Objective: To evaluate the efficacy of a psychological treatment to reduce moderate to severe hopelessness after severe traumatic brain injury (TBI). Method: Randomized controlled trial. Participants were aged between 18 and 65 years, experienced posttraumatic amnesia more than 1 day and moderate to severe hopelessness (Beck Hopelessness Scale [BHS]) and/or suicide ideation. Intervention comprised a 20-hour manualized group cognitive behavior therapy program. Participants were randomly allocated using concealed allocation (treatment n = 8; wait-list n = 9); all remained in their allocated group. Outcome variables were collected by assessors blind to group allocation. Results: No between-groups differences were observed on demographic, injury, cognitive, and psychosocial variables at baseline (time 1). A significant group-by-time interaction was found for BHS in the treatment group ($F_{1,15} = 13.20$, $P = .002$), reflecting a reduction in mean BHS scores between time 1 and time 2 (posttreatment) with no main effects for group or time. At 3-month follow-up (time 3), the treatment gains were maintained or improved for 75% (6/8) of participants. Secondary outcome variables (suicide ideation, depression, social problem solving, self-esteem, hopefulness) displayed no significant group-by-time interactions or main effects. Conclusions: This trial provides initial evidence for the efficacy of a psychological intervention in reducing hopelessness among long-term survivors with severe TBI. Keywords: hopelessness, randomized controlled trial, suicide ideation, suicide prevention, traumatic brain injury

There is growing evidence from population and epidemiological studies of elevated suicidality among people with traumatic brain injury (TBI) in comparison to the general population. Findings from 3 countries have found significantly higher levels of completed suicide among civilians\(^1\)\(^,\)\(^2\) and veterans.\(^3\)\(^,\)\(^4\) Elevated levels of suicide attempts\(^5\) and suicide ideation\(^6\) have also been reported among civilian populations with TBI. One notable feature of these findings is the chronicity of the suicidal behaviors, documented up to 25 years or more postinjury, with few studies finding that any one particular time period was associated with elevated risk.\(^1\)\(^,\)\(^3\)\(^,\)\(^7\)\(^,\)\(^8\)

In response to these findings, there is a corresponding need to develop effective means of prevention.\(^9\)\(^,\)\(^10\)\(^,\)\(^11\) One important element of any prevention framework is psychological interventions that reduce risk by ameliorating suicidal distress and strengthening coping mechanisms.\(^9\)\(^,\)\(^8\)\(^,\)\(^11\) In other clinical populations, trials of psychological therapies such as problem-solving therapy\(^13\) and dialectical behavior therapy\(^14\) have shown promise (but not conclusive evidence) for reducing morbidity associated with suicidal behaviour.\(^15\) These therapies complement the psychopharmacological and psychosocial approaches to suicide prevention.\(^12\)

Hopelessness is a strong risk factor for eventual suicide, with greater predictive power than depression itself.\(^16\)\(^,\)\(^17\) This gave rise to the important possibility that targeting hopelessness rather than treating depression more generally would more specifically address issues of suicidality.\(^18\) Hopelessness acts as a precursor to the development of suicidal ideation, which then
Hopelessness is widely observed among people with severe TBI over the long term (ie, greater than 1 year). Rates of moderate to severe hopelessness as high as 35% have been reported between 1 and 10 years postinjury.\(^7\) In line with research findings in other clinical populations,\(^{18}\) studies in severe TBI samples have found that hopelessness was a strong independent predictor of suicide ideation, with suicide ideation a strong predictor of postinjury suicide attempts.\(^7\),\(^{24}\)

The Window to Hope (WtoH) program is an expanded and enhanced version of an earlier psychological intervention that aimed to treat chronic hopelessness experienced after TBI.\(^{25}\) The program was developed from principles and therapeutic techniques drawn from cognitive behavior therapy (CBT) (Table 1). Cognitive behavior therapy increases the risk of suicidal acts.\(^{19},^{20}\) Furthermore, in studies of depressed patients and patients experiencing first episode psychosis, interventions that reduced hopelessness demonstrated the potential to lower suicide risk.\(^{16},^{21}–^{23}\)

