An Evidence-Based Review of the Effectiveness of Cognitive Behavioral Therapy for Psychosocial Issues Post Spinal Cord Injury

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Abstract

Study Design—Systematic review.

Objective—To examine the evidence supporting the effectiveness of cognitive behavioral therapy (CBT) for improving psychosocial outcomes in individuals with spinal cord injury (SCI).

Method—Electronic databases (MEDLINE, CINAHL, EMBASE, and PsycINFO), were searched for studies published between 1990 and October 2010. Randomized control trials (RCTs) and non-randomized control trials (non-RCTs) utilizing a CBT intervention to improve psychosocial outcomes (depressive symptomatology, anxiety, coping and adjustment to disability) in outpatient persons with SCI were included for review. Levels of evidence were assigned to each study using a modified Sackett scale. Effect size calculations for the interventions were provided where possible.

Results—Nine studies met the inclusion criteria. The studies reviewed included two RCTs, six prospective controlled trials (PCTs) and one cohort study. All studies examined at least two groups. There is Level 1 and Level 2 evidence supporting the use of specialized CBT protocols in persons with SCI for improving outcomes related to depression, anxiety, adjustment and coping.

Conclusions—CBT holds promise as an effective approach for persons with SCI experiencing depression, anxiety, adjustment and coping symptoms. As CBT may involve many different components, it is important in future to determine which of these elements alone or in combination is most effective in treating the emotional consequences of SCI.

Keywords

cognitive behavioral therapy; spinal cord injury; rehabilitation

Introduction

Approximately 27% of persons with spinal cord injury (SCI) experience clinically significant levels of depression (North, 1999); however, rates of depressive symptoms across other studies have been found to range from 10–60% (Bombardier, Richards, Krause, Tulskey, & Tate, 2004; Elliott & Frank, 1996; Kalpakjian & Albright, 2006). Similarly, the prevalence of anxiety symptoms can range between 20–25% (Hancock, Craig, Dickson, Chang & Martin, 1993). Following SCI, individuals can experience high levels of emotional distress, pain, and dependency, which can significantly impact quality of life (Elliott & Frank, 1996; Galvin & Godfrey, 2001). Hence, to help people cope effectively, the rehabilitation process needs to address psychological issues that may occur post-SCI.

Coping has been defined as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person,” (Lazarus & Folkman, 1984, p. 178). Coping is an important mediator of emotional adjustment (Galvin & Godfrey, 2001). Kennedy et al. (2000) found that higher levels of anxiety and depression correlate with maladaptive coping strategies such as behavioral disengagement, denial, relationship status and drug and alcohol abuse.

Contrary to previous beliefs regarding adjustment to SCI, Hancock and colleagues (1993) found no evidence to support spontaneous adjustment over time. Instead, a key predictor of long-term adjustment is coping style, with many studies demonstrating that adjustment early post-injury often predicts long-term adjustment (Craig, Hancock, & Dickson, 1994; Kennedy and Rogers, 2000; Pollard & Kennedy, 2007). For instance, Pollard and Kennedy (2007) found that anxiety and depression rates did not change significantly within a sample of 87 persons with SCI over 10 years, and that coping strategies used at week 12 explained a third of the variance in depression rates at year 10. Interventions that can potentially help persons cope early post-injury may have long-term benefits.

Issues of anxiety and depression following SCI may be ameliorated by addressing both emotional and cognitive processes. For instance, Elliott, Godshall, Herrick, Witty, & Spruell (1991) found that effective problem-solving abilities were associated with lower levels of depression and distress among persons with SCI. Furthermore, a positive relationship has been demonstrated between the use of cognitive restructuring and effective coping and adjustment (Hanson, Buckelew, Hewett, & O’Neal, 1993). Based on these findings, interventions such as cognitive behavioral therapy (CBT) that attempt to increase a person’s problem solving and cognitive restructuring abilities may be effective means for improving psychosocial functioning following SCI.

CBT is a frequently used treatment for psychosocial issues. CBT incorporates a variety of techniques to facilitate emotional and behavioral change on the part of the person. Several common techniques used in CBT include cognitive restructuring, increasing the person’s

access and willingness to engage in rewarding activities, various forms of relaxation training, problem solving strategies, as well as assertiveness and coping skills training. Cognitive restructuring attempts to lessen distress by encouraging a re-evaluation of distorted cognitions that underlie feelings of depression and anxiety. It is important that CBT be directed specifically to the symptoms of interest rather than a general psychotherapy process (Swett & Richardson, 2004).

Butler, Chapman, Forman, and Beck (2006) conducted a review of the meta-analytic literature on CBT for a range of disorders, such as depression, anxiety, social phobia, post-traumatic stress, in persons without chronic illness and found CBT to be effective for both major depression and generalized anxiety disorders. Elliott and Kennedy (2004) evaluated interventions to treat depressive symptoms and reported positive effects of CBT in SCI persons with high levels of depressive symptomatology. The purpose of the present systematic review was to evaluate the available evidence for the effectiveness of CBT in improving depressive and anxiety symptoms in persons with SCI, and for addressing issues of coping and adjustment post SCI.

Method

Literature Search Strategy

A systematic review of relevant literature, published in English between 1990 to October 2010, was conducted using multiple databases (MEDLINE, CINAHL, EMBASE, and PsycINFO). Key words used for the search included: spinal cord injury, paraplegia, quadriplegia, tetraplegia, cognitive behavioral therapy or its acronym (CBT), depression, anxiety. References of identified articles were also reviewed to find additional pertinent articles that may have been omitted from the database search results.

