), regulation of emotional distress, adaptive coping, subjective well being, and symptom distress in 98 participants at an outpatient community mental health center. The participants were separated into two groups, a pre-therapy orientation group that received five weeks of basic motivational concepts related to hope, called “didactic hope lessons,” and a five-week wait list control group (Irving et al., 2004, p. 429). Individual differences in hope and treatment outcomes were measured at intake, at the first therapy session, and at weeks 3, 6, and 11. The results were analyzed and Irving et al. found that, for all participants, higher hope at
baseline was associated with superior coping, superior ability to regulate emotional distress, greater well-being, and fewer reported symptoms across the entire course of treatment. They also found that higher levels of agency thinking at the beginning phases of therapy were associated with positive changes in satisfaction with life in the early stages of therapy. Additionally, a higher level of pathways thinking later in therapy was associated with significant improvements in satisfaction with life by the last session of therapy. Unfortunately, Irving et al. were unable to report group differences between the pre-therapy orientation group and the wait-list control group due to attrition. Overall, these results suggest an association between increases in hope, agency and pathways thinking and increases in well-being during and after psychotherapy treatment.

Cheavens, Feldman, Gum, Michael, and Snyder (2006) investigated another newly developed manualized hope therapy treatment in a community sample of 32 adults. In a pre-test post-test control group design, Cheavens and fellows measured level of hope, agency thinking, pathways thinking, symptoms of anxiety and depression, life meaning, and self-esteem using a two-way ANOVA, time-point interactions, and post hoc tests using hierarchical multiple regression. The treatment protocol was based on theoretical research about hope as put forth by C.R. Snyder (1994) and others. The treatment consisted of 8 two-hour sessions. Each session had four segments and included review of the previous week’s content, psychoeducation, applications of the current hope lesson to daily life, and a homework assignment. Results indicated an increase in agency thinking, life meaning, and self-esteem, as well a decrease in symptoms of anxiety for participants involved in the hope treatment group over wait-list controls. However, overall level of hope, pathways thinking, and depressive symptoms from pre-test to post-test was not significantly different between the treatment group and control
Running head: HOPE AND TBI

group. Post hoc tests were then performed using hierarchical multiple regression, and this indicated that changes in Hope Scale scores were associated with decreases in symptoms of anxiety and depression from pre-test to post-test for participants in the treatment group. Further, this improvement was shown to be greater in the treatment group than in the control group. Overall, the authors suggest that these results indicate that hope therapy may increase psychological strengths and reduce psychopathological symptoms.

Prentorius and colleagues (2008) also evaluated the effectiveness of a hope-based program in a non-clinical sample of adults. Prentorius et al. measured the relationship between hope and several factors related to general psychological well-being, including personal expectations for the future, coherence (described as a sense of available resources and coping ability), and satisfaction with life. Three groups were examined (one treatment group and two control groups), each consisting of 8 participants. The experimental treatment group participated in a 12-hour hope enhancement program and, of the two control groups, one received no intervention and the other formed a “chat” group. Data were analyzed using the Wilcoxon rank sum test. The results indicated that only the hope treatment group showed significant increases in overall hope, as well as positive increases in personal expectations for the future and coherence. There was no significant increase in satisfaction with life. Prentorius et al. suggested that the results indicate that hope theory may inform the development of effective treatments, and hope may be protective against the development of psychopathology.

Research Studies of Goal-Oriented Treatment, Hope, and Medical Injury or Disease

As previously mentioned, goals are an essential part of hope theory and are considered an “anchor” for agency and pathways thinking, (Snyder, 2000). The application of hope theory, specifically increasing agency and pathways thinking in the context of goal-directed behavior,
may be used as a protective factor and within a treatment program has also been studied in patients with spinal cord injury, visual impairment, stroke, and mild cognitive impairment (Elliott et al., 1991; Gum et al., 2006; Jackson et al. 1998; Londos et al., 2008). In particular, there is some evidence that hope is important for persons with acquired injuries because persons who maintain high hope post-injury evidence higher levels of overall functioning (Gum et al., 2006; Jackson et al., 1998). These higher levels of overall functioning involve lower levels of depression, higher levels of daily functioning, a greater number of functional coping styles and, when combined with good communication abilities, higher levels of participation in therapeutic activities (Elliot et al., 1991; Gum, et al., 2006; Jackson et al. 1998). Several other studies have examined hope as a goal-oriented treatment modality and the results suggest that goal-oriented treatments may be an effective means of improving motivation in the pursuit of goals, goal attainment, and patient ratings of treatment outcomes in patients with acquired injuries (Gum et al., 2006; Webb & Glueckauf, 1994).

Elliott and colleagues (1991) examined the influence of hope, as it relates to goal achievement and depression, in 57 patients with acquired spinal cord injuries. Participants were recruited from two university rehabilitation centers, a Veterans’ Affairs Medical Center, and an independent living facility. Length of time since injury varied significantly and was analyzed as a predictor variable. These researchers postulated that, as patients with acquired injuries progress through rehabilitation, pathways thinking will correspondingly increase. Using Pearson correlations and multiple regressions to analyze several factors, Elliott and colleagues analyzed agency and pathways thinking separately, examining the association of each with depression, overall impairment, and time post-injury. They surmised that the distinct mental processes of pathways thinking and agency thinking would have separate associations for persons with
acquired injuries because of adjustments they would need to make when navigating a new reality post-injury. According to Elliott et al. (1991) and Snyder, Irving, and Anderson (1991), pathways thinking is considered an indispensable part of the process of rehabilitation because it indicates that patients are utilizing the skills learned during rehabilitation to develop new avenues for achieving personal goals regarding daily functioning. Furthermore, high agency thinking is considered extremely important because it reflects how motivated patients are to utilize learned rehabilitation strategies. As predicted, Elliot et al. (1991) found strong negative associations between pathways thinking and levels of depression and psychosocial impairment for these patients. This study provided some insight into the benefits of using hope-based interventions for those with SCI; however, further research would be needed to examine how these may be applied to those with history of TBI.

Jackson and colleagues (1998) examined the relationship between hope, coping ability and daily functioning in 63 American military veterans with visual impairment. Participants were recruited from an inpatient rehabilitation facility and completed the study measures as part of a routine evaluation. Cause of vision loss varied significantly from damage in a part of the visual system to symptoms of a medical condition, and extent of vision loss varied as well. Jackson and colleagues used Pearson correlations and multiple regression to analyze the results and found that higher levels of hope were associated with higher levels of confident coping styles, including more effective social and proactive coping styles, greater strategies for coping with daily stress, and maintaining a positive focus. Conversely, hope levels were negatively associated with endorsement of depressive symptoms. The authors suggested that these findings provide support for the value of hope in rehabilitation outcome for persons with visual impairments. While this study did provide support for the positive effect hope can have on
recovery and daily functioning, the population involved did not include persons with history of TBI, and the research did not explain how these results may be applied to this population.

Elliott, et al., (2000) examined the relationships between goal instability, depression, acceptance of disability, independence in daily functioning, career decision making, and other factors relating to the severity and adjustment of acquired spinal cord injuries (SCI). The paper reviews four separate studies conducted by the authors and included participants with SCI at an inpatient setting, a community sample of participants with SCI, and participants with physical disabilities at inpatient and outpatient settings. Results for each study were analyzed separately and primarily used multiple regression analysis. Based on the overall findings, the researchers suggested that individuals with high goal instability are more likely to experience difficulty setting new goals and maintaining the necessary drive to achieve their goals. In turn, the authors suggested that lack of goals inhibits motivation to participate in rehabilitation programs and ultimately contributes to lower levels of life satisfaction. While this study provided empirical support for the positive effect of constructs related to hope on life satisfaction, specifically goals, again it did not include persons with history of TBI or provide support for the application of these findings with this population.

Gum and colleagues (2006) examined the relationship between hope, depression and participation in activities for 110 patients who had survived a stroke. Participants were recruited through several Kansas City healthcare facilities, were less than one month post-injury, and ranged in level of disability from no symptoms to moderate impairment. Gum et al. used Pearson correlations and multiple regression to analyze the results and found that hopeful thinking was the best predictor of depression and was negatively associated with depression. Post hoc analyses further revealed that, as hope and communication abilities increased, so did
participation in daily activities, with hope acting as a mediating factor for participation when combined with physical functioning, memory, and communication abilities. While, this study provided further support for the benefit of hope and related constructs with respect to daily functioning in the areas of physical functioning, memory, and communication abilities for those with acquired brain injury, again it did not specifically include persons with history of TBI. Further, this study did not provide recommendations for how research findings may be applied to interventions with this population.

Londos and colleagues tested the efficacy of a goal-oriented treatment program on 15 participants with mild cognitive impairment (MCI; Londos, et al., 2008, p. 178). Participants with MCI who did not meet criteria for dementia were recruited from a memory disorder clinic at the Malmö University Hospital. These researchers tested a structured goal-oriented memory strategy program to determine if the goal-oriented treatment improved quality of life, performance of activities of daily living, and cognitive functioning from pre-test to post-test and at six months follow-up. The treatment group met twice per week for 8 weeks for 2½ hours and involved learning strategies to compensate for memory problems. Each session included review of previous lessons, psychoeducation about the week’s lesson, strategies for learning new memory techniques and mnemonic strategies, in-session practice and planning, and a homework assignment. Londos et al. analyzed the data using t-tests, the Wilcoxon rank sum test, Mann-Whitney U test, and Spearman correlations. Occupational performance and quality of life significantly improved by the end of treatment. There were no significant differences in level of cognitive performance. Improvements were still present at six months follow-up with respect to occupational performance. The authors suggested that a goal-oriented rehabilitation program may significantly improve treatment outcomes with regard to quality of life and occupational
performance for persons with mild cognitive impairment. This study provided new support for utilizing hope-related constructs, specifically goals, in an applied setting; however, it did not include persons with history of TBI and also did not include a control group for comparison.