### Table 1: Window to Hope program

<table>
<thead>
<tr>
<th>N</th>
<th>Session title</th>
<th>Core session goal/s</th>
<th>Underlying principles</th>
<th>Key content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Getting started</td>
<td>Group participants get to know each other, introduce overall program theme</td>
<td>Group formation</td>
<td>Ice breaker, identifying feelings, rating impact of injury, rating challenges in maintaining a sense of hope</td>
</tr>
<tr>
<td>2</td>
<td>Living a positive lifestyle</td>
<td>Examine the relationship between affect and lifestyle factors</td>
<td>Behavioural activation(^{28})</td>
<td>Introduce Positive Lifestyle incorporating Eating, Activity, Sleep and Exercise (PLEASE) model</td>
</tr>
<tr>
<td>3</td>
<td>Thoughts and feelings</td>
<td>Learn about the relationship between thoughts and feelings</td>
<td>Socialization to CBT(^{28})</td>
<td>Learning about how thoughts and feelings are connected, changing my thinking style</td>
</tr>
<tr>
<td>4,5</td>
<td>Take another look (I and II)</td>
<td>To examine how cognitive restructuring can ameliorate distress</td>
<td>Cognitive restructuring(^{28})</td>
<td>Negative self-talk cycle, breaking the negative self-talk by using the Stop Revive Survive model (Stop the thought, Revive—take 4 deep breaths, Survive—use a self-affirmation statement)</td>
</tr>
<tr>
<td>6,7</td>
<td>Problem-solving (I and II)</td>
<td>To develop a systematic approach to solving problems</td>
<td>Problem solving(^{28})</td>
<td>Introducing the model how to be a STAR (Spot the problem, Think of options, Act on the best one, Review the outcome)</td>
</tr>
<tr>
<td>8</td>
<td>Problem-solving and recovery after TBI</td>
<td>To develop skills to address the existential challenge associated with the extent of postinjury recovery</td>
<td>Compensatory techniques(^{56})</td>
<td>Problems associated with recovery after TBI (trying to get back to the way things were before the injury), Introducing the model &quot;Ask the Coach&quot; and the 4 plays: (1) doing the same thing in a different way, (2) doing something else that meets the same need, (3) breaking a large goal down into smaller steps, (4) if goal out of reach, choosing something else to focus on</td>
</tr>
<tr>
<td>9</td>
<td>Building hope</td>
<td>To identify means of building hope after TBI, develop self-esteem</td>
<td>Relapse prevention(^{28})</td>
<td>Introducing the model for building hope, building self-esteem—being an everyday hero in living with a TBI</td>
</tr>
<tr>
<td>10</td>
<td>Building hope</td>
<td>Making meaning of the TBI, positive expectancy, and building connections</td>
<td>Relapse prevention(^{28})</td>
<td>Continue work on model for hope—building connections, having a sense of purpose, expecting good things to happen</td>
</tr>
</tbody>
</table>

Abbreviations: CBT, cognitive behavior therapy; TBI, traumatic brain injury.
behavior therapy has been effective in treating various affective disorders in TBI samples, as highlighted in 2 recent systematic reviews on depression\textsuperscript{26} and anxiety\textsuperscript{27} identified by a search of the PsycBITE database of psychological treatment studies for people with acquired brain injury (www.psycbite.com). The WtoH program was structured around 4 core therapeutic strategies of behavioral activation, cognitive restructuring, problem solving, and relapse prevention, drawing upon the recommendations of Khan-Bourne and Brown\textsuperscript{28} for adapting CBT for people with TBI.

On the basis of this structure, hopelessness was specifically targeted across the 4 sections of the program. The central metaphor was a Window of Hope, with the core therapeutic strategies represented by one each of the 4 window panes. In addition, a therapeutic rationale was provided for each section, making explicit ways in which the various strategies could contribute to alleviating hopelessness. The final section on relapse prevention introduced concepts from the field of posttraumatic growth.\textsuperscript{29} Specifically, posttraumatic growth refers to the successful psychological accommodation to a traumatic event.\textsuperscript{30,31} Therefore, this section moved the focus from the reduction of hopelessness to ways of instilling a positive sense of hopefulness (including a sense of direction, connection with others, and positive expectancy) and reestablishing a valued sense of self.\textsuperscript{9,29}

In devising the evaluative strategy, hopelessness was the primary outcome measure. The selection of secondary outcome measures was driven by 2 considerations. First, levels of suicide ideation and depressive symptoms needed to be assessed, in recognition of their interrelationship with hopelessness. Second, given the multiple therapeutic modalities incorporated into WtoH, measures were employed to monitor whether any changes could be detected in psychological domains targeted by particular sections of the program.