Study Selection

Only those studies examining the impact of CBT on psychosocial symptoms post SCI were included. Studies involving adult participants with at least 50% having an SCI and a minimum of three SCI participants were reviewed. Studies included both controlled and uncontrolled trials. Studies which reported combined pharmacological or other non-pharmacological treatments were also included. Of the 120 identified studies, only 9 studies met these inclusion criteria.

It should be noted that for this paper, the terms “depression” and “depressed,” refer to the clinical diagnosis of Major Depressive Disorder according to the Diagnostic and Statistical Manual Of Mental Disorders (DSM-IV; American Psychiatric Association, 2000), while “depressive symptoms” or “anxiety symptoms” refer to assessments based on an individual self-report measures.

Study Appraisal and Data Synthesis

A quality assessment was conducted for all randomized controlled trials (RCTs) by two blinded reviewers using the Physiotherapy Evidence Database (PEDro) scoring system (RCTs; Moseley, Herbert, Sherrington, & Maher, 2002). The PEDro tool consists of 11

questions with a maximum score of 10. The following criteria were used for rating the methodologic quality of a study: 9 to 10, excellent; 6 to 8, good; 4 to 5, fair; and < 4 poor (Foley, Bhogal, Teasell, Bureau, & Speechley, 2006). Rare scoring discrepancies were resolved by a third blinded reviewer. Intraclass correlations (ICC[model 1, K]) and confidence intervals (CI) for the two reviewers have been previously established to be 0.91 (95% CI 0.70–0.98) for the PEDro score (*F* statistic not significant; Eng et al., 2007).

Data were extracted on the type of study, participant characteristics, description of the intervention, outcome measures used and study results. The strength of the evidence for each intervention was rated using a modified Sackett scale containing 5 levels instead of the original 10 sub-categories (Eng et al., 2007; Straus, 2005; See Table 1).

Data Analysis

Effect sizes for each intervention were provided where possible. The effect size was calculated as a standardized mean difference for each study by subtracting mean change scores of the control group from the treatment group and dividing by the pooled standard deviation. Hence, effect sizes represent size and direction of the treatment effect in each study. The criteria used to interpret the resulting effect sizes were those outlined in Cohen (1988): small = 0.2, moderate = 0.5, large = 0.8. By shifting the focus towards the effect size estimate and away from significance tests, this allows for a better understanding of the clinical potential of an intervention. The effect size focuses attention on the key index (i.e., how large is the effect) in the population.

Results

Study Size and Quality

Power calculation results were reported in only two studies (Dorstyn, Mathias, & Denson, 2010; Duchnick, Letsch, & Curtiss, 2009). Duchnick et al. (2009) reported a sample size estimate of 0.80 with an alpha error protection rate of 0.05, while Dorstyn et al. (2010) reported their study to be underpowered. Sample sizes of all the studies reported herein ranged from 18 to 296, with an average sample size of 76.1. Only one study, a strong RCT, qualified as Level 1 evidence (Schulz et al., 2009). The remaining eight studies provided Level 2 evidence according to the modified Sackett scale (see Table 2). While one other study did utilize participant randomization, the quality score yielded was inadequate to be considered Level 1 evidence (Duchnick et al., 2009). One study utilized a blind assessor (Schulz et al., 2009) and the assessment of outcome measures were conducted by a clinician or research coordinator not responsible for administering treatment to participants in another two studies (Dorstyn et al., 2010; Kahan, Mitchell, Kemp, & Adkins, 2006).

Study Design

Five studies compared the outcomes of a treatment and a control group (see Table 2). Of these, three studies compared the treatment group with a retrospective control group (Craig, Hancock, Chang, & Dickson, 1998; Kennedy, Duff, Evans, & Beedie, 2003; King & Kennedy, 1999), and two utilized control groups consisting of patients who declined treatment (Kahan et al., 2006; Kemp, Kahan, Krause, Adkins, & Nava, 2004). Dorstyn et al.

(2010) allocated participants into two groups: treatment group, which received CBT treatment and the control group, which received standard SCI rehabilitation only (“treatment as usual”). Craig and colleagues (1998) followed the same participants as originally assessed in Craig, Hancock, Dickson and Chang (1997) over a one-year period. Duchnick et al. (2009) provided group CBT treatment as part of a “Coping Effectiveness Training” (CET) intervention; the control group received supportive group therapy (SGT) involving peer based emotional support. Schulz et al. (2009) randomized caregivers and care receivers into three groups: 1) dual treatment group, which involved training both the caregiver and care receiver; 2) single treatment group, where only the caregivers received training; and 3) a control group, where participants received a comprehensive education package and three check-in telephone calls for the duration of the study.

Five studies utilized group-based therapy conducted during inpatient rehabilitation periods (Craig et al., 1997; Craig et al., 1998; Duchnick et al., 2009; Kennedy et al., 2003; King & Kennedy, 1999). Group size for these studies ranged from 4 to 9 participants with therapy intensities of between 1 to 2 hours per week for 7 to 10 weeks duration. Three studies examined the effectiveness of individual CBT in either an inpatient (Dorstyn et al., 2010) or outpatient (Kahan et al., 2006; Kemp et al., 2004) setting. Most individual participant interventions were less time intensive (30 to 60 minutes per week) than were the group interventions, but were typically of longer duration (up to 6 months in some cases). Schulz et al. (2009) provided both individual and group based treatment for participants. In this study, participants receiving treatment were provided six individual therapy sessions at home or by the telephone. Five telephone support group sessions were also provided. The dual treatment group sessions for caregivers were administered without the care receiver being present and vice versa.

In all studies, therapeutic interventions included treatments involving coping skills training, cognitive restructuring, problem solving, and stress management techniques. Attention diverting strategies primarily for lessening feelings of pain were also administered. Schulz et al. (2009) included educational components involving enhancing self care and preventative health behaviors.