**Research Studies of Goal-Oriented or Hope Treatment and TBI**

Webb and Glueckauf (1994) examined a goal-oriented treatment program in 16 persons with TBI in both inpatient and outpatient settings. The researchers postulated that level of involvement in goal setting was significantly correlated with patient ratings of a favorable outcome in treatment. Outcome was based on patient ratings of progress towards attaining treatment goals. Using a two-factor ANOVA, Webb and Glueckauf measured patient ratings of goal attainment in two patient groups who were involved in an eight-week rehabilitation program. One group consisted of eight patients who were highly involved in setting their own treatment goals, and the other consisted of eight patients who had low involvement in setting their treatment goals. Webb and Glueckauf found that both patient groups made significant progress in attaining their goals; however, only patients who were highly involved in setting treatment goals still showed significant improvement towards goal-attainment at two months follow-up. Overall, Webb and Glueckauf suggested that these findings indicate positive relationships between involvement in goal-setting, motivation for change, and improvements in goal-attainment for persons with TBI. This study provided some insight into how hope-related constructs, specifically goals, may be utilized in treatment in order to improve outcomes in a population with history of TBI; however, the study did not use Snyder’s hope constructs, and additional research would be needed to examine how these findings could be consistently produced.
In a pilot study, Wilbur and Parenté (2008) analyzed the impact of hope-based treatment on different aspects of daily life for 14 persons with a history of TBI. Using the Domain Specific Hope Scale (Snyder, 2000) Wilbur and Parenté (2008) measured change in hope from pre-test to post-test with respect to pathways thinking, agency thinking, and the following life domains: social relationships, academics, romantic relationships, family life, work, and leisure activities. The hope treatment consisted of 6 weeks of 3-hour sessions. Results were analyzed with F tests, using confidence intervals. Wilbur and Parenté found that six areas of life showed significant improvement from pre-test to post-test, including social relationships, romantic relationships, work, and leisure activities, as well as agency and pathways thinking overall. The results suggest that hope-based treatment may be an effective strategy to improve certain areas of life for persons with history of TBI. However, because a control group was not used as a comparison, it is difficult to determine how much of the effect can be attributed to the hope treatment. Additional research using Snyder’s hope constructs and a control group would be necessary to fully understand the relationship between the application of hope constructs on quality of life for those with history of TBI.

In summary, prior research suggests that goal-oriented hope-based treatments have the potential to improve treatment outcome in terms of quality of life and daily functioning in persons with acquired injuries (Elliott, et al., 1991; Elliott, et al., 2000; Gum, et al., 2006; Jackson, et al., 1998; Londos et al., 2008; Webb & Glueckauf, 1994; Wilbur & Parenté, 2008). The purpose of the present study was to pilot a manualized hope-based treatment with participants with history of TBI and to examine group differences on hope and perceived quality of life from pre-test to post-test. The present study posed the following hypothesis: (a) It was hypothesized that there would be differences over time on measures of hope and quality of life.
between the control group and the hope-based treatment group, and (b) the treatment group’s improvement over time would be greater than that of the control group. In summary, we sought to determine whether there was a change over time that was different between groups, and whether the treatment group’s improvement would be greater than the control group in order to inform future research. After the therapy, participants also were asked to report on their expectations and experience of the treatment, and participant feedback was examined and collated for themes and consistencies. We were interested in whether participant feedback would also provide valuable insights to inform future directions and potential modifications of the hope-based treatment and future study design.

Method

Research Design

A pre-test post-test control group design was used to test the effects of the hope-based intervention on treatment outcome. Participants were assigned to either the hope-based treatment group (HBTG) or a wait-list control group. All treatment groups were offered the same six-week hope-based intervention at no cost. Participants in the wait-list control group were offered the no-cost hope treatment immediately after the HBTG completed the six-week hope-based intervention. Both groups completed pre-test questionnaires after having provided informed consent and before random assignment to groups. Post-test measures were administered to both groups after completion of the final treatment session for the HBTG. A two-month follow-up phone survey was administered to the treatment group to measure whether or not the treatment had lasting effects. A program evaluation was also administered to the treatment group to measure the participants’ rating of the usefulness of the treatment and handouts, and offer participants an opportunity to express their thoughts and reactions to the treatment. The two-
month follow-up phone call and program evaluation questionnaire are shown in the Appendices. Administration of the pre- and post-test measures and program evaluation, phone screen, and manualized treatment protocol was conducted by doctoral level graduate students in clinical psychology.

Eligibility Criteria

Inclusion criteria were as follows: Participants must have been at least one year post brain injury to minimize difference scores related merely to physiological processes in early recovery (Dikmen, Machamer, Temkin & McLean, 1990; Lannoo, Colardyn, Jannes & De Soete, 2001; Pagulayan, Temkin, Machamer, & Dickmen, 2006). In addition to having an acquired brain injury, participants must have met DSM-IV-TR (American Psychiatric Association, 1994) criteria for a cognitive disorder (i.e., DSM-IV: 294.10 or 294.9). In order to determine eligibility, participants were screened through use of a pre-screening questionnaire. Participants may have already received any type of rehabilitation treatment for any length of time. Participants may have been involved in other types of rehabilitation treatment concurrently, including but not limited to: psychopharmacological treatment, speech therapy, occupational rehabilitation, physical rehabilitation, and individual and group psychotherapy. Also, since comorbidity with depression is high among persons with TBI (Babin, 2003; Draper et al., 2007), participants may have presented with depression, which was measured using a depression questionnaire and analyzed as a potential factor that may differentiate between the groups at baseline. Exclusion criteria included the following: Participants may not have been less than one year post-injury. Participants may not have had a current diagnosis of any of the following mental disorders: Substance Dependence, any psychotic disorder, or Bipolar Disorder. Participants may not have had behavioral disturbance to the degree that it would interfere with
participating in a group treatment. Behavioral disturbance and severity of TBI was determined using the Mayo-Portland Adaptability Inventory-4 (MPAI-4; Lezak, & Malec, 2003) and questions regarding group participation in the prescreening questionnaire. As mentioned, all participants completed pre-screening questionnaire to determine eligibility (see Appendix A).

**Participants**

Participants were 8 traumatically brain injured adults from the ages of 18-50. The prospective sample size was determined based on previous research of similar pilot studies, as well as ethical and logistical concerns. An earlier study by Wilbur and Parenté (2008) used a preliminary version of the proposed treatment program but had several methodological limitations. This study did not use a control group, and the outcome measure used had not yet been validated for persons with TBI. Additionally, treatment in this earlier study did not follow a manualized protocol. With treatment manualization, changes were made to the original hope treatment, including consolidating the topics based on R.C. Snyder’s List of Lessons (1995) into 6 consecutive weeks, anchoring the sub-topics to be covered and discussed within each week, establishing session structure, and developing handouts for each week. Because of these changes, it was considered more ethically responsible to first use the modified treatment on a small pilot sample in order to provide justification for its use in a larger sample and to inform research methodology for future clinical trials.

**Participant Characteristics**

The study sample (n = 8) had a mean age of 26.5 (SD = 8.34, range = 19-45 years) and included 5 males and 3 females, 7 of whom identified as White and 1 who identified as being of Mixed Heritage. The mean age of the treatment group (n = 4) was 22.25 (SD = 2.75, range = 19-
25) and included 2 males and 2 females. The mean age of the control group \((n = 4)\) was 30.75 (SD = 10.34, range = 21-45) and included 3 males and 1 female. Please see Table 2 below.

Table 2. Demographics and Covariates

<table>
<thead>
<tr>
<th></th>
<th>Total Treatment Group</th>
<th>Total Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>22.5 (2.7)</td>
<td>30.75 (10.34)</td>
</tr>
<tr>
<td></td>
<td>Range: 19-25</td>
<td>Range: 21-45</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>2 Male</td>
<td>3 Male</td>
</tr>
<tr>
<td></td>
<td>2 Female</td>
<td>1 Female</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td>4 White</td>
<td>3 White</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Mixed Heritage</td>
</tr>
<tr>
<td><strong>CESD Total</strong></td>
<td>14 (4.96)</td>
<td>11.75 (8.42)</td>
</tr>
<tr>
<td></td>
<td>Range: 8-20</td>
<td>Range: 0-20</td>
</tr>
<tr>
<td><strong>Previous Treatment</strong></td>
<td>All had Previous Treatment</td>
<td>All had Previous Treatment</td>
</tr>
<tr>
<td><strong>MPAI-4 Total</strong></td>
<td>51.25 (2.06)</td>
<td>52.75 (5.73)</td>
</tr>
<tr>
<td></td>
<td>Range: 49-53</td>
<td>Range: 46-58</td>
</tr>
</tbody>
</table>

**Procedure and Recruitment**

Subsequent to approval from the Pacific University Human Research Ethics Committee, eligible participants were recruited from three community-based brain injury support groups and one supported living organization for persons with brain injury. The principle investigator attended the support groups, with written permission from the group coordinator, and provided information about the study verbally and through a study brochure. Interested persons spoke with the principle investigator after the support group concluded and set up an appointment to complete pre-screening, if desired. Those persons who were found to be eligible were invited to complete informed consent. After 8 participants had entered the study, they were randomly assigned to either the treatment or control group.
Treatment

The hope intervention consisted of a six-week course that had been manualized for this study and was modeled after Snyder’s (1995) suggestions for enhancing agency and pathways. Sessions 1, 3, and 4 combined two of Snyder’s (1995) suggestions, and sessions 2, 5, and 6 combined three. The combination of lessons was determined based on relatedness and expected difficulty level of each lesson. More difficult lessons were spread out over the six weeks in order to allow enough time in each session to fully cover each topic. Please see Table 3 for a complete listing of lessons by session and Appendix B for corresponding handouts for each week.

Each lesson in the hope-based treatment intentionally followed the same session structure (see Table 3). The purpose of having a Session Agenda was to direct participants to focus their attention on the session and to provide a general layout of what to expect. Review of Previous Lessons was included to reinforce previously learned techniques. Discussion of Successes and Challenges of applied homework from the previous session was included to bridge the techniques that were taught with the participants’ personal lives and to foster generalization. The Discussion of Successes and Challenges section also gave participants the opportunity to discuss techniques that were successful and allowed them to discuss any difficulties they had in implementing the hope techniques in their daily lives.

Table 3

<table>
<thead>
<tr>
<th>Lessons by week</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Thinking Positively</td>
<td>Self talk; Wrong strategy, not lack of talent</td>
</tr>
<tr>
<td>2 Approaching Challenges</td>
<td>Obstacles are challenges not failures; Break down the goal; Utilize laughter</td>
</tr>
</tbody>
</table>
3 Nurturing Success  Recall past successes; Cultivate inspiration
4 Support Network  Foster friendships; Identify role models
5 Your Health  Exercise; Eat properly; Rest adequately
6 Moving Forward  Re-goaling; Reward yourself; Educate yourself

Note: Lessons must be performed by the treatment administrator in this order.