The trial targeted people with severe TBI who were more than 1 year postinjury. The primary hypothesis was that participants who completed the WtoH program would report a significant reduction in their levels of hopelessness compared with wait-list controls. The secondary hypotheses were that the treatment group would demonstrate significant reductions in suicide ideation and depression, and increased social problem-solving, self-esteem, and hopefulness in comparison to the wait-list controls.

**METHODS**

**Design**

The program was evaluated by a randomized control trial with participants randomly allocated to treatment or wait-list conditions on a 1:1 ratio. The trial is reported in accordance with the CONSORT statement.\textsuperscript{32,33} The flow diagram of the trial is displayed in Figure 1.

**Sample**

Selection criteria were to have sustained a severe TBI (duration of posttraumatic amnesia \(>1\) day); aged 18 years or older at injury and current age \(\leq 65\) years; and moderate to severe levels of hopelessness and/or suicide ideation. Exclusion criteria included severe neuropsychological impairments in cognitive or language functions as documented in neuropsychological test reports, extreme challenging behavior that would affect compliance with the study protocol as assessed by the treating Brain Injury Rehabilitation Unit (BIRU) community team staff, and nonfluency in English.

Power analysis to estimate sample size was complicated by the lack of previous studies with TBI samples. In trials using CBT therapies for non–brain-damaged depressed outpatients\textsuperscript{34}, pretreatment Beck Hopelessness Scale (BHS\textsuperscript{35}) scores (12.4 \(\pm\) 5.2) lay in the moderate range (similar to BHS scores reported for a TBI sample; 11.8 \(\pm\) 5.1).\textsuperscript{7} In the study by Blackburn and Bishop,\textsuperscript{34} posttreatment BHS scores decreased by approximately 1 standard deviation, which was interpreted as a successful treatment outcome. Based on these data, the sample size for 2 equivalent groups with power set at 0.80, effect size (\(d = 1\)), and the significance level for \(\alpha\) set at .05 2-tailed, found that each group (ie, treatment vs standard care) would need 16 participants, for a total sample of \(n = 32\).

**MEASURES**

The study battery comprised 6 standardized self-report scales, 5 of which have been used previously in TBI samples. A small battery of neuropsychological measures and a standard protocol were employed to collect data on key demographic, injury, cognitive, and psychosocial variables at trial entry.

**Primary outcome measure**

The BHS\textsuperscript{35} is a 20-item true-false self-report scale that measures the level of negative expectations about the future held by respondents over the previous week. Scores range from 0 to 20 representing nil (0-3), mild (4-8), moderate (9-14) and severe (>14) levels of hopelessness. The scale has excellent internal consistency (Cronbach \(\alpha = 0.93\)) and strong concurrent validity with clinical ratings of hopelessness (\(r = 0.74\)) and other measures of hopelessness (\(r = 0.60\)).\textsuperscript{35} The cutoff score equal to or greater than 9 was employed. Beck et al\textsuperscript{16} found that BHS scores equal to or greater than 9 were associated with significantly elevated levels of suicide risk.
Secondary outcome measures

The Beck Scale for Suicide Ideation (BSS)\textsuperscript{36} is a 19-item scale that assesses severity of suicide ideation within the previous week with total scores ranging from 0 (no suicide ideation) to 38. High levels of internal consistency (Cronbach $\alpha = 0.93$) and concurrent validity has been reported with the Beck Depression Inventory ($r = 0.64$ to $r = 0.75$)\textsuperscript{36} as well as the BHS in TBI ($r = 0.60$)\textsuperscript{7} and non–brain-damaged populations ($r = 0.52$ to $r = 0.63$).\textsuperscript{36} The present study used the standard cutoff score of equal to or greater than 9 as representing clinically significant levels of ideation.\textsuperscript{7,36}

The Hospital Anxiety and Depression Scale\textsuperscript{37} comprises 2 seven-item subscales measuring subjective complaints of generalized anxiety and depressive symptoms over the previous week. The current study employed the depression subscale. Scores range from 0 to 21 representing normal (0-7), mild (8-10), moderate (11-14) and severe (>15) levels of depressive symptoms. The subscale has high internal consistency (Cronbach $\alpha = 0.90$)\textsuperscript{38} and high test-retest reliability over an unspecified interval ($r = 0.92$).\textsuperscript{37}

The Herth Hope Index\textsuperscript{39} is a 12-item scale measuring hope in adults in clinical settings. The measure comprises 3 subscales (future orientation, positive expectancy, interconnectedness) and a total score, which ranges from 12 to 48 with higher scores representing stronger levels of hope. Coefficients for both internal consistency (Cronbach $\alpha = 0.97$) and test-retest reliability over 2 weeks (0.91) were both strong. Construct validity was investigated by factor analysis, which indicated a 3-factor solution accounting for 61% of the variance. All factors had eigenvalues greater than 1, and using 0.4 as a cutoff, there were no complex factors, and equivalent numbers of items loaded onto each of the 3 factors. Mean total score for the validation sample ($n = 172$ adults with acute, chronic, or terminal illnesses) was 32.4 ± 9.2.