Treatment Fidelity

Treatment fidelity (i.e., the methodological strategies used to monitor and enhance the reliability and validity of interventions) was reported in eight studies. Schulz et al. (2009) utilized a standard training protocol for all interventionists and monitored treatment sessions. Two studies conducted a comprehensive review of all persons on their completion of psychotherapy, adherence to medications and complications (Kahan et al., 2006; Kemp et al., 2004). The studies found no significant difference in baseline personal characteristics between persons who adhered to the treatment protocol and those who did not.

Another two studies utilized an adapted protocol based on adjustment in persons with human immunodeficiency virus (HIV; Kennedy et al., 2003; King & Kennedy 1999), whereas Duchnick et al. (2009) utilized a standardized protocol specific to SCI (Kennedy & Duff (2001). Similarly, Craig and colleagues (1997; 1998) also followed a manualized treatment protocol for persons following SCI.

Participant Characteristics

Most studies provided comprehensive baseline characteristics of participants for both the treatment and control groups. Of note, most of studies reviewed included a heterogeneous sample of persons with mild to moderate depressive symptoms based on self-report outcome measures such as the Beck Depression Inventory (BDI; Craig et al., 1997; Craig et al., 1998; Kennedy et al., 2003; King & Kennedy, 1999), Center for Epidemiological Studies of Depression Scale (CES-D; Duchnick et al., 2009; Schulz et al., 2009) and Depression Anxiety Distress Scale-21 (DASS-21; Dorstyn et al., 2010). Two studies included only those persons with SCI who reported symptoms consistent with major depression according to DSM-IV criteria and/or the Older Adult Health and Mood Questionnaire (OAHMQ; Kahan et al., 2006; Kemp et al., 2004). In Duchnick et al. (2009), the control group reported greater depressive and anxiety symptoms (CES-D; $M = 19.6$ [$SD = 11.7$] vs. 13.8 [$SD = 9.0$]; STAI; 47.5 vs. 42.2) than did the treatment group at baseline; however, this difference did not reach statistical significance.

Combined Pharmacological Treatment

Three of the studies reviewed used pharmacological treatments however, only one reported administration of a specific drug to each participant (Dorstyn et al., 2010; Kahan et al., 2006; Kemp et al., 2004). Dorstyn et al. (2010) reported providing amitriptyline to five participants in the treatment group for “distress” and five participants in the control group for neuropathic pain. Participants in both the control and treatment groups of the Kahan et al. (2006) and Kemp et al. (2004) studies were prescribed antidepressants on an individual basis; with paroxetine and sertraline most commonly prescribed.

Effectiveness of CBT on Depression and Depressive Symptomatology

Effect sizes for depression-related outcomes were calculated and reported according to duration of follow-up (Table 3). Only two studies examined the effectiveness of CBT on major depression (Kahan et al., 2006; Kemp et al. 2004). Both studies demonstrated that CBT is effective in reducing the incidence of major depressive disorder and maintaining the reduction. At six months, large effect sizes were seen in Kahan et al. (2006), $SMD = 1.529$ and Kemp et al. (2004), $SMD = 1.503$, at reducing depressive symptoms based on the OAHMQ. Further, based on the OAHMQ, Kahan et al. (2006) found that 76% of persons improved their depressive symptoms post-CBT treatment compared to 32% in the control group. Kemp et al. (2004) also demonstrated a significant decrease in depression scores based on OAHMQ in the treatment group but not in the control group ($p < 0.001$).

King and Kennedy (1999) found a moderate effect for up to two years in their study using coping effectiveness training to improve depressive symptoms, anxiety and coping in participants with SCI. The study showed a significant decrease in BDI scores between the two groups post-intervention ($p < 0.01$) and only one of nine participants continued to report elevated BDI scores (>14).

Small improvements in depressive symptoms were seen in Craig et al. (1997; 1998), Dorstyn et al. (2010), Duchnick et al. (2009), and Schulz et al. (2009). Dorstyn and colleagues (2010) employed a CBT protocol directed towards improving general psychological morbidity.

Although the total DASS-21 scores in their treatment group did not change over the treatment course, the depression sub-scale decreased following intervention ($p < 0.05$) but returned to baseline values at a 3-month follow-up. In contrast, the control groups' sub-scale scores remained stable over the period of investigation. At the 3 month follow-up, 78% of persons in the treatment group met clinical criteria for major depressive disorder; only one (10%) person in the control group met these criteria.

Duchnick et al. (2009) evaluated a coping effectiveness training protocol in the treatment of depression and anxiety symptoms. The study reported improvements ($p < 0.05$) in depressive symptoms at program conclusion in both the CET and an SGT control groups; however, no difference in symptoms was seen between them. Both groups also evidenced subsequent increases in depressive symptoms at follow up. No significant improvement on depression outcome measures was reported following completion of a group CBT intervention by Craig et al. (1997) or at one-year follow-up (Craig et al., 1998). Of participants with elevated BDI scores (>14) at baseline lower levels of depressive mood after one year were reported when compared to control participants ($p < 0.01$; Craig et al., 1997).

Schulz et al. (2009) conducted a study evaluating the effectiveness of CBT intervention for improving quality of life in caregivers and care recipients. The study found significant improvement in depressive symptoms in the dual target group compared to the caregiver-only group when mean values of the caregiver and care recipient scores were calculated as a unit ($p = 0.014$). However, no significant improvement was found in the CES-D scores of care receivers in the active treatment group compared to the control group. Effect sizes could not be calculated for the Kennedy et al., (2003) studies; however, the study found a significant decrease in BDI scores in participants receiving CBT ($p < 0.001$) compared to the control group.