Discussion of Successes and Challenges also provided the opportunity to discuss techniques that were not used, or were used incorrectly, and to help participants explore what could have been more effective or beneficial to them. Discussion of Present Lesson involved teaching participants specific hope training techniques to increase hope and goal attainment. It included definitions of the session topic and discussions of options (pathways thinking) and actions (agency thinking). Brainstorming Techniques involved helping participants learn how to apply the hope-based treatment techniques in their lives, while still allowing them to use the group study leader as a resource for suggested applications and techniques. The final focus area, Homework Assignment, involved creating individualized real-life-experiments to help participants develop specific, personalized solutions using a hope-based approach.

Table 4
Session structure and time allotment for hope intervention treatment

<table>
<thead>
<tr>
<th>Focus Area</th>
<th>Time allotted</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session Agenda</td>
<td>5 minutes</td>
<td>Redirection and orientation to treatment; Expected session layout.</td>
</tr>
<tr>
<td>Review of Previous Lesson</td>
<td>10 minutes</td>
<td>Reinforce previous techniques.</td>
</tr>
<tr>
<td>Discussion of Successes and Challenges</td>
<td>15 minutes</td>
<td>Bridge the techniques with application.</td>
</tr>
<tr>
<td>Discussion of Present Lesson</td>
<td>10 minutes</td>
<td>Definitions, Options, and Actions.</td>
</tr>
</tbody>
</table>
Brainstorming Techniques  30 minutes  Develop personal application of new techniques.
Homework Assignment  5 minutes  Create real-life experiments.

Note: focus areas must be addressed sequentially in each session; Two 5-10 minute breaks were taken during each session.

Outcome Measures

The Hope Scale. The Adult Dispositional Hope Scale (see Appendix C), also simply called The Hope Scale (Snyder et al., 1991) is a 12-item self-report measure that is rated on a 4-point Likert-type scale (1 = Definitely False to 4 = Definitely True). According to Snyder, when this scale is administered it should be titled The Goals Scale because when the word ‘hope’ was used, most people became more interested in discussing the topic than completing the measures. It was designed to measure an individual’s level of Agency Thinking, Pathways Thinking, and overall level of hope, with higher scores indicating higher levels of the constructs. Factor analysis revealed two distinct constructs: agency, which included four items (2, 9, 10, 12), and pathways, which also included four items (1, 4, 6, 8). The remaining four items are distracters and are not included in the scoring. Additional evidence of the two-component factor structure was provided by confirmatory factor analysis performed by Babyak, Snyder and Yoshinobu (1993). Test-retest reliability using Cronbach’s alpha was assessed by Snyder et al. (1991) at 3-week, 8-week, and 10-week intervals, with alphas of .83, .73, and .76-.82, respectively. Concurrent construct validity was examined and the Hope Scale found to be sufficiently correlated with several scales of similar constructs (Snyder et al., 1991; Snyder et al., 2000). Specifically, scores from the Hope Scale correlated from .50 to .60 with scores on measures of optimism (Life Orientation Test; Scheier and Carver, 1985), expectancy for goal attainment (Generalized Expectancy for Success Scale; Fibel & Hale, 1978), and self-esteem (Self-Esteem
Running head: HOPE AND TBI

The Hope Scale has been validated in non-clinical and clinical populations including participants with TBI and spinal cord injuries (Elliott et al., 1991; Gum et al., 2006; Peleg, et al., 2009, Snyder, 2000). The Hope Scale is shown in Appendix C.

The Perceived Quality of Life Scale. The Perceived Quality of Life Scale (PQOL) was developed as a self-report measure of satisfaction with life (Donald Patrick and Marion Danis, 1998). The PQOL contains 20 items with a range of scores on a Likert-type scale ranging from 0-10. Higher scores indicate higher levels of personal satisfaction with daily functioning. The PQOL yields one overall score and three subscales relating to physical, social, and cognitive health satisfaction. Internal consistency of the PQOL at its development was assessed using coefficient alpha and was reported as high at .88 (Patrick, Danis, Southerland, & Hong, 1988). Internal reliability for the PQOL total score has also been measured for TBI populations using Pearson’s correlation and was reported at .89 (Cicerone & Azulay, 2007). Divergent construct validity of the PQOL in stroke patients was assessed by comparing scores with the Sickness Impact Profile (Bergner, Bobbitt, Carter, & Gilson, 1981), with a resulting correlation of -.73 (Patrick, 2000). The PQOL is shown in Appendix D.

The Center for Epidemiologic Studies Depression Scale. The Center for Epidemiologic Studies Depression Scale (CES-D) was developed by Radloff (1977) as a measure of depressive symptoms. It contains 20 items on a Likert-type scale ranging from 0-3. High scores indicate a high frequency of multiple depressive symptoms. The CES-D yields one overall score and four subscales (Depressed Affect, Positive Affect, Somatic and Retarded Activity, and Interpersonal Concerns; McCauley, et al., 2006). The CES-D has been widely used among medical populations, including persons with stroke and acquired brain injuries. Internal consistency for the CES-D as measured by coefficient alpha has been reported at .93 among
patients with TBI (McCauley, et al., 2006). Given the high incidence of depression among patients with brain injuries (Babin, 2003; Draper et al., 2007; Shinar, 1986), the total score on the CES-D will be analyzed at baseline as a potential covariate, provided it correlates in a linear fashion with the dependent variables. The CES-D is shown in Appendix E.

The Mayo Portland Adaptability Inventory-4. The Mayo Portland Adaptability Inventory-4 (MPAI-4) (Lezak & Malec, 2003) was developed by Lezak and Malec (2008) as an outcome measure for individuals with history of acquired brain injury and to evaluate rehabilitation programs. It contains 35 items on a Likert-type scale ranging from 0-4. High scores indicate more severe problems that interfere with activities more than 78% of the time. The MPAI-4 yields one overall score and three subscales (Malec & Lezak, 2008). The MPAI-4 was developed and standardized on persons with acquired brain injuries. Rasch Person Reliability for the Self MPAI-4 were reported at .92 and Item Reliability was reported at .96 (Malec & Lezak, 2008). Internal consistency using coefficient alpha was reported to range from .76 to .83, with an average of .79 (Malec & Lezak, 2008). The total score on the MPAI-4 was used as a pre-screening instrument to determine eligibility for the study, as participants must have had a moderate to severe brain injury in order to participate and must behaviorally have been able to participate in groups. Participants with a total severity score of 60 or above were eligible, as persons in this range are highly likely to have greater needs than the structure of this group can provide. Further, participants with a range of 40 to 50 were categorized as having mildly to moderately severe disability, and 51 to 59 were categorized as having moderately to severe disability. This information was also used as a pre-screening measure and analyzed as a potential covariate, provided it correlates in a linear fashion with the dependent variables. The MPAI-4 is shown in Appendix F.
Running head: HOPE AND TBI

Statistics

Due to this pilot study’s small sample size and the use of repeated measures, a randomization permutation test using a mixed effects model was used to examine group differences and interaction effects between the groups on the outcome measures. First, preliminary descriptive analyses were run to examine whether group differences existed between pre- and post-test scores between groups in order to appropriately inform further inferences and analyses of group differences over time. We found that the distribution of scores at pre-test on the hope outcome variable was non-normal for both groups. This finding, combined with a small sample size, precluded traditional parametric analyses. Consequently, Monte Carlo permutation tests were used to examine differences between groups over time within the context of a mixed effects model that could examine both within group differences and interaction effects between groups on the outcome measures.

Results

All participants in the treatment group completed six sessions of therapy and the pre- and post-tests, two-month follow-up phone interview, and program evaluation. All of the participants from the control group completed the pre- and post-tests. After their participation, three of the four participants from the control group elected to complete the six sessions of therapy.

Demographic and Pre-screening Variables

Based on the pre-screening data, all participants reported on the pre-screening phone questionnaire that they had engaged in treatment after sustaining severe TBI. One participant in the control group and one in the treatment group produced scores that fell above the clinical cutoff for depression (CES-D; Babin, 2003; Shinar et al., 1986). The original intent for analyzing depression was to examine this factor as a potential covariate between groups. Due to the small
Running head: HOPE AND TBI

Sample size and lack of statistically significant results, the CES-D is reported as a measurement of potential differences between groups at baseline. The mean for depression on the CES-D for the treatment group was 14 (SD = 4.96, range = 8-20), and the mean for depression for the control group was 11.75 (SD = 8.42, range = 0-20). All participants fell within the moderately to severely impaired range for disability on the MPAI-4. The mean for disability on the MPAI-4 for the treatment group was 51.25 (SD = 2.06, range = 49-53) and the mean for disability for the control group was 52.75 (SD = 5.75, SD = 46-58). Again, please see Table 2. T-tests were run to examine differences between groups on both the CES-D and MPAI-4 at baseline. The results indicated that on average, at baseline, the treatment group experienced greater depression (M = 14.00, SE = 5.0), than the control group (M = 11.75, SE = 8.4). However, the difference was not significant t(6) = .46, p>.05. For disability level, the treatment group was similar (M = 51.75, SE = 2.9) to the control group (M = 51.50, SE = 5.6), and again were not significantly different t(6) = .080, p>.05.

Pre-screening for Treatment Outcome Variables

Descriptive statistics for the outcome variables included Hope Total Pre-test, Hope Total Post-test, PQOL Total Pre-test, and PQOL Total Post-test scores. See Table 5 for means, standard deviations, and ranges for the all outcome measures. Next, the outcome data were examined with respect to the assumption of normality. Normality was assessed using the Shapiro-Wilk test. Results of the Shapiro-Wilk test were not significant for the treatment or control group for Pre- and Post-test scores on the PQOL or Post-test scores for the Hope scale, indicating that the spread of these scores was normally distributed. However, results of the Shapiro-Wilk test were significant for both groups on the Hope Pre-test. For the treatment group the result was $D(4) = .729$, $p<0.05$, and the for the control group the result was $D(4) = .762$, 

p < 0.05, indicating that the distribution of scores on the Hope Pre-test data were significantly non-normal.