The Rosenberg Self-Esteem\textsuperscript{40} scale is a 10-item measure that evaluates the extent of positive versus negative orientation toward the self. Items are rated on a Likert-type scale that produces a total score ranging from 0 to 30 with higher scores representing higher self-esteem. Internal consistency is moderate (Cronbach

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*Figure 1. Study flow diagram.*
\( \alpha = 0.77, 0.88^{41,42} \) and moderately strong test-retest correlations are reported over a 2-week period \((r = 0.85)^{43} \). The Social Problem Solving Inventory—Revised (SPSI-R)\(^44\) is a 52-item self-report measure of social problem-solving capacity. Items are rated on a 5-point Likert-type scale with higher scores representing more effective problem solving. The scale produces a total score (range 0-108; the variable used in the current study), as well as 5 subscales (positive problem orientation, rational problem-solving; negative problem orientation, impulsive/careless, and avoidance). Internal consistency for the total scale is strong (Cronbach \( \alpha = 0.95)^{44} \) as were test-retest correlations for a 3-week interval \((r = 0.87)^{44} \). In this study, the raw total scores were standardized following the administration guidelines. Standardized scores have a mean of 100 ± 15.

Preintervention neuropsychological measures

Because deficits in executive functions have been suggested as risk factors for suicide (and they are also characteristic impairments after TBI), a brief selection of executive measures commonly used in clinical practice was administered to obtain a profile of the groups. Components of executive function examined were planning and problem solving using the key search and zoo map subtests from the Behavioural Assessment of the Dysexecutive Syndrome,\(^{45}\) generativity using the Controlled Oral Word Association Test,\(^{46}\) conceptual thinking using the similarities substest from the Wechsler Adult Intelligence Scale—Revised\(^47\), and cognitive flexibility using the Trail Making Test.\(^48\)

PROCEDURE

Ethics approval was granted by the Sydney South West Human Research Ethics Committee. The electronic database of active clients of the BIRU community team was reviewed to identify suitable potential participants. Recruitment took place over a 3-year period (January 2007 to December 2009) Ninety potential participants who met eligibility criteria were screened with the BHS and BSS and 25 (28%) were eligible for inclusion with scores of greater than or equal to 9 on either scale. Three declined to participate in the trial, 1 agreed but then could not be contacted, 1 agreed but because of a delay in starting the next group was no longer available, and 3 were identified but could not be treated within the study timeframe, resulting in a total of \( n = 17 \) participants recruited to the trial (Figure 1).

Participants providing informed consent were administered the screening measures and test battery (time 1 baseline) by the first author (G.K.S.).\(^*\) Eligible participants were then invited to participate in the trial. Allocation to the study arms was conducted off-site by the second author (R.T.) and allocation was concealed. A block randomization procedure was used: When a group of 4 participants was enrolled, they were randomly allocated to condition using a computer-generated set of random numbers. All participants remained in the group to which they had been allocated.

The treatment group then commenced the WtoH program, which was delivered at the BIRU (by G.S.) over a 10-week period. The wait-list group participants were informed that there would be a delay before their group commenced. When the program was completed, the study battery was readministered to participants for both arms of the study (time 2). For ethical reasons, the wait-list participants were then provided with the treatment program, and on completion, the 2 groups completed the study battery for the final time (time 3): For the treatment group, this data collection occasion comprised a 3-month follow-up, whereas for the wait-list group, the data comprised their postgroup assessment. Final time 3 data were collected by July 2010.

One participant in the wait-list arm withdrew from the trial after completing the time 2 assessment. The remaining 16 participants completed all time 1, 2, and 3 assessments (Figure 1). The 16 participants who commenced the treatment completed the program with 100% attendance of all sessions.