Effectiveness of CBT on Anxiety

Five studies examined the effect of CBT on anxiety post-SCI. CBT was found to produce small effects in reducing anxiety in three studies (i.e., Dorstyn et al., 2010; Duchnick et al., 2009; King and Kennedy 1999). King and Kennedy (1999) found a trend towards decreased anxiety in participants receiving CBT; however, anxiety was shown to be strongly related to reports of depressive symptoms. Post hoc analysis demonstrated an improvement in anxiety in the treatment group when compared to the control group ($p < 0.05$). Duchnick et al., (2009) reported a reduction in State Trait Anxiety Inventory (STAI) scores for both the CET and SGT groups ($p < 0.001$). Significant decreases in DASS-21 anxiety sub-scale scores ($p < 0.05$) were found by Dorstyn et al. (2010).

CBT had no effect on anxiety symptoms in Craig et al. (1997), based on effect size calculations. Further, no significant improvement in anxiety levels were reported according to the STAI scale in persons receiving CBT when compared to controls (Craig et al., 1997). Effect sizes could not be calculated for one remaining study that demonstrated that CBT was effective in reducing anxiety when compared to controls (Kennedy et al., 2003). Kennedy and colleagues (2003) found a reduction in STAI scores from baseline to post intervention in persons receiving CBT but not in the controls ($p = 0.001$).

Effectiveness of CBT on Coping

Four studies examined the effectiveness of a CBT intervention on coping post-SCI. Craig et al. (1997) found small effects in improving self-esteem based on the Self Esteem Scale (SES) post-CBT; however, significantly higher levels of self-esteem were present in the treatment group compared to the control at baseline. Hence, considering pretreatment levels, no significant improvement in self-esteem was seen between the two groups post CBT. In the one year follow up study (Craig et al. 1998), CBT had no effect on the participants' locus of control as measured by the Locus of Control Behavior Scale (LCB). Both Kennedy et al. (2003) and King and Kennedy (1999) used the COPE inventory to assess coping post CBT intervention. Effect size calculations were not possible for these studies due to lack of available data. The studies found no significant change overall; however, Kennedy et al., (2003) alcohol usage was lower in the intervention group compared to the treatment group ($p < 0.001$) while King and Kennedy (1999) noted that the use of religion and humor coping strategies ($p < 0.05$).

Effectiveness of CBT on Adjustment

Three studies examined the effectiveness of CBT on adjustment post-SCI. Duchnick et al. (2009) found significant improvement in the Adaptation to Disability Scale – Revised (ADS-R) in the group receiving CBT compared to the SGT group ($p < 0.001$) at six month follow up. Kahan et al. (2006) and Kemp et al. (2004) examined adjustment in SCI persons using the Life Satisfaction Scale (LSS) and Community Activities Checklist (CAC). Both studies found persons receiving CBT intervention were significantly more satisfied with their life ($p < 0.001$) and participated in significantly more activities ($p < 0.001$) than those in the control group at discharge and up to an average of two years later.

Discussion

In this review of CBT interventions post SCI, nine studies met established inclusion criteria. Two studies addressed major depression while seven explored the effect upon measures of depressive symptomatology. Five studies explored symptoms of anxiety whereas a smaller proportion addressed coping ($n = 4$) and adjustment (3). Overall, there is Level 1 and Level 2 evidence supporting the effectiveness of CBT on significantly decreasing depressive symptoms after SCI. With regard to anxiety, there was conflicting Level 2 evidence that CBT is effective in decreasing symptoms of anxiety. Finally, there was only Level 2 evidence that CBT positively impacts coping styles and adjustment post-SCI.

CBT Effectiveness

The largest effect of CBT on depression symptoms was seen in two studies (Kahan et al., 2006; Kemp et al., 2004), which included only participants diagnosed with Major Depressive Disorder according to the DSM-IV (American Psychiatric Association, 2000). The remaining studies had more heterogeneous group of patients and employed self-report screening measures (e.g., BDI) to identify depressive symptoms. In the baseline and follow-up study of Craig and colleagues (1997; 1998), no statistically significant improvements in depression symptoms post-CBT were detected, and the effect sizes calculated were small. One possible explanation of the lack of significant findings reported by Craig et al. (1997;

1998) might be that the participants' baseline depressive symptoms were not severe enough to yield a substantial change as a result of treatment. For instance, these studies reported baseline average BDI scores approximating the lower limit of the "mild" severity range (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Evaluating the impact of CBT in a sample that includes only a small percentage of participants with depressive symptoms makes it difficult to demonstrate a treatment effect. Indeed, Craig et al. (1998) has suggested offering CBT only to those SCI survivors identified as experiencing significant adjustment difficulties.

Furthermore, Duchnick et al., (2009) reported baseline differences in CES-D scores between the treatment and control group. Although this difference was statistically significant, possibly due to the small sample size, it may have important clinical implications regarding evaluating treatment effectiveness. A criterion score of 16 or 19 on the CES-D is indicative of depressed mood (Sakakibara, Miller, Orenczuk, & Wolfe, 2009; Schein & Koenig, 1997). Based on these criteria the control group in Duchnick et al., (2009) would have a depressed mood (CES-D = 19.6) while the treatment group would not (CES-D = 13.8) at baseline. Pre-existing differences at baseline like this one can dramatically decrease the likelihood of finding significant treatment effects when groups are compared after an intervention.