Table 5. Pre- and Post-Test Scores Hope and PQOL Means (Standard Deviation; Range)

<table>
<thead>
<tr>
<th></th>
<th>Total Treatment Group</th>
<th>Total Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hope Total Pre-Test</strong></td>
<td><strong>20.5</strong> (4.04)</td>
<td><strong>23.25</strong> (7.22)</td>
</tr>
<tr>
<td></td>
<td>Range: 17-24</td>
<td>Range: 17-30</td>
</tr>
<tr>
<td><strong>Hope Total Post-Test</strong></td>
<td><strong>25</strong> (1.41)</td>
<td><strong>26.25</strong> (4.5)</td>
</tr>
<tr>
<td></td>
<td>Range: 23-26</td>
<td>Range: 21-30</td>
</tr>
<tr>
<td><strong>PQOL Total Pre-Test</strong></td>
<td><strong>93.5</strong> (15.26)</td>
<td><strong>134</strong> (26.49)</td>
</tr>
<tr>
<td></td>
<td>Range: 80-114</td>
<td>Range: 103-158</td>
</tr>
<tr>
<td><strong>PQOL Total Post-Test</strong></td>
<td><strong>114.75</strong> (22.5)</td>
<td><strong>141.25</strong> (30.13)</td>
</tr>
<tr>
<td></td>
<td>Range: 93-144</td>
<td>Range: 103-175</td>
</tr>
</tbody>
</table>

Given that the distribution of hope scores at baseline were significantly non-normal, combined with the small sample size, tests of significance and causation would not yield viable results, and so non-parametric randomization tests were used to analyze the differences between groups pre-to post, and power analyses were performed to estimate sample size, effect size, and power for a clinical trial. The advantage of the permutation test was that fewer statistical assumptions were required to be met in order to appropriately interpret the findings (Field, 2005; Hesterberg, Moore, Monaghan, Clipson, & Epstein, 2003), which was an important consideration within this data set, as the pre-test scores for hope were found to be not normally distributed in both groups, and it allowed us to examine whether the null hypothesis is true (H₀ = All permutations of the data are equally likely to indicate no difference between groups over time on Hope and PQOL scores). The permutation test analyzes data by randomly selecting combinations of the outcome scores and calculates the mixed effects model for the randomized combination. In this way, the permutation test allows researchers to examine the probability of a variable being significant if multiple combinations of the data are examined (Hesterberg, Moore, Monaghan,
The Monte Carlo permutation test used in this study was programmed to take 1000 possible combinations of the resample to create a permutation distribution of the scores for both hope and perceived quality of life.

The test statistic calculated using the permutation test was a mixed effects model. Mixed effects models are a type of multi-level analysis that can be structured in a way that allows greater flexibility in examining the relationships between both dependent and independent variables, by allowing researchers to determine fixed and random factors or effects, and may be used in a repeated measures design such as in the present study. As used in this analysis, fixed effects are considered to be factors that do not vary across participants, and random effects are factors that do vary and cannot be controlled within an experiment (Rodelo, 2013; Winter, 2013). In this model, both group (treatment versus control) and time of test administration (pre- versus post-testing) are considered fixed factors, and participant responses are the random factor. The random factor in this model allows the pre-testing or baseline scores to vary among participants, while the slope of the distribution is held constant. There are several advantages to the mixed effects model. First, because the baseline scores are allowed to vary among participants, each permutation is used as its own control in comparing change from pre-test to post-test. In this way, the mixed model includes the scores from both pre- and post-testing in the analyses. This is advantageous over other types of analyses that look at difference scores (or a single unit of change, created by subtracting post-testing from pre-testing), as it allows more of the data to be analyzed and thereby increases power, which is the ability to estimate the true effect of the treatment. It may also provide additional information about group differences and the amount of change that occurred over time within groups than if change was examined solely using a single difference score for each participant. Another advantage of the mixed model is that this analysis
takes into account the correlation inherent in repeated measure designs by using each participant’s randomized pre-test permutation as a control in order to reduce error. Ultimately, this mixed effects model examined between group differences on the outcome measures, whether there was change over time within groups, and the interaction effect, in order to determine whether the changes over time between groups was significant.

Therefore, following pre-analysis, Monte Carlo permutation tests were run within a mixed effects model to examine whether there was change over time within groups on the outcome measures, and whether there was an interaction effect between group assignment and improvement on the outcome measures over time. Finally, participant feedback comments were collated and examined qualitatively for consistencies that may inform future directions for the hope treatment program.

**Treatment Outcome Analyses**

**Hope scale.** The Monte Carlo permutation distribution was analyzed to determine whether there was a significant difference over time on the Hope scale within both the control group and the treatment group. The results were not significant (SD = 1.3 [95% CI: 0.51, 0.57], SE = 0.02, p = 0.441), indicating that Hope scores were not significantly different within groups from pre- to post-test, and that on average participants’ hope increased by 4.5 points from pre-testing to post-testing. These findings were further analyzed for the main effect of group assignment and change over time, specifically whether there was a difference between groups on Hope scores over time. The results were not significant (SD = 0.8 [95% CI: 0.80, 0.85], SE = 0.01, p = 0.825), indicating that there was no interaction effect with group assignment. These findings indicate that there was no change over time on the Hope scale for either group and that
the hope-based treatment did not have a significant effect on hope over time as measured by the Hope Scale. Results are shown in Table 6 below.

Table 6. Hope Mixed Model Results from Permutation Test (1000 Repetitions)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>2.8</td>
<td>0.441</td>
</tr>
<tr>
<td>Pre vs. Post</td>
<td>4.5</td>
<td>0.208</td>
</tr>
<tr>
<td>Interaction</td>
<td>-1.5</td>
<td>0.825</td>
</tr>
<tr>
<td>Constant</td>
<td>20.5</td>
<td></td>
</tr>
</tbody>
</table>

|                  |             |         |
| Between Subject  | 1.3         |         |
| Variability (SD) |             |         |
| Within Subject   | 0.8         |         |
| Variability (SD) |             |         |

**PQOL measure.** The Monte Carlo permutation distribution was analyzed to determine whether there was a significant difference over time on the PQOL measure within both the control group and the treatment group. The results were not significant (SD = 2.8 [95% CI: 0.36, 0.06] SE = 0.01, p = 0.048), indicating that scores of perceived quality of life were not significantly different within groups from pre- to post-test, and that on average participants’ scores increased by 21.25 points, or more than one standard deviation, from pre-testing to post-testing. These findings were further analyzed for the main effect of group assignment and change over time, specifically whether there was a difference between groups on perceived quality of life over time. The results were not significant (SD = 2.53 [95% CI: 0.61, 0.67] SE = 0.02, p = 0.641), indicating that there was no interaction effect for group assignment over time. These findings indicate that change on the PQOL measure for participants in the treatment group was not greater than participants in the control group and that the hope-based treatment did not have a significant effect on improvement on measures of perceived quality of life over time. Results are shown in Table 7 below.
Table 7. PQOL Mixed Model Results from Permutation Test (1000 Repetitions)

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>40.5</td>
</tr>
<tr>
<td>Pre vs. Post</td>
<td>21.25</td>
</tr>
<tr>
<td>Interaction</td>
<td>-14</td>
</tr>
<tr>
<td>Constant</td>
<td>93.5</td>
</tr>
</tbody>
</table>

Between Subject Variability (SD)  2.82
Within Subject Variability (SD)  2.53

Participant Feedback

After completing the 6-week group, participants in the hope-based treatment group were asked to complete a program evaluation of the group, asking their opinion of the most and least helpful aspects of the treatment program. We also asked for participant input on the handouts and any additional feedback of the hope-based treatment. The results were as follows:

**Overall rating of the program.** On a scale of 1-4 (1=poor, 2=fair, 3=good, 4=excellent) all participants rated the hope-based treatment program as good or excellent. When asked to explain this rating the participants indicated the following:

1. “Because it gave me a chance to interact with others and [names a participant] in particular.
2. “It was a very good group that helped me to better implement the things I was working on getting implemented.”
3. “It was very helpful for people who want to find and meet goals because if they were having trouble thinking of a goal, then they could call someone in the group for encouragement.”
4. “Setting goals is a great thing in life to do. I got a lot out of it.”
Most helpful aspects of the group. Comments regarding the most beneficial aspect of the group included the socialization that the group provided and the value of goal-setting and working with others who understand the unique challenges experienced by persons with TBI. The comments included:

1. “Getting out and speaking with others”
2. “It was a place where you could work on goals and the taking care of yourself Health day was the most helpful.”
3. “Having a leader who understood TBI and the stuff that we have going on that’s hard.”
4. “That we got together so often to check on your progress on the goals.”

Least helpful aspects of the group and suggestions for improvement. The comments provided about the least helpful aspects or what could be improved in the hope-based treatment program primarily focused on increasing group meeting frequency:

1. “I can’t really think of anything.”
2. “Not that I can remember.”
3. “Longer, spending longer time. Maybe twice a week to really get what we covered pounded into our brain. It felt like we didn’t spend a long enough time on stuff.”
4. “Meet more frequently two times a week or touch base on whether you were meeting your goals.”

Handouts. The participants were asked to rate ‘Yes’ or ‘No’ as to whether they found the handouts helpful. The participants were evenly split in their responses, with half of the participants indicating that they found the handouts useful and half indicating that they were not.
Additional Comments. The participants were asked whether they had any additional comments or input to improve the hope-based treatment program. One participant provided an additional comment:

1. “Yes, the handouts were very helpful so writing down notes is a good thing.”