Assessments at time 2 and time 3 used an independent assessor who was blind to the condition. Participants were reminded not to disclose their treatment condition to the assessor. To check the success of blinding, the assessor was asked to record any inadvertent disclosure by participants of their treatment arm and to also guess whether the person was in the treatment or wait-list group. One person was unblinded at time 2 (self-disclosure) and was therefore unblinded at time 3. Of the remaining 16 participants at time 2, the assessor correctly guessed the condition for 69% (11 of the 16) of participants. Of the remaining 15 participants at time 3, the assessor correctly guessed the arm for 47% (7 of the 15), no better than chance.

Treatment program

The experimental intervention (WtoH) comprised a 20-hour manualised group-based program delivered in 10 weekly 2-hour sessions. A breakdown of the program

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\(^*\)It is noted that author (G.K.S.) conducted the Time 1 (baseline) testing, as well as delivering the therapy program. However, because randomization occurred after the Time 1 (baseline) testing occurred, this effectively meant that (G.K.S.) was blind to group allocation. Assessments at Time 2 and Time 3 were conducted by an independent assessor, not (G.K.S.).
by session title, goals, underlying therapeutic principles and key content are provided in Table 1. Learning activities included small amounts of didactic presentations, group exercises, brainstorming, group discussion, use of therapeutic self-rating questions, activity scheduling, and a small number of intersession tasks.

The therapist’s role involved collaboration with participants in exploring the issues causing them distress. The facilitator engaged in a process of continuous assessment, identifying participant statements reflecting cognitive distortions in sessions 1 and 2 that could become the target of treatment in sessions 3 to 5 (cognitive restructuring); identifying problems or evidence of problem solving in sessions 1 to 5 that could serve as a focus in sessions 6 to 8 (problem solving). The emphasis across sessions was to treat the current issues or challenges that participants were facing. The group-based format gave participants the opportunity to compare experiences and share solutions with another person with severe TBI.

Throughout the program, standard therapeutic strategies were employed to compensate for participant cognitive impairment. For example, to compensate for learning and memory difficulties, participants were provided with a folder to keep the program handouts and worksheets. These handouts and worksheets were used as the basis for introducing and working through the key points in each of the sessions. Moreover, the facilitator wrote up summary notes for each session, which were distributed to participants. Each session began with a revision of the content from the previous session.

Handouts and worksheets contained limited amounts of text in large-sized font to forestall problems arising from poor literacy, comprehension, or visual impairments. The text of the handouts and worksheets were also reviewed to ensure they had an appropriate readability level. Furthermore, participants were not required to write anything, but some worksheets involved choosing specific responses from multiple options using a highlighter pen.

To manage problems with attention and cognitive fatigue, the groups comprised 2 participants each and were conducted in a quiet room with minimal external distractions. The groups ran for 2 hours but had a 15-minute break after the first hour. Limiting the group size also provided time for pacing the rate at which new concepts were introduced and to ensure that each participant was able to understand key ideas. Moreover, each session involved significant amounts of repetition of the key ideas and themes. In addition, the facilitator also played a more directive role in seeking to support participants who were tangential to maintain focus.

The wait-list group continued to receive standard care from the BIRU community team. The program did not constitute a crisis intervention. Therefore, a contingency plan was devised to manage any participant who became actively suicidal (treatment or wait-list condition) during the trial. The plan involved withdrawing the participant from the trial and ensuring they received the appropriate intensive intervention. However, this eventuality did not arise for any participant during the trial.

**Data analysis**

Data were entered into PASW Statistics Version 18.0 (SPSS Inc, Chicago, IL). Data screening identified 3 missing BSS scores. Values were imputed for 2 of these 3 scores. In these cases, the missing value was filled by the substitution of the participant’s BSS score completed at the adjacent time point (ie, time 2 or time 3 for the treatment group) once it had been determined that the mean group scores across the 2 time points had remained relatively stable. The final missing data point was the time 3 posttreatment score for a wait-list participant, and was left as missing data. After data screening, repeated-measures analyses of variance were conducted (group by time) for all primary and secondary outcome variables. For the between-groups analyses, the significance level was set at $P = 0.008$ (Bonferroni correction, $\alpha = 0.05/6$) to control for type I error because of multiple comparisons.

**RESULTS**

Data screening was conducted using a series of Kolmogorov-Smirnov tests on the data from each of the treatment and wait-list groups. For demographic and injury data duration of posttraumatic amnesia and time posttrauma were not normally distributed. For the key outcome variables, with 2 exceptions, all variables were normally distributed at the time 1 and time 2 assessment occasions. The one variable that was not normally distributed came from the treatment group (BSS at time 2, $P = .009$). Examination of skewness and kurtosis of this variable against the normal curve distribution, as suggested by Tabachnik and Fidell, indicated that it met criteria for normality.