Hence, in the future, CBT studies targeting the issue of depression in patients with SCI, may wish to focus on selecting participants with more severe depressive symptoms, ideally those meeting strict clinical diagnostic criteria, to increase the likelihood of detecting improvements following CBT. Alternately, conducting a sub-group analysis on persons with clinically elevated levels of depression may also be an option; however, this would also likely require larger sample sizes which could potentially be an issue for recruitment. Additionally, baseline group differences should be kept to a minimum.

There is conflicting evidence for the effectiveness of CBT on anxiety symptoms. For instance, Craig et al. (1997) found no decrease in anxiety symptoms whereas the other studies (Dorstyn et al., 2010; Duchnick et al., 2009; King & Kennedy, 1999; Kennedy et al., 2003) showed small improvement in anxiety symptoms; however, these benefits were in short term and the severity of anxiety symptoms later returned to levels similar to baseline. The varying results in the management of anxiety using the CBT protocols may in part be due to the fact that the CBT interventions in these studies were specifically geared towards depressive symptoms and adjustment; anxiety was a secondary outcome for most interventions. Having CBT sessions that directly address anxiety issues may have been more effective at reducing anxiety post-SCI.

With regards to post injury coping and adjustment, the evidence is promising but further work is required to determine the best means for integrating CBT into clinical practice. Although significant findings were detected in the identified studies using SCI specific coping CBT interventions (Kennedy et al., 2003; King & Kennedy, 1999), each study found differing effects for particular coping styles. Kennedy et al. (2003) reported persons with increased coping improved in the use of alcohol and drugs, while King and Kennedy (1999) noted that the use of religion and humor coping strategies increased. These findings indicate that strategies of coping may be different for each person. Therefore, it is important to not

only examine group changes but also individual change. As well, the findings may have been influenced by the use of the COPE measure, which may not have been sensitive enough to measure all the changes during a short period of time.

In contrast to the studies above, Craig and colleagues (1997; 1998) found only a modest effect of CBT on locus of control. This lack of an effect might be attributed to using a CBT protocol designed for another health population (e.g., HIV patients). Given the multitude of physical and emotional consequences following SCI, it is important that CBT interventions are specifically targeted at the issues relevant to the SCI population.

Adjustment (i.e., community participation; life satisfaction; disability acceptance) improved significantly in three studies following CBT intervention (Duchnick et al., 2009; Kahan et al., 2006; Kemp et al., 2004). Duchnick et al., (2009) found the CBT group demonstrated greater improvements compared to the comparison group receiving a non-CBT intervention. Furthermore, both Kahan et al., (2006) and Kemp et al., (2004) were individual-based therapies that reported improvement in adjustment and life satisfaction. Collectively, it appears that a CBT intervention may positively affect adjustment for both inpatients and outpatients and in both group and individual interventions.

Limitations and Considerations

Various methodological issues noted in the studies reviewed limited the general applicability of these results. Power calculations were conducted in only two studies (Dorstyn et al., 2010; Duchnick et al., 2009), with one of the two studies too underpowered to demonstrate significant differences in outcomes (Dorstyn et al., 2010). As such, the possibility exists that the lack of positive findings might have resulted from studies being underpowered and not that CBT was ineffective. Duchnick et al. (2009) reported no significant difference in outcomes between CBT and SGT group interventions; however, they identified that a possible overlap was identified involving the cognitive and educational content discussed in the groups. In a similar study comparing CBT, supportive expressive group psychotherapy (SEG), and sertraline for the treatment of depression in persons with multiple sclerosis (Mohr, Boudewyn, Goodkin, Bostrom, & Epstein 2001), it was found that CBT and sertraline were each more effective at reducing depression than was SEG. In contrast to the Duchnick et al. (2009) study, Mohr et al., (2001) discussed the use of coping strategies only within the CBT group intervention.

The multifaceted treatment practices typically employed in CBT interventions also raise an important concern. Most studies employed various components of CBT including psycho-education, relaxation training, cognitive restructuring, increased behavioral activation and assertiveness training. As a result, it was difficult to determine which intervention or combination of interventions were most effective for depression and anxiety symptoms in persons post SCI. Furthermore, studies stated that their aim was to improve adjustment or coping; however, assessments were only conducted to examine improvement in depression or anxiety rather than the construct the CBT was targeted for. This can have important implications since the CBT technique is most effective when directed towards particular symptoms rather than general psychological well-being. Hence, it is imperative to match study outcomes to the targeted outcome of the CBT intervention.

More generally, the impact of social factors during therapy was not addressed in all but one of the studies (Schulz et al., 2009). While this study's primary focus was improving caregiver quality of life, their analysis found when both the caregiver and care receiver were given active treatment, significant improvements in both CES-D scores and health symptoms were seen in the care receivers. This study fits well with the model for understanding adjustment following disability described by Elliott (2002). This model emphasizes the influence of various factors such as personal characteristics, social and environmental characteristics, physical health, the phenomenological and appraisal process, and psychological well-being in the ongoing adjustment of persons with physical disability. One important social and environmental factor is the interaction with the person's caregiver and their quality of life. Including an extra group in Schulz et al. (2009) with care receivers the only participants receiving active treatment, could empirically demonstrate this linkage.

Many of the studies reviewed did not report details of any concurrent psychopharmacological treatment received by their participants. There appears to be a subset of persons with highly refractory mood and anxiety symptomatology that may not respond readily to time limited treatment packages and may require longer treatment duration (Kahan et al., 2006). Furthermore, several of the studies reviewed reported short term improvement in depression and/or anxiety symptoms post-CBT treatment, which returned to baseline a few months post-treatment. Contemporary theories on the psychotherapeutic change suggest that the process is not necessarily a linear transition but can be discontinuous and nonlinear. It is believed that the process of psychotherapy can challenge a person's emotional and psychosocial environment resulting in abrupt patterns of life changes (Hayes, Laurenceau, Feldman, Strass & Cardaciotto, 2007; Laurenceau, Hayes & Feldman, 2007). Kemp et al. (2004) found non-linear change in improvement of symptoms over time. Multiple assessments are important to establish both effectiveness and trajectory of change. As well, presenting individual data rather than group averages may yield more sensitive and specific results data (Hayes et al., 2007; Laurenceau et al., 2007).