Two-Month Follow-Up Phone Screen

Two months after completing the 6-week hope-based treatment program, participants in the treatment group were asked to complete a follow-up phone screen that included 4 items from the Hope scale (2 items measuring agency and 2 items measuring pathways thinking) and 4 items from the PQOL measures (1 item relating to week 4 [Support Network], 1 item relating to week 6 [Moving Forward], 1 item relating to perceived satisfaction with life meaning, and 1 item relating to overall perceived happiness). Given that there was no interaction effect between group assignment and improvement on the Hope scale or PQOL measures over time, the results of the two-month follow-up phone screen were not analyzed for significance. The following data is reported for anecdotal evidence only and does not imply causation. All participants (4/4) in the treatment group indicated that they could find lots of ways around problems, that they met their goals, and that they generally felt happy about their lives. Most participants (3/4) indicated that they could find solutions to problems when others became discouraged, were able to find lots of ways around their problems, and were satisfied with the meaning and purpose of their lives. One participant indicated satisfaction with his/her current support network, and two of the participants expressed satisfaction with their health. Collation of the two-month follow-up phone screen is presented in Table 8.
Table 8. Two-Month Follow-up Phone Screen

<table>
<thead>
<tr>
<th>Hope scale or PQOL item</th>
<th>Participant True responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathways item 1</td>
<td>3/4</td>
</tr>
<tr>
<td>Pathways item 2</td>
<td>4/4</td>
</tr>
<tr>
<td>Agency item 1</td>
<td>3/4</td>
</tr>
<tr>
<td>Agency item 2</td>
<td>4/4</td>
</tr>
<tr>
<td>Item relating to Support Network/week 4 topic</td>
<td>1/4</td>
</tr>
<tr>
<td>Item relating to Your Health/week 5 topic</td>
<td>2/4</td>
</tr>
<tr>
<td>Item relating to overall satisfaction with life and personal life meaning</td>
<td>3/4</td>
</tr>
<tr>
<td>Item relating to overall satisfaction with happiness</td>
<td>4/4</td>
</tr>
</tbody>
</table>

Discussion

This study set out to pilot test a new manualized hope-based treatment program for persons with history of TBI using a randomized experimental-control design. The sample size for this pilot study was small, and results found that scores were not normally distributed on measures of hope at pre-test in both groups. As a result, parametric data analyses were not possible, and a permutation distribution was used in the context of a mixed effects model to examine between group differences on the outcome measures, whether there was change over time within groups, and the interaction effect, in order to determine whether the treatment group’s improvement was greater than the control group’s over time. Results indicated that the groups were not statistically different on either hope or quality of life measures from pre-test to post-test, which indicates that the hope-based treatment did not have a significant effect on improvement on hope or quality of life in this study.

In addition to examining differences between the treatment and control group on measures of hope and perceived quality of life, a program evaluation and two-month follow-up phone screen were administered to participants who completed the hope treatment. The results indicated that all participants rated the hope-based program highly, crediting socialization, goal-
setting and accomplishment, and working with group leaders who were knowledgeable about brain injury as the most helpful aspects of the treatment program. Reactions to the handouts were mixed, with group members evenly split as to whether the handouts were helpful or not. Additional suggestions focused on increasing the frequency and duration of group sessions. At two months follow up, all participants retrospectively endorsed a moderate to high amount of pathways and agency thinking, reported that they had achieved goals over the course of the group, and rated themselves as happy.

**Study Limitations**

While qualitative findings suggest that the hope-treatment has the potential to offer some benefit, there are many limitations to this study that must be taken into account, especially with regards to sample size and external and internal validity. One clear, major limitation of this study was the small sample size that ultimately led to non-parametric data distribution. The small sample size reduced power, making it difficult to detect treatment efficacy, or the differences between groups over time. Further, the small sample size led to violations of assumptions of general linear model testing, specifically that both groups were not normally distributed at pretest on the outcome measure of hope. Since the assumptions of general linear model testing were violated, the nature of the covariation or relationship between groups is called into question and therefore negates the likelihood of accurately interpreting the results (Field, 2005). Thus, non-parametric permutation randomization tests were used. These too had serious limitations, because although randomization permutation creates a randomized distribution based on the data, but because of this it also limits interpretation and also generalizability of results to a broader population. Essentially, even if the results had been significant, the fact that the results came
from a permutation distribution instead of actual scores limits the degree of causality that could be attributed to treatment effects (Heterberg, Moore, Monaghan, Clipson, & Epstein, 2003).

In addition to concerns raised regarding analysis of a non-normal distribution of scores, the fact that the groups were not equivalent at baseline also made interpretation difficult for multiple reasons. The greater the non-equivalence between groups at baseline, the greater the amount of possible error, and the more difficult it becomes to accurately compare groups and justifiably attribute change over time to the treatment, as opposed to other known or unknown factors (Shadish, Cook and Campbell, 2002).

In addition to limitations because of non-parametric analyses, small sample size also has implications for generalizability. Because the sample size was small, even if significance had been found, the study may not have produced much in the way of practical recommendations or application to other populations. This is because small sample size makes it difficult to account for other possible interactions due to unknown factors that may affect treatment outcome for diverse populations, or any population different from the pilot sample (Mitchell & Jolley, 2004; Shadish, Cook & Campbell, 2002). At this time, due to the small sample size we do not yet know if the treatment will increase hope or perceived quality of life, or affect any other variables that were not measured. Even if treatment effects had been found, due to the small sample size and restrictive setting, it is not clear if the treatment effects would hold in different settings or contexts or for more diverse populations.

In addition to these problems with power and generalizability, there are also several important potential threats to internal validity that should be considered and addressed based on the structure of the manualized hope-based treatment itself. Pre-screening and baseline information was gathered about current disability and depressive symptoms, along with
demographic information. These participant characteristics certainly can influence response to treatment and must be carefully considered and analyzed as potential covariates for treatment outcome in future studies. While we were unable to examine the potential influence of these factors due to small sample size, we were able to measure disability and depression at baseline and found that the groups were not significantly different from each other on these measures. Future studies should carefully consider these and other factors, such as ethnicity, gender, age, and current treatment involvement to investigate potential influences on the treatment effect within the study participants in order to better understand generalizability and the characteristics of participants who do and do not benefit from this treatment. The treatment program also takes place over time, which has the potential to introduce uncontrollable, extraneous factors that can impact participant outcomes (Mitchell & Jolley, 2004; Shadish, Cook & Campbell, 2002). For example, in this study participants were involved with other treatment providers or support groups concurrently, which could lead to improved outcome not attributable to the hope-based treatment, or there may be have synergistic effects.

With respect to recruitment, there are several possible reasons that may have contributed to the relatively small numbers of participants. First, recruitment was primarily drawn from several local support groups and one brain injury group home, versus a rehabilitation institution or facility, which may have provided greater accessibility to potential participants. Specifically, it is likely that a rehabilitation facility would be connected with more potential participants than are several support groups, as most people become connected to the medical system after sustaining a TBI but may not attend support groups. Second, the inclusion/exclusion criteria for this study were stringent. Many other persons with brain injury expressed strong interest in participating in the study, and over 20 people completed phone screens with the principle
Running head: HOPE AND TBI

investigator. Even so, phone screens were only completed with persons who seemed likely to be eligible and who had already spoken with the principle investigator about study requirements and structure. Many other interested parties expressed strong interest in participating in the study, but were found to be ineligible, mostly due to having sustained a non-traumatic brain injury (e.g., stroke, brain tumor, anoxic injury, etc.). It may be that future research should broaden inclusion/exclusion criteria to include other types of brain injuries.

Another consideration relating to recruitment could be that recruitment settings introduced selection bias into this study. Given that participants were recruited from local support groups and one brain injury group home, it could be that participants in these settings had limited resources but were individually motivated to seek additional support. This could be an individual factor that may have influenced participant potential for change in both treatment and control groups. Increasing motivation is a primary change agent in the hope-based program, and if participants were recruited from a biased self-selected sample that already had high motivation, it could limit the ability to find significant results and determine treatment efficacy. According to Peleg, et al., 2009, a study that reported norms for traumatically brain injured adults on the Hope Scale, adults with history of TBI had a mean total Hope score of 23.1 and a standard deviation of 5.0. In our total sample, participants’ baseline Hope scores had a mean of 21.87 and a standard deviation of 5.63, which is comparable to Peleg’s findings. Our sample was less similar with respect to perceived quality of life. Cicerone & Azula (2007) reported norms for the PQOL for persons with history of TBI, with a mean of 63.38 and a standard deviation of 19.4. In our total sample participants’ baseline total PQOL was 113.75, with a standard deviation of 20.87. This is about 1.5 standard deviations greater. It is unclear why our sample reported higher degrees of perceived quality of life, but this could be an artifact of the small sample size.
It is also possible, as mentioned above, that recruitment methods led to self-selection bias that could have influenced baseline scores on the PQOL. Since participation in both the support groups and the present study were completely voluntary, it may be that the participants were highly motivated to begin actively making attempts to improve their quality of life. In addition, another factor that may have inadvertently increased hope in the control group at post-testing is that the wait-list group may have felt a surge of hope with the anticipation that their wait was over, and they would soon be able to attend the hope-based treatment program.

Further, although not statistically different, the control group at pretest had higher average PQOL scores than did the treatment group. This may also have led to a ceiling effect, or the control group not appearing to exhibit significant change over time because their scores began at levels that were so high that they reached the highest scores achievable for those with history of TBI before the study even began. This is typically monitored through frequency distribution graphs of pre-test and post-test scores, and again, may have led to inaccurate interpretations of the results and assessment of treatment efficacy (Martin, 2000; Mitchell & Jolley, 2004; Shadish, Cook & Campbell, 2002).

Another major limitation relates to the measures used in this study, as they were all based on self-report. Although it is arguable that only the person with brain injury can report his or her own perception of hope and quality of life, it may be of value in future studies to include other objective measures such as input from caregivers or providers on study measures in order to reduce potential error. Another issue that makes this study less generalizeable relates to participant goal setting. Goal setting and goal attainment were not measured in this study. The hope-treatment was designed to allow the person with history of TBI to develop and pursue personal goals, which could arguably be more meaningful than pursuing goals that have been set
by treatment providers or caregivers. However, there was no method of measuring differences in goal complexity or progress. This could lead to participants working on unattainable goals or overly simplistic ones that did not encourage utilization of the hope-based treatment skills, which ultimately has the potential to diminish treatment benefit.

**Future Directions**

One potential method to more objectively measure outcomes with respect to goal-setting and attainment may be using the Goal Attainment Scaling (GAS). GAS is a method of developing and measuring specific, measurable goal-related behaviors (Kiresuk & Sherman, 1968). In a study by Webb and Glueckauf (1994) that measured the effectiveness of high-involvement goal setting on rehabilitation outcomes in persons with history of TBI. Participants were encouraged to create, operationalize, and prioritize goals with the help of a therapist (Webb & Glueckauf, 1994). At the end of the study, goal progress and rate of goal achievement were measured by participants, a therapist, and an impartial, independent rater who had no knowledge of the purpose of the study. Future studies of this hope-based treatment program could utilize a similar method, by tracking participants’ goals and include ratings from the group leader, a caregiver or provider, and an independent rater to include a more objective method of measuring progress over time. Another consideration may be adding additional questions to the program evaluation. In this study participants rated the program highly and specifically identified socialization and goal setting and attainment as benefits of the program. However, there may be other areas or factors that improved that were not assessed. It is possible that participants experienced therapeutic levels of change due to participation in the program that were not captured in the statistical analyses on the outcome variables or in the program evaluation as written. Therefore, future studies should broaden the questions in the program evaluation to
allow participants to include any change or benefit that they may have experienced over the course of the program to more fully capture change over time.