At baseline, there were no significant group differences on pertinent demographic (age at injury, age at trial entry, sex), injury (duration of posttraumatic amnesia, time posttrauma), or key outcome variables (Table 2). Data on the executive measures in Table 2 demonstrate that although there were no significant group differences on the executive function measures, the mean scores indicate that the groups did experience executive impairment, albeit not to a severe degree. Both groups had lower self-esteem scores than found in other reports on TBI samples and similar mean hopefulness scores as the scale’s original (non–brain-damaged) validation sample. The mean standardized SPSI-R scores for both the treatment and wait-list groups were determined using the standardized SPSI-R scores for both the treatment and wait-list groups.

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### TABLE 2
Demographic, injury, cognitive and current psychosocial status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment (n = 8)</th>
<th>Wait-list (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at treatment, y (M,SD)</td>
<td>39.41 (12.42)</td>
<td>44.08 (11.74)</td>
</tr>
<tr>
<td>Time Post Injury, y (M,SD)</td>
<td>6.25 (6.78)</td>
<td>7.60 (4.61)</td>
</tr>
<tr>
<td>Duration of PTA, d (median,IQR)</td>
<td>10 (48)</td>
<td>21 (27)</td>
</tr>
<tr>
<td>Education, y (M,SD)</td>
<td>10.75 (1.75)</td>
<td>10.89 (1.54)</td>
</tr>
<tr>
<td>BADS key search, profile score (M,SD)</td>
<td>2.63 (1.51)</td>
<td>2.22 (1.39)</td>
</tr>
<tr>
<td>BADS zoo map, profile score (M,SD)</td>
<td>2.25 (1.49)</td>
<td>2.22 (1.39)</td>
</tr>
<tr>
<td>Similarities, age-scaled score (M,SD)</td>
<td>7.50 (3.51)</td>
<td>8.78 (2.49)</td>
</tr>
<tr>
<td>COWAT, total score (M,SD)</td>
<td>34.00 (8.47)</td>
<td>32.00 (11.10)</td>
</tr>
<tr>
<td>COWAT, total errors (M,SD)</td>
<td>1.25 (1.75)</td>
<td>1.56 (2.24)</td>
</tr>
<tr>
<td>Trail-making test—part B, s (M,SD)</td>
<td>113.60 (88.32)</td>
<td>151.44 (113.79)</td>
</tr>
</tbody>
</table>

Relationship status (n, %)
- Married/de facto: Treatment 2 (25.0) vs. Wait-list 5 (55.5)
- Single/separated/divorced: Treatment 6 (75.0) vs. Wait-list 4 (44.4)
- Living with (n, %)
  - Alone/friends: Treatment 3 (37.5) vs. Wait-list 3 (33.3)
  - Parents/family/spouse: Treatment 5 (62.5) vs. Wait-list 6 (66.7)
- Occupation (n, %)
  - Unskilled/semiskilled: Treatment 2 (25.0) vs. Wait-list 1 (11.1)
  - Clerical/skilled labor/professional: Treatment - vs. Wait-list 1 (11.1)
  - Student/avocational/homemaker: Treatment 5 (62.5) vs. Wait-list 6 (66.7)
  - In rehabilitation: Treatment 1 (12.5) vs. Wait-list 1 (11.1)
- Activity status (n, %)
  - Working fulltime, part-time, casual: Treatment 4 (50.0) vs. Wait-list 6 (66.6)
  - No regular weekly activities: Treatment 4 (50.0) vs. Wait-list 3 (33.3)

Abbreviations: BADS, Behavioural Assessment of the Dysexecutive Syndrome; COWAT, Controlled Oral Word Assessment Test; PTA, posttraumatic amnesia.

wait-list groups were almost 2 standard deviations below the mean standardized scores for the normative (non-brain-damaged) samples. Given the lack of between-groups differences on the total Herth Hope Index and SPSI-R scores respectively, further analyses of the subscales for the 2 measures were not conducted. Clinically, the depressive symptom scores for both groups were on the borderline between the mild and moderate severity bands. A total of 11/17 (64.7%) participants were on antidepressant medication at the time of the trial with no significant difference ($\chi^2$) in the distribution in the frequencies across the 2 conditions (treatment n = 4/8; wait-list n = 7/9).