CBT Clinical Considerations

CBT has many potential advantages over alternate treatment modalities for treating depression and anxiety in persons with SCI. CBT has been shown to be more cost effective than pharmacological treatments for depression (Byford & Bower, 2002). Furthermore, pharmacological interventions often require long-term, or in some cases lifetime adherence, which can be quite costly. As well, medications may have side effects that impact treatment compliance. Not infrequently, access to suitable transportation to and from outpatient therapy can also be a potential barrier for many persons with SCI. As such, CBT can be delivered in a number of formats that can circumvent this issue. For instance, CBT delivered through the Internet (Wade, Walz, Carey, & Williams, 2008), videoconferencing (Elliott, Brossart, Berry, & Fine, 2008; Hufford, Glueckauf, & Webb, 1999) and telephone counseling (Hopko et al., 2008) have been shown to be effective for a variety of populations. These alternate delivery methods may allow persons with SCI who have transportation or access issues (e.g., living in remote areas), to immediately engage in therapy.

In addition, sensitivity of outcome measures to assess depressive symptoms in persons with SCI is limited. Assessment of depression by generic instruments include such somatic symptoms as weight or energy loss, increased blood pressure, sleep disturbance, and rapid heart rate. These symptoms may be present in the person with SCI and be unrelated to depression (Sakakibara et al., 2009). Bombardier and colleagues (2004) found depressed mood, anhedonia and two somatic symptoms including disturbed sleep and decreased energy are high indicators of MDD. Due to these issues, some have recommended higher depression cutoff scores on the BDI and CES-D when used with persons with SCI (Kuptniratsaikul, Chulakadabba, & Ratanavijitrasil, 2002; Radnitz et al., 1997). Similarly, symptom measures of anxiety may include somatic items (e.g., numbness or tingling; jittery; unsteady; shakiness) that can also be consequences of SCI.

Conclusion

CBT was found to be moderately effective in improving symptoms of depression, coping and adjustment in adults following SCI. However, its effect on anxiety is yet to be established. Furthermore, CBT was found to have large effect size improvements in depressive symptoms in persons clinically diagnosed with depression compared to those presenting only mild symptoms of depression.

The use of CBT has many advantages in a rehabilitation program: it is structured; time limited, involves goal setting, engages clients, and is skills based. Further, the CBT approach can be delivered either on a group or individual basis, and is applicable to both inpatient and outpatient settings, which makes it useful for comprehensive rehabilitation programs. Alternative modes of delivery (i.e. telephone, internet) may also be of benefit for those patients unable to attend outpatient therapy sessions.

Although most studies were well-designed, certain limitations of these studies need to be addressed to further evaluate CBT's effectiveness. These limitations include the use of small sample sizes, ineffective inclusion criteria (i.e. patients without depressive symptomatology), monitoring of anti-depressant treatments, lack of long term follow up with participants, and difficulty in evaluating the effectiveness of each individual component of the program. Despite these limitations, CBT shows great promise in improving psychosocial functioning such as depression, anxiety, coping and adjustment post SCI.

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Reference List

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington, DC: American Psychiatric Association; 2000. Text Revision
- Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Archives of General Psychiatry*. 1961; 4:561–571. [PubMed: 13688369]