As mentioned above, a major study limitation was the small sample size and potential for selection bias. Future studies may consider recruiting from a rehabilitation facility because of increased access to a broad spectrum of participants. However, recruitment from a rehabilitation facility alone may also lead to selection bias and treatment effect artifacts. This is because it is possible that the hope-based treatment program provides participants with the opportunity to increase focus and engagement on rehabilitation treatment goals. Therefore improved outcome could be more related to increased treatment engagement, not that the hope-based program itself, or there may have been an interaction effect. In addition, it may be more difficult to recruit participants who are at least one year post-injury from rehabilitation centers. The best option for future studies may be to recruit from multiple settings including support groups, rehabilitation centers, private practices, brain injury conferences, group homes, and other settings, and to analyze recruitment facility and con-current treatment as potential covariates.

In order to inform a larger clinical trial, it is valuable to consider the amount of change that occurred from pre- to post-testing in this study. Our research indicated that, on average, participants’ hope scores increased by 4.5 points from pre-test to post-test, and PQOL scores increased by 21.25 points. Future research may use this data for informing a power analysis in order to determine sample size. Another concern relates to ceiling effects. Although not statistically significant, the control group had higher scores on average than the treatment group, which may have led to a ceiling effect, rendering the range of possible improvement minimal. Future studies should consider adding an additional control group, such as a support group or
cognitive behavioral therapy (CBT) group, for comparison so that any changes in scores could better isolate treatment effects.

Another potential confounding factor relates to degree of cognitive dysfunction and type of brain injury. Certainly not all brain injuries are alike, and therefore a treatment that may be beneficial in one population may not be useful in another. If research criteria were broadened to include additional types of brain injury, type of brain injury should be analyzed as a covariate. Further, most people with TBI experience cognitive difficulties (Ylvisaker, Todis, & Glang, 2001), and the hope-based program is utilizes cognitive strategies (i.e., agency and pathways thinking). This brings into question whether the degree of disability or cognitive impairment will influence the outcome on the hope-based program. Research suggests that most persons (53-73%) with moderate brain injury can generally expect good recovery by 6 months post-injury and about half (46-54%) of persons with severe brain injury may expect good recovery by 1 year post-injury, although they may continue to experience some disability (Roebuck-Spencer & Sherer, 2008). The present study included persons who had sustained severe TBI and who were at least 1 year post-injury in order to separate out maturation effects from treatment effects (Dikmen, Machamer, Winn & Temkin, 1995; Lannoo, Colardyn, Jannes, & De Soete, 2001; Roebuck-Spencer & Sherer, 2008). To date, there are no studies that have specifically examined type of brain injury and severity level in relation to pathways and agency thinking. In a study of a hope-based group treatment for depressed older adults by Klauser, Snyder, and Cheavens (2000), the authors noted that one adaptive result of increasing pathways thinking was increased cognitive flexibility, an area of particular difficulty for persons with history of TBI (Milders, Ietswaart, Crawford & Currie, 2008). Elliott et al. (1991) examined differences in pathways and agency thinking over time with persons with SCI in relation to perceived psychosocial
impairment. They found that agency diminishes over time, while pathways thinking increases (Elliott et al., 1991). Jackson et al. (1998) found that persons with visual impairment and higher hope also reported higher functional abilities, although actual ability was not measured. Londos et al. (2008) examined the effectiveness of a goal-based program in persons with mild cognitive impairment and found it did not lead to improvement in most cognitive domains. Wilbur and Parenté (2008) studied the effects of a hope-based group on multiple life domains in persons with history of TBI, and found that limited change occurred in two life domains, including family relationships and academic pursuits. It was suggested that some domains are more resistant to change in persons with history of TBI due to difficulties with foresight (Wilbur & Parenté, 2008; Wehman et al., 2007) and an inability to imagine a strong benefit from short-term gains. That being said, all of the studies also found improvement in many areas including hope, satisfaction with activities of daily living and quality of life for mood and memory, and increased hope in social and romantic relationships and work and leisure activities, among others. These findings suggest that persons with TBI may benefit from goal and hope-based treatments, although treatment may need to include methods to address the cognitive difficulties unique to persons with TBI, particularly as these difficulties impact pathways and agency thinking. It may be beneficial for future clinical trials of the current hope-based program to include a tracking form to further emphasize applying the pathways and agency skills taught each week. Glueckauf and Quittner (1992) developed a Goal Follow-up Form as part of an assertiveness training program for disabled adults using wheelchairs. Such a form could be added in the Homework Assignment section of the Session Structure to assist persons with TBI compensate for difficulties in cognitive flexibility and foresight as they apply the hope-based skills taught in the manualized program. Another method could be including a caregiver or support person who is
already involved in the participant’s daily life to help the participant maintain focus on the goal and applying hope-based skills.

There is also no way to completely control for all variations in cognitive differences between participants, and another method of measuring treatment effectiveness could be by single-case study design. It may be that persons with TBI can benefit from the hope-based treatment program, but individual differences in physical and cognitive disability as well as resources after TBI, along with unique goals, may require a degree of personalization that would only demonstrate effectiveness if it is applied in an individual setting. Future studies could utilize single-case design and measure treatment effectiveness via continuous assessment in order to capture the potential benefit of this program on the individual level.

Another factor to consider is whether to balance groups for age while still maintaining random assignment. Although covariates were not analyzed in this study due to non-normal distributions on Hope in both groups, the age range between the treatment and control group was notably different (see Table 2). Age and stage of life have the potential to impact goal setting and attainment, as well as options for adapting to adverse life circumstances. By creating age pairs before random assignment, an equal age distribution may be created within each group to address this potentially confounding factor. In this way, future studies should consider matching participants on age before random assignment to control for differences between groups and analyze age as a covariate.

Three other manualized group therapies were found for persons with TBI, including an anger management program, a problem-solving deficits program, and social competence intervention (Hawley & Newman, 2010; Rath et al., 2003; Walker et al., 2010). Of these, only the anger management and problem-solving deficits programs completed a clinical trial and
demonstrated efficacy. Two other studies offer a structured, although not manualized, program, one for persons with history of TBI and another for persons with acquired brain injury (TBI, stroke and “other”); these included a program for increasing self-awareness and psychosocial functioning, and a coping skills group. Results for these studies indicated mixed efficacy (Anson & Ponsford, 2006; Ownsworth & McFarland, 2000). None of the studies focused on helping persons with brain injury develop and pursue his or her personal goals, or to increase hope and quality of life. None of the manualized treatments reported participant reactions to the group therapy, or polled whether the population receiving the treatment perceived the treatment as beneficial, an important component of treatment compliance. Anson and Ponsford (2006) included participant reactions to their structured program, and similar to the results found in the present study, participants rated the program highly and specifically noted the benefit of decreasing isolation by being involved with a group.

There are also several important differences between this research and the hope-based group in Wilbur and Parenté’s study (2008). The hope-based group in Wilbur and Parenté’s (2008) study was not manualized which may have allowed each session to be tailored to the group needs and allowed greater flexibility in topics covered in a given week. However, the lack of manualization also makes it more difficult to reliably replicate the treatment. In the current study, treatment manualization still allowed for flexibility in goal setting, but the consolidation of topics into six weeks with anchored sub-topics made it more likely that all participants received similar skill training. This increases the possibility that reliable results will be found in future clinical trials that replicate the current study. In addition to anchored topics, the session structure also introduced important changes. The duration of the group was twice as long in the study by Wilbur and Parenté (3 hours per group versus 1.5 hours in the current study), and
regulating the structure of each group allowed for a more streamlined and time-effective approach to skill delivery. Given the cognitive challenges associated with TBI, it was thought that a briefer, more streamlined group structure would be the optimal method of delivering treatment while not over-taxing participants.

Another clear difference between previous research on a hope-based group for TBI and this study was the use of a control group. Control groups are typically used and provide insight into treatment effects. Although the use of a control group in this study increased the likelihood that changes over time would be attributable to treatment effect, both groups improved on the outcome measures over time. It is possible that any differences found were related solely to the placebo effect. Another method of exploring true effects would be the use of an active placebo group, such as a brain injury support group or cognitive behavioral therapy group, in addition to a wait-list control group. The differences could be compared between all three groups in order to better isolate treatment effects.

At this time, we cannot determine whether or not the hope-based treatment is efficacious for persons with history of TBI. All participants identified his or her personal goals during the course of this study, making this treatment personally relevant to each. After two months, all participants rated themselves as having high pathways thinking, reported goal attainment, and felt happy about their life, demonstrating that a manualized hope-based treatment program has the potential to provide benefit for persons with history of TBI. It is also useful to understand which aspects of the program were most valued by participants; these included socialization, goal-setting and accomplishment, and working with group leaders experienced with TBI, as this may inform future directions and areas of emphasis in future clinical trials. The limitations of this pilot study also provided useful information for future clinical trials, particularly
generalizeability concerns due to small sample size, potential covariates, recruitment concerns and selection bias, and lack of objective outcome measures. Based on our findings, future studies should include objective ratings, utilize multiple recruitment methods, consider effect sizes from the present study for calculating sample sizes, and use additional control groups. Future studies may also consider changes to treatment protocol, including introducing additional methods to address the cognitive demands of hope-based interventions with a TBI population. These recommendations may aid future studies in determining the potential treatment efficacy of the hope-based treatment program and facilitate a more comprehensive understanding of how to best support goal development and attainment and increase hope and quality of life for persons with history of TBI.
References


Patrick, D.L, Danis, M., Southerland, L.I., & Hong, G. (1988). Quality of life following


Appendix A

Pre-Screening Questionnaire

The following questions will help us gather information about the participants in our study. It will also help us decide if this study is right for you. Please answer each question as truthfully as you can.

Do you have a legal guardian who helps you make important decisions?