A repeated-measures analysis of variance on the primary outcome variable (BHS) revealed a significant group-by-time interaction ($F_{1,15} = 13.20, P = .002$); main effects for both group and time were not significant. The mean scores indicate that the treatment group showed greater improvement on the BHS between baseline (time 1) and posttreatment (time 2) assessment occasions in comparison with the wait-list control group, which did not receive treatment between time 1 and time 2. The mean scores are presented graphically in Figure 2, showing that the treatment group improved with a reduction of 6 BHS points, whereas the wait-list group increased scores by 1 BHS point. Moreover, at an individual level 6 of the 8 participants (75%) in the treatment group reduced BHS scores by at least 1 severity band: 2 of the 4 participants who were in the severe range at baseline (time 1) improved to the moderate (n = 2) or mild (n = 2) band, and 2 of the 4 participants who scored in the moderate range at baseline improved to the mild band; the remaining 2 participants remained in the moderate band at posttreatment (time 2).

A series of repeated-measures analyses of variance was conducted on the 5 secondary outcome measures. There was a trend for significant group-by-time interaction for BSS ($F_{1,13} = 5.49, P = .036$), but no significant main effects for group or time. Inspection of mean scores, however, indicated that the treatment group remained stable on the BSS following treatment, whereas scores of the wait-list group increased over the same time period (Table 3). For the remaining secondary measures there were no other main or interaction effects.

The wait-list group received treatment (for ethical reasons) between time 2 and time 3 and although their BHS scores at time 3 (corresponding to their post-treatment assessment occasion) decreased relative to time 2, the reduction was not statistically significant. The pretreatment and posttreatment scores on the primary and secondary outcome measures for the 2 groups were then aggregated. After Bonferroni adjustment, paired $t$ tests
found a significant improvement on the BHS (pre 13.1 ± 4.3 vs post 8.8 ± 4.2; t = 3.1, degrees of freedom = 15, P = .008) for the combined groups. Clinically, this represents a global improvement from the moderate to the mild band on the BHS. There were no significant changes in the other 5 variables (suicide ideation, depression, self-esteem, social problem solving, and hopefulness).

Figure 2 also shows that BHS scores of the treatment group increased at follow-up (time 3) but the change was nonsignificant. Examining the stability of change across the 3 time points (T1 pretreatment, T2 posttreatment, and T3 follow-up), 50% (4/8) of participants who made sufficient gains to improve their BHS scores by a severity band between time 1 and time 2 (e.g., severe to moderate; moderate to mild), maintained or extended this improvement at time 3. The scores for another 2 participants remained within the same severity band across the 3 time points. Finally, 2 participants who had improved their scores sufficiently to change a severity band between times 1 and 2, did not maintain this improvement and at time 3 were scoring again in the original severity band that they had recorded at time 1.

DISCUSSION

There have been several calls for the development of psychological therapies as a treatment modality for suicidal distress after TBI.8,9,11,12 Hopelessness is an important precursor of elevated suicidality and to the best of our knowledge, the current report is the first trial of an intervention that targets psychological symptoms associated with elevated suicide risk. The WtoH intervention produced a strong treatment effect in reducing levels of hopelessness among participants compared with wait-list controls. The size of the change is comparable to earlier trials of CBT programs that treated hopelessness among samples of non–brain-damaged depressed inpatient and outpatients.21,34 Importantly, for 75% (6/8) clients in the treatment arm, these levels were maintained or

| TABLE 3 | Descriptive statistics for outcome variables |

<table>
<thead>
<tr>
<th>Variable</th>
<th>Time 1 (baseline)</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment (n = 8)</td>
<td>Wait-list (n = 9)</td>
<td>Treatment (n = 8)</td>
</tr>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Beck Hopelessness Scale</td>
<td>13.50 (3.03)</td>
<td>10.33 (3.81)</td>
<td>7.88 (2.30)</td>
</tr>
<tr>
<td>Beck Scale for Suicide Ideation</td>
<td>7.75 (10.69)</td>
<td>8.67 (7.11)</td>
<td>5.14 (8.92)</td>
</tr>
<tr>
<td>HADS—depression</td>
<td>10.63 (2.67)</td>
<td>9.56 (3.09)</td>
<td>9.50 (2.20)</td>
</tr>
<tr>
<td>Social Problem Solving Scale</td>
<td>77.38 (12.78)</td>
<td>82.11 (24.92)</td>
<td>83.75 (13.47)</td>
</tr>
<tr>
<td>Herth Hope Index</td>
<td>32.38 (5.88)</td>
<td>33.67 (4.64)</td>
<td>34.25 (2.92)</td>
</tr>
</tbody>
</table>

Abbreviation: HADS, Hospital Anxiety and Depression Scale.
improved at 3-month follow-up. Moreover, when the pre- and posttreatment scores for all trial participants were aggregated (n = 16), a similar robust reduction in hopelessness scores was observed.