- Bombardier CH, Richards JS, Krause JS, Tulskey D, Tate DG. Symptoms of major depression in people with spinal cord injury: implications for screening. *Archives of Physical Medicine and Rehabilitation*. 2004; 85:1749–1756. [PubMed: 15520969]
- Butler AC, Chapman JE, Forman EM, Beck AT. The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clinical Psychology Review*. 2006; 26:17–31. [PubMed: 16199119]
- Byford S, Bower P. Cost effectiveness of cognitive behavioural therapy for depression: current evidence and future research priorities. *Expert Review of Pharmacoeconomics and Outcomes Research*. 2002; 2:457–465.
- Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*. 2. Lawrence Erlbaum Associates; 1988.
- Craig A, Hancock K, Chang E, Dickson H. The effectiveness of group psychological intervention in enhancing perceptions of control following spinal cord injury. *Australian & New Zealand Journal of Psychiatry*. 1998; 32:112–118. [PubMed: 9565192]
- Craig AR, Hancock KM, Dickson HG. A longitudinal investigation into anxiety and depression in the first 2 years following a spinal cord injury. *Paraplegia*. 1994; 32:675–679. [PubMed: 7831074]
- Craig AR, Hancock K, Dickson H, Chang E. Long-term psychological outcomes in spinal cord injured persons: results of a controlled trial using cognitive behavior therapy. *Archives of Physical Medicine & Rehabilitation*. 1997; 78:33–38. [PubMed: 9014954]
- Dorstyn DS, Mathias JL, Denson LA. Psychological intervention during spinal rehabilitation: a preliminary study. *Spinal Cord*. 2010; Advanced online publication. doi: 10.1038/sc.2009.161
- Downs SH, Black N. The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology & Community Health*. 1998; 52:377–384. [PubMed: 9764259]
- Duchnick JJ, Letsch EA, Curtiss G. Coping effectiveness training during acute rehabilitation of spinal cord injury/dysfunction: a randomized clinical trial. *Rehabilitation Psychology*. 2009; 54:123–132. [PubMed: 19469601]
- Elliott TR. Defining out common ground to reach new horizons. *Rehabilitation Psychology*. 2002; 47:131–143.
- Elliott TR, Brossart D, Berry JW, Fine PR. Problem solving training via videoconferencing for family caregivers of persons with spinal cord injuries: a randomized controlled trial. *Behaviour Research & Therapy*. 2008; 46:1220–1229. [PubMed: 18828993]
- Elliott TR, Frank RG. Depression following spinal cord injury. *Archives of Physical Medicine and Rehabilitation*. 1996; 77:816–823.
- Elliott TR, Godshall F, Herrick S, Witty T, Spruell M. Problem solving appraisal and psychological adjustment following spinal cord injury. *Cognitive Therapy Research*. 1991; 15:387–398.
- Elliott TR, Kennedy P. Treatment of depression following spinal cord injury: An evidence based review. *Rehabilitation Psychology*. 2004; 49:134–139.
- Eng J, Teasell R, Miller W, Wolfe D, Townson A, Aubut JA, Abramson C, Hsieh JTC, Connolly S, Konnyu K. Spinal cord injury rehabilitation evidence: Method of the SCIRE systematic review. *Topics in Spinal Cord Injury Rehabilitation*. 2007; 13:1–10. [PubMed: 22767989]
- Foley NC, Bhogal SK, Teasell RW, Bureau Y, Speechley MR. Estimates of quality and reliability with the physiotherapy evidence-based database scale to assess the methodology of randomized controlled trials of pharmacological and nonpharmacological interventions. *Physical Therapy*. 2006; 86:817–824. [PubMed: 16737407]
- Galvin LR, Godfrey HPD. The impact of coping on emotional adjustment to spinal cord injury: A review of the literature and application of a stress appraisal and coping formulation. *Spinal Cord*. 2001; 39:615–627. [PubMed: 11781857]
- Hancock K, Craig A, Dickson H, Chang E, Martin J. Anxiety and depression over the first year of spinal cord injury: A longitudinal study. *Paraplegia*. 1993; 31:349–357. [PubMed: 8336997]
- Hanson S, Buckelew SP, Hewett J, O'Neal G. The relationship between coping and adjustment after spinal cord injury: A five-year follow-up study. *Rehabilitation Psychology*. 1993; 38:41–52.
- Hayes AM, Laurenceau JP, Feldman G, Strass JL, Cardaciotto L. Change is not always linear: The study of nonlinear and discontinuous patterns of change in psychotherapy. *Clinical Psychology Review*. 2007; 27:715–723. [PubMed: 17316941]

- Hopko DR, Bell JL, Armento M, Robertson S, Mullane C, Wolf N, Lejuez CW. Cognitive-behavior therapy for depressed cancer patients in a medical care setting. *Behavior Therapy*. 2008; 39:126–136. [PubMed: 18502246]
- Hufford BJ, Glueckauf RL, Webb PM. Home-based, interactive videoconferencing for adolescents with epilepsy and their families. *Rehabilitation Psychology*. 1999; 44:176–193.
- Kahan JS, Mitchell JM, Kemp BJ, Adkins RH. The results of a 6-month treatment for depression on symptoms, life satisfaction, and community activities among individuals aging with a disability. *Rehabilitation Psychology*. 2006; 51:13–22.
- Kalpajian CZ, Albright KJ. An examination of depression through the lens of spinal cord injury. Comparative prevalence rates and severity in women and men. *Womens Health Issues*. 2006; 16:380–388. [PubMed: 17188221]
- Kemp BJ, Kahan JS, Krause JS, Adkins RH, Nava G. Treatment of major depression in individuals with spinal cord injury. *Journal of Spinal Cord Medicine*. 2004; 27:22–28. [PubMed: 15156933]
- Kennedy P, Duff J. Post traumatic stress disorder and spinal cord injuries. *Spinal Cord*. 2001; 39:1–10. [PubMed: 11224007]
- Kennedy P, Duff J, Evans M, Beedie A. Coping effectiveness training reduces depression and anxiety following traumatic spinal cord injuries. *British Journal of Clinical Psychology*. 2003; 42:1–52. [PubMed: 12675975]
- Kennedy P, Rogers B. Anxiety and depression after spinal cord injury: A longitudinal analysis. *Archives of Physical Medicine and Rehabilitation*. 2000; 81:932–937. [PubMed: 10896007]
- Kennedy P, Marsh N, Lowe R, Grey N, Short E, Rogers B. A longitudinal analysis of psychological impact and coping strategies following spinal cord injury. *British Journal of Health Psychology*. 2000; 5:157–172.
- King C, Kennedy P. Coping effectiveness training for people with spinal cord injury: preliminary results of a controlled trial. *British Journal of Clinical Psychology*. 1999; 38:5–14. [PubMed: 10212733]
- Kuptniratsaikul V, Chulakadabba S, Ratanavijitrail S. An instrument for assessment of depression among spinal cord injury patients: comparison between the CES-D and TDI. *Journal of the Medical Association of Thailand*. 2002; 85:978–983. [PubMed: 12450075]
- Laurenceau JP, Hayes AM, Feldman GC. Some methodological and statistical issues in the study of change processes in psychotherapy. *Clinical Psychology Review*. 2007; 27:682–695. [PubMed: 17328996]
- Lazarus, RS., Folkman, S. *Stress, appraisal and coping*. New York: Spinger; 1984.
- Mohr DC, Boudewyn AC, Goodkin DE, Bostrom A, Epstein L. Comparative outcomes for individual cognitive-behavior therapy, supportive-expressive group psychotherapy, and sertraline for the treatment of depression in multiple sclerosis. *Journal of Consulting & Clinical Psychology*. 2001; 69:942–949. [PubMed: 11777121]
- Moseley AM, Herbert RD, Sherrington C, Maher CG. Evidence for physiotherapy practice: a survey of the Physiotherapy Evidence Database (PEDro). *Australian Journal of Physiotherapy*. 2002; 48:43–49. [PubMed: 11869164]
- North NT. The psychological effects of spinal cord injury: A review. *Spinal Cord*. 1999; 37:671–679. [PubMed: 10557122]
- Pollard C, Kennedy P. A longitudinal analysis of emotional impact, coping strategies, and post-traumatic psychological growth following spinal cord injury: a 10-year review. *British Journal of Health Psychology*. 2007; 12:347–362. [PubMed: 17640451]
- Radnitz C, McGrath R, Tirsch D, Willard J, Perez-Strumolo L, Festa J, Binks M, Broderick CP, Schlein IS, Walczak S, Lillian LB. Use of the Beck Depression Inventory in veterans with spinal cord injury. *Rehabilitation Psychology*. 1997; 42:93–101.
- Sakakibara BM, Miller WC, Orenczuk SG, Wolfe DL. A systematic review of depression and anxiety measures used with individuals with spinal cord injury. *Spinal Cord*. 2009; 47:841–851. [PubMed: 19621021]
- Schein RL, Koenig HG. The Center for Epidemiological Studies-Depression (CES-D) Scale: Assessment of depression in the medically ill elderly. *International Journal of Geriatric Psychiatry*. 1997; 12:436–446.