- YES  \(\rightarrow\) If yes, guardian’s permission is required before proceeding
- NO

Have you had a brain injury for one year or more?

- YES
- NO

Was your injury the result of a blow to the head or other kind of external head trauma?

- YES
- NO

When you got the injury, were you unconscious for more than 20 minutes?

- YES
- NO

Did you have to go to the hospital?

- YES  If yes: Did you have to stay at the hospital for any time?  Yes\_\_\_\_  No
- NO

Did you have to participate in rehabilitation treatment in any way?

- YES
Did the doctors refer to your condition as a concussion?
  o YES
  o NO

Are you currently diagnosed with a psychological disorder?
  o YES → If yes, what type of disorder: ________________________________
  o NO

Do you drink alcohol?
  o YES → If yes, how many alcoholic beverages do you have in a week?
   o 0-1 times a week
   o 2-3 times a week
   o 4-5 times a week
   o 6-7 times a week
   o 8 or more
  o NO

Do you use street drugs?
  o YES
  o NO

Group participation

Is there anything that would prevent you from participating in a group treatment, such as problems controlling your behavior?
  o YES
  o NO

Would you have difficulty listening, waiting for others to finish talking, or participating in give and take conversation?
YES ➔ If yes, would you be able to participate appropriately with staff or family support?

- Yes
- No

NO

How often do you show your anger by yelling or physically expressing your anger towards others?

<table>
<thead>
<tr>
<th>0 = none</th>
<th>1 = rarely</th>
<th>2 = some of the time (5-24% of the time)</th>
<th>3 = a lot of the time (25-75% of the time)</th>
<th>4 = all the time (75% or more)</th>
</tr>
</thead>
</table>

How often do you act out in behavior that does not usually fit the time and place, like being silly or rude?

<table>
<thead>
<tr>
<th>0 = none</th>
<th>1 = rarely</th>
<th>2 = some of the time (5-24% of the time)</th>
<th>3 = a lot of the time (25-75% of the time)</th>
<th>4 = all the time (75% or more)</th>
</tr>
</thead>
</table>

How often is it really hard or stressful to cooperate with the people you live with to get things that need to be done to keep the household running?

<table>
<thead>
<tr>
<th>0 = none</th>
<th>1 = rarely</th>
<th>2 = some of the time (5-24% of the time)</th>
<th>3 = a lot of the time (25-75% of the time)</th>
<th>4 = all the time (75% or more)</th>
</tr>
</thead>
</table>

Notes:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(Note to Administrator: If the participant is an adult, at least one year post moderate to severe brain injury, does not have a current diagnosis of any of the following mental disorders: Substance Abuse or Dependence, any psychotic disorder, or Bipolar Disorder; And does not exhibit behavioral disturbance to the degree that it would interfere with participating in a group, then they are eligible to participate in the study.)

If eligible ➔ “It sounds like you would be a good fit to participate in our study if you would like to. I can answer any further questions that you have and we can set up an appointment time for
you to come in and find out more about the study. At this appointment you can find out more
detailed information about the study, and you can make a final decision about whether you want
to participate. After you have fully decided we will ask you to fill out a lot of questions about
yourself, with help from your staff if you would like. The whole appointment should take about
35-45 minutes. Would you like to set up this appointment?”

If not eligible → “It sounds like this group would not be the best for you, but we can give you
some information about support groups in your area if you would like.” (Provide list of on-going
support groups from BIA-OR).
Appendix B

Weekly Hope-Program Handouts

THINKING POSITIVELY

A — Attitude
E — Encouraging Self-Talk
I — I Can Statements
O — Outlook
U — U-Turn/Use New Strategies
Support Networks

Foster Friendships

Identify Role Models
Your Health

Rest Adequately
- No caffeine before bed
- Sleep in a dark room
- No distractions
- Keep bedtime the same
- Wind down before sleep

Exercise Regularly
- Pick a day and stick to it!

Self-Care
- Be good to yourself
- Find ways to bring joy into everyday life
- Eat properly
- Eat several times a day
- Drink plenty of water
Moving Forward

Regoaling

Reward Yourself

Educate Yourself
Appendix C

The Hope Scale

The Goals Scale

*Directions:* Read each item carefully. Using the scale shown below, please select the number that best describes YOU and put that number in the blank provided.

1 = Definitely False  2 = Mostly False  3 = Mostly True  4 = Definitely True

___ 1.  I can think of many ways to get out of a jam.

___ 2.  I energetically pursue my goals.

___ 3.  I feel tired most of the time.

___ 4.  There are lots of ways around any problem.

___ 5.  I am easily downed in an argument.

___ 6.  I can think of many ways to get the things in life that are most important to me.

___ 7.  I worry about my health.

___ 8.  Even when others get discouraged, I know I can find a way to solve the problem.

___ 9.  My past experiences have prepared me well for my future.

___ 10.  I've been pretty successful in life.

___ 11.  I usually find myself worrying about something.

___ 12.  I meet the goals that I set for myself.
Appendix D

Perceived Quality of Life Scale

See publisher for test.
Appendix E

The Center for Epidemiologic Studies Depression Scale (CES-D)

<table>
<thead>
<tr>
<th>Center for Epidemiologic Studies Depression Scale (CES-D), NIMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Rarely or none of the time (less than 1 day)</th>
<th>Some or a little of the time (1-2 days)</th>
<th>Occasionally or a moderate amount of time (3-4 days)</th>
<th>Most or all of the time (5-7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was bothered by things that usually don't bother me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. I did not feel like eating; my appetite was poor.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. I felt that I could not shake off the blues even with help from my family or friends.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. I felt just as good as other people.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. I had trouble keeping my mind on what I was doing.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. I felt depressed.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. I felt that everything I did was an effort.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. I felt hopeful about the future.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>9. I thought my life had been a failure.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>10. I felt fearful.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>11. My sleep was restless.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>12. I was happy.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>13. I talked less than usual.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>15. People were unfriendly.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>16. I enjoyed life.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>17. I had crying spells.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>18. I felt sad.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>19. I felt that people dislike me.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>20. I could not get &quot;going.&quot;</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**SCORING:** 0 for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is 0 to 60, with higher scores indicating the presence of more symptomatology.
Appendix F

The Mayo Portland Adaptability Inventory-4

Mayo-Portland Adaptability Inventory-4

Muriel D. Lozak, PhD, ABPP & James F. Malec, PhD, ABPP

Name: ____________________________  Clinic #: __________  Date: __________

Person reporting (circle one):  Single  Professional  Professional Consensus  Person with brain injury  Significant other: __________

Below each item, circle the number that best describes the level at which the person being evaluated experiences problems. Mark the greatest level of problem that is appropriate. Problems that interfere rarely with daily or valued activities, that is, less than 5% of the time, should be considered not to interfere. Write comments about specific items at the end of the rating scale.

For Items 1-20, please use the rating scale below.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None</td>
<td>Mild problem but does not interfere with activities</td>
<td>Mild problem that interferes with activities 5-24% of the time</td>
<td>Moderate problem, interferes with activities 25-74% of the time</td>
<td>Severe problem; interferes with activity more than 75% of the time</td>
</tr>
</tbody>
</table>

Part A. Abilities

1. Mobility: Problems walking or moving; balance problems that interfere with moving about

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Normal stress within family or other close network of relationships</td>
<td>Mild stress that does not interfere with family functioning</td>
<td>Mild stress that interferes with family functioning 5-24% of the time</td>
<td>Moderate stress that interferes with family functioning 25-74% of the time</td>
<td>Severe stress that interferes with family functioning more than 75% of the time</td>
</tr>
</tbody>
</table>

2. Use of hands: Impaired strength or coordination in one or both hands

3. Vision: Problems seeing; double vision; eye, brain, or nerve injuries that interfere with seeing

4. Audition: Problems hearing; ringing in the ears

5. Dizziness: Feeling unsteady, dizzy, light-headed

6. Motor speech: Abnormal clearness or rate of speech; stuttering

7A. Verbal communication: Problems expressing or understanding language

7B. Nonverbal communication: Restricted or unusual gestures or facial expressions; talking too much or not enough; missing nonverbal cues from others

8. Attention/Concentration: Problems ignoring distractions, shifting attention, keeping more than one thing in mind at a time

9. Memory: Problems learning and recalling new information

10. Fund of Information: Problems remembering information learned in school or on the job; difficulty remembering information about self and family from years ago

11. Novel problem-solving: Problems thinking up solutions or picking the best solution to new problems

12. Visuospatial abilities: Problems drawing, assembling things, route-finding, being visually aware on both the left and right sides

Part B. Adjustment

13. Anxiety: Tense, nervous, fearful, phobias, nightmares, flashbacks of stressful events

14. Depression: Sad, blue, hopeless, poor appetite, poor sleep, worry, self-criticism

15. Irritability, anger, aggression: Verbal or physical expressions of anger

16. Pain and headaches: Verbal and nonverbal expressions of pain; activities limited by pain

17. Fatigue: Feeling tired; lack of energy; tiring easily

18. Sensitivity to mild symptoms: Focusing on thinking, physical or emotional problems attributed to brain injury; rate only how concerned or worried about these symptoms affects current functioning over and above the effects of the symptoms themselves

19. Inappropriate social interaction: Acting childish, silly, rude, behavior not fitting for time and place

20. Impaired self-awareness: Lack of recognition of personal limitations and disabilities and how they interfere with everyday activities and work or school

Use scale at the bottom of the page to rate item #21

21. Family/significant relationships: Interactions with close others; describe stress within the family or those closest to the person with brain injury; “family functioning” means cooperating to accomplish those tasks that need to be done to keep the household running
### Part C. Participation

#### 22. Initiation: Problems getting started on activities without prompting

<table>
<thead>
<tr>
<th>0 None</th>
<th>1 Mild problem but does not interfere with activities; may use assistive device or medication</th>
<th>2 Mild problem; interferes with activities 5-24% of the time</th>
<th>3 Moderate problem; interferes with activities 25-74% of the time</th>
<th>4 Severe problem; interferes with activities more than 75% of the time</th>
</tr>
</thead>
</table>

#### 23. Social contact with friends, work associates, and other people who are not family, significant others, or professionals