 Clinically, the importance of maintenance therapy after completion of treatment programs to preserve therapeutic gains was highlighted by the decline in scores for 2 participants from the treatment group over the follow-up period. The importance of booster sessions after the completion of programs has been recognized across the field of neurorehabilitation as being particularly important for participants with severe TBI.\(^\text{28,52}\) Despite the cognitive impairments displayed by the trial group, participants still derived benefit from the program, reinforcing findings that people with cognitive deficits after TBI do benefit from psychotherapy.\(^\text{28}\)

 A trend for a significant reduction in suicide ideation scores in the treatment group was also observed (P > .05). This is a potentially important clinical gain given that suicide ideation typically represents an escalation in the level of suicidal distress.\(^\text{12}\) Furthermore, the non-significant increase in the BSS raw scores for the wait-list group between times 1 and 2 point to the possible risks in leaving such distress untreated. There were no significant changes in the scores for the other outcome variables of depression, social problem-solving, self-esteem or hopefulness.

 The treatment and wait-list groups both displayed mild-moderate rather than severe levels of depressive symptoms at Time 1 and were therefore suitable candidates for psychological therapy.\(^\text{12}\) It could be argued that providing treatment for depression may have achieved similar results. Both hopelessness and suicide ideation can be a state-dependent characteristic of depression, and treatment for depression can ameliorate suicidal distress.\(^\text{12}\) However, meta-analyses evaluating the efficacy of antidepressant medication on suicidal behavior have not been conclusive.\(^\text{53}\)

 This illustrates the point that although hopelessness and depression overlap, hopelessness cannot be subsumed under depression.\(^\text{12,18}\) In the current study, the significant reduction in hopelessness was not related to more general reductions in depressive symptoms, given that the Hospital Anxiety and Depression Scale–D scores remained relatively constant across the 3 time points for both treatment and wait-list groups. There are a number of possible explanations for this finding. First, in clinical populations people with similar levels of depression do display varying levels of hopelessness.\(^\text{16}\) This was also found in a TBI sample, with Jorge et al\(^\text{34}\) reporting that hopelessness was only present in 19% to 36% of participants classified as depressed across 4 time points during the first year postinjury. In addition, hopelessness can be observed among individuals without enough other symptoms to warrant the diagnosis of a depressive disorder.\(^\text{12,18}\) Furthermore, data on the subjective experiences of people with severe TBI suggest that hopelessness may not solely arise from depressogenic cognitive distortions but from the valid appraisal that life has changed profoundly in ways that cannot be viewed positively.\(^\text{9,10}\) Therefore, although the treatment of depression is an important therapeutic target whenever it is detected in suicidal populations, there is value in having interventions that more specifically target the precursors to, and features of, suicidal distress.

 There are some limitations in this trial and hence caution in generalizing. The trial was conducted at a single center with a modest sample. Therefore, results need to be replicated in larger sample and multicenter studies, as well as by independent researchers. The intervention may not be as effective with participants who have more severe depressive disorders. Furthermore, it would be important to monitor the therapeutic gains over a longer follow-up period. In addition to a stand-alone intervention, the potential for evaluating the benefit of such programs in combination with pharmacotherapy could also be investigated.\(^\text{12,55}\) However, even within the context of larger trials, it still would be difficult to fully evaluate the benefits of such programs in reducing overall suicide mortality or morbidity given the relatively low base rates for suicidal behaviors across the TBI population\(^\text{11}\), a problem endemic to suicide prevention research in general.\(^\text{11,12}\)

 Despite these cautions, the results of the current trial show initial promise. On the basis of the power analysis, the study was underpowered; yet, it found a strong effect size for reducing hopelessness. Four decades ago, Achte and colleagues\(^\text{3}\) observed that suicide was the end result of a process of unsuccessful adaptation after TBI. Programs such as WtoH provide a resource to intervene and increase the possibility of turning this process around.

### REFERENCES


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