- Schulz R, Czaja SJ, Lustig A, Zdaniuk B, Martire LM, Perdomo D. Improving the quality of life of caregivers of persons with spinal cord injury: a randomized controlled trial. *Rehabilitation Psychology*. 2009; 54:1–15. [PubMed: 19618698]
- Straus, SE. *Evidence-Based Medicine: How to Practice and Teach EBM*. 3. Toronto: Elsevier Churchill Livingstone; 2005.
- Swett, SE., Richardson, WS. Cognitive-Behavioral Therapy. In: Chan, F.Berven, NL., Thomas, KR., editors. *Counseling theories and techniques for rehabilitation health professionals*. New York, NY, US: Springer Publishing Co; 2004. p. 159-176.
- Wade SL, Walz NC, Carey JC, Williams KM. Preliminary efficacy of a Web-based family problem solving treatment program for adolescents with traumatic brain injury. *Journal of Head Trauma Rehabilitation*. 2008; 23:369–377. [PubMed: 19033829]

Table 1

Modified Levels of Evidence

Evidence Level	Description
Level 1	RCTs with a PEDro score of greater than or equal to 6.
Level 2	Poorer quality RCTs (PEDro less than 6), prospective controlled trials (PCTs), and cohort studies.
Level 3	Case control studies.
Level 4	Pre-post, post-test only, and case series.
Level 5	Observational studies, clinical consensus and case reports.

Straus et al. (2005)

Table 2

Summary of Reviewed Articles

Study	Participants	Therapy Characteristics	Outcome Measure	Results
Craig et al. (1997) Level 2 Prospective Controlled Trial	N _{Total} =62 N _{Control} =31 N _{Treatment} =31 Sex=23M/5F Mean Age= 31yrs YPI=not stated	Time:1.5–2hr/wk for 10 weeks Place: Acute SCI Rehabilitation Group Based	BDI STAI SES	<ul style="list-style-type: none"> No significant difference between the two groups in anxiety or depression post treatment. Subgroup analysis based on participants with high levels of depressive symptoms resulted in significant improvement in BDI scores ($p<0.01$), but no significant improvement in STAI scores. No significant difference between treatment and control group in self-esteem post treatment.
Craig et al. (1998) Level 2 Cohort	N _{Total} =58 N _{Control} =31 N _{Treatment} =27 Sex=23M/5F Mean Age= 31yrs YPI=not stated	Time:1.5hr/wk for 10 weeks Place: Acute SCI ward Group Based	BDI LCB	<ul style="list-style-type: none"> No significant difference was seen in LCB scores between the two groups post CBT. Subgroup analysis of participants with external locus of control at baseline, resulted in significant improvement in LCB scores between the two group post CBT, $p<0.05$. Depressive symptoms were found to be significantly correlated with a participants locus of control, $p<0.05$.
Dorstyn et al. (2010) Level 2 Prospective Controlled Trial	N _{Total} =24 N _{Control} =13 N _{Treatment} =11 Gender =20M/4F Mean Age= 49.2yrs YPI=not stated	Time: 30–60min for 7 to 22 sessions. Place: Inpatient rehabilitation Individual based	DASS-21	<ul style="list-style-type: none"> Significant improvements in depressive symptoms were seen at week 12, $p<0.048$. No significant improvements in anxiety were present post treatment.
Duchnick et al. (2009) Level 2 RCT PEDro=4	N=41 N _{CEI} =21 N _{SGT} =20 Gender =39M/2F Mean Age= 52.7yrs YPI=53.1 days	Time: 60min/wk for 8–12wks. Place: Inpatient Rehabilitation Group Based	CES-D STAI ADS-R	<ul style="list-style-type: none"> No significant differences in outcomes were seen between the two groups post treatment. Both groups demonstrated significant improvement in STAI ($p<0.001$) and CES-D ($p<0.005$) over time.
Kahan et al. (2006) Level 2 Prospective Controlled Trial	N _{Total} =76 (SCI=53.9%) N _{Control} =22 (SCI=59.1%) N _{Treatment} =54 (SCI=51.9%) Gender =39M/37F Mean Age= 49.3yrs YPI=24yrs	Time:6 months; 1