<table>
<thead>
<tr>
<th>0 Normal involvement with others</th>
<th>1 Mild difficulty in social situations but maintains normal involvement with others</th>
<th>2 Mildly limited involvement with others (75-95% of normal interaction for age)</th>
<th>3 Moderately limited involvement with others (25-74% of normal interaction for age)</th>
<th>4 No or rare involvement with others (less than 25% of normal interaction for age)</th>
</tr>
</thead>
</table>

#### 24. Leisure and recreational activities

<table>
<thead>
<tr>
<th>0 Normal participation in leisure activities for age</th>
<th>1 Mild difficulty in these activities but maintains normal participation</th>
<th>2 Mildly limited participation (75-95% of normal participation for age)</th>
<th>3 Moderately limited participation (25-74% of normal participation for age)</th>
<th>4 No or rare participation (less than 25% of normal participation for age)</th>
</tr>
</thead>
</table>

#### 25. Self-care: Eating, dressing, bathing, hygiene

<table>
<thead>
<tr>
<th>0 Independent completion of self-care activities</th>
<th>1 Mild difficulty, occasional assistance or mildly slowed completion of self-care; may use assistive device or require occasional prompting</th>
<th>2 Requires little assistance or supervision from others (5-24% of the time); including frequent prompting</th>
<th>3 Requires moderate assistance or supervision from others (25-73% of the time)</th>
<th>4 Requires extensive assistance or supervision from others (more than 75% of the time)</th>
</tr>
</thead>
</table>

#### 26. Residence: Responsibilities of independent living and homemaking (such as, meal preparation, home repairs and maintenance, personal health maintenance beyond basic hygiene including medication management) but not including managing money (see #29)

<table>
<thead>
<tr>
<th>0 Independent: Living without supervision or concern from others</th>
<th>1 Living without supervision but others have concerns about safety or managing responsibilities</th>
<th>2 Requires little assistance or supervision from others (5-24% of the time); including frequent prompting</th>
<th>3 Requires moderate assistance or supervision from others (25-73% of the time)</th>
<th>4 Requires extensive assistance or supervision from others (more than 75% of the time)</th>
</tr>
</thead>
</table>

#### 27. Transportation

<table>
<thead>
<tr>
<th>0 Independent in all modes of transportation including independent ability to operate a personal motor vehicle</th>
<th>1 Independent in all modes of transportation, but others have concerns about safety</th>
<th>2 Requires little assistance or supervision from others (5-24% of the time); cannot drive</th>
<th>3 Requires moderate assistance or supervision from others (25-73% of the time); cannot drive</th>
<th>4 Requires extensive assistance or supervision from others (more than 75% of the time); cannot drive</th>
</tr>
</thead>
</table>

#### 28A. Paid Employment: Rate either item 28A or 28B to reflect the primary desired social role. Do not rate both. Rate 28A if the primary social role is paid employment. If another social role is primary, rate only 28B. For both 28A and 28B, “supervisor” means special help from another person with responsibilities (such as, a job coach or shadow, tutor, helper) or reduced responsibilities. Modifications to the physical environment that facilitate employment are not considered as support.

<table>
<thead>
<tr>
<th>0 Full-time (more than 30 hrs/week) without support</th>
<th>1 Part-time (3 to 30 hrs/week) without support</th>
<th>2 Full-time or part-time with support</th>
<th>3 Sheltered work</th>
<th>4 Unemployed; employed less than 3 hours per week</th>
</tr>
</thead>
</table>

#### 28B. *Other employment:* Involved in constructive, role-appropriate activity other than paid employment. Check only one to indicate primary desired social role: Child rearing/care-giving, Homemaker, no childrearing or care-giving

<table>
<thead>
<tr>
<th>0 Student Volunteer Retired (Check retired only if over age 60; if unemployed, retired as disabled and under age 60, indicate &quot;unemployed&quot; for item 28A)</th>
<th>1 Part-time (3 to 30 hrs/week) without support</th>
<th>2 Full-time or part-time with support</th>
<th>3 Activities in a supervised environment other than a sheltered workshop</th>
<th>4 Inactive; involved in role-appropriate activities less than 3 hours per week</th>
</tr>
</thead>
</table>

#### 29. Managing money and finances: Shopping, keeping a check book or other bank account, managing personal income and investments; if independent, with small purchases but not able to manage larger personal finances or investments, rate 3 or 4.

<table>
<thead>
<tr>
<th>0 Independent, manages small purchases and personal finances without supervision or concern from others</th>
<th>1 Manages money independently but others have concerns about larger financial decisions</th>
<th>2 Requires a little help or supervision (5-24% of the time) with large finances; independent with small purchases</th>
<th>3 Requires moderate help or supervision (25-73% of the time) with large finances; some help with small purchases</th>
<th>4 Requires extensive help or supervision (more than 75% of the time) with large finances; frequent help with small purchases</th>
</tr>
</thead>
</table>
### Part D: Pre-existing and associated conditions

The items below do not contribute to the total score but are used to identify special needs and circumstances. For each rate, pre-injury and post-injury status.

#### 30. Alcohol use: Use of alcoholic beverages.

<table>
<thead>
<tr>
<th>Pre-injury</th>
<th>Post-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No or socially acceptable use</td>
</tr>
<tr>
<td>1</td>
<td>Occasionally exceeds socially acceptable use but does not interfere with everyday functioning; current problem under treatment or in remission</td>
</tr>
<tr>
<td>2</td>
<td>Frequent excessive use that occasionally interferes with everyday functioning; possible dependence</td>
</tr>
<tr>
<td>3</td>
<td>Use or dependence interferes with everyday functioning; additional treatment recommended</td>
</tr>
<tr>
<td>4</td>
<td>Inpatient or residential treatment required</td>
</tr>
</tbody>
</table>

#### 31. Drug use: Use of illegal drugs or abuse of prescription drugs.

<table>
<thead>
<tr>
<th>Pre-injury</th>
<th>Post-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No or occasional use</td>
</tr>
<tr>
<td>1</td>
<td>Occasional use does not interfere with everyday functioning; current problem under treatment or in remission</td>
</tr>
<tr>
<td>2</td>
<td>Frequent use that occasionally interferes with everyday functioning; possible dependence</td>
</tr>
<tr>
<td>3</td>
<td>Use or dependence interferes with everyday functioning; additional treatment recommended</td>
</tr>
<tr>
<td>4</td>
<td>Inpatient or residential treatment required</td>
</tr>
</tbody>
</table>

#### 32. Psychotic Symptoms: Hallucinations, delusions, other persistent severely distorted perceptions of reality.

<table>
<thead>
<tr>
<th>Pre-injury</th>
<th>Post-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Current problem under treatment or in remission; symptoms do not interfere with everyday functioning</td>
</tr>
<tr>
<td>2</td>
<td>Symptoms occasionally interfere with everyday functioning but no additional evaluation or treatment recommended</td>
</tr>
<tr>
<td>3</td>
<td>Symptoms interfere with everyday functioning; additional treatment recommended</td>
</tr>
<tr>
<td>4</td>
<td>Inpatient or residential treatment required</td>
</tr>
</tbody>
</table>

#### 33. Law violations: History before and after injury.

<table>
<thead>
<tr>
<th>Pre-injury</th>
<th>Post-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None or minor traffic violations only</td>
</tr>
<tr>
<td>1</td>
<td>Conviction on one or two misdemeanors other than minor traffic violations</td>
</tr>
<tr>
<td>2</td>
<td>History of more than two misdemeanors other than minor traffic violations</td>
</tr>
<tr>
<td>3</td>
<td>Single felony conviction</td>
</tr>
<tr>
<td>4</td>
<td>Repeat felony convictions</td>
</tr>
</tbody>
</table>

#### 34. Other condition causing physical impairment: Physical disability due to medical conditions other than brain injury, such as, spinal cord injury, amputation. Use scale below #35.

<table>
<thead>
<tr>
<th>Pre-injury</th>
<th>Post-injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Mild problem but does not interfere with activities, may use assistive device or medication</td>
</tr>
<tr>
<td>2</td>
<td>Mild problem, interferes with activities 5-54% of the time</td>
</tr>
<tr>
<td>3</td>
<td>Moderate problem; interferes with activities 25-75% of the time</td>
</tr>
<tr>
<td>4</td>
<td>Severe problem, interferes with activities more than 75% of the time</td>
</tr>
</tbody>
</table>

#### Comments:

Item #

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Scoring Worksheet

Items with an asterisk (4, 16, 27, 28A/28B) require rescoring as specified below before Raw Scores are summed and referred to Reference Tables to obtain Standard Scores. Because items 22-24 contribute to both the Adjustment Subscale and the Participation Subscale, the Total Score will be less than the sum of the three subscales.

Abilities Subscale

Rescore item 4. Original score =
If original score = 0, new score = 0
If original score = 1, 2, or 3, new score = 1
If original score = 4, new score = 3

A. New score for item 4 =
B. Sum of scores for items 1-3 and 5-12 =
C. (use highest score for 7A or 7B)

Sum of A and B = Raw Score for Abilities subscale =
(Place in Table below)

Adjustment Subscale

Rescore item 16. Original score =
If original score = 0, new score = 0
If original score = 1 or 2, new score = 1
If original score = 3 or 4, new score = 2

C. New score for item 16 =
D. Sum of scores for items 13-15 and 17-24 =

Sum of C and D = Raw Score for Adjustment Subscale =
(Place in Table below)

Participation Subscale

Rescore item 27. Original score =
If original score = 0 or 1, new score = 0
If original score = 2 or 3, new score = 1
If original score = 4, new score = 3

Rescore item 28A or 28B. Original score =
If original score = 0, new score = 0
If original score = 1 or 2, new score = 1
If original score = 3 or 4, new score = 3

E. New score for item 27 =
F. New score for item 28A or 28B =
G. Sum of scores for items 22-24 =
H. Sum of scores for items 25, 26, 29 =

Sum of E through H = Raw Score for Participation Subscale =
(Place in Table below)

Use Reference Tables to Convert Raw Scores to Standard Scores

Raw Scores
(from worksheet above)

Standard
(Obtain from appropriate reference Table)

I. Ability Subscale (Items 1-12)
II. Adjustment Subscale (Items 13-24)
III. Participation Subscale (Items 22-29)
IV. Subtotal of Subscale Raw Scores (I-III)
V. Sum of scores for items 22-24
VI. Subtract from V. from IV = Total Score

MPAI-4 3/31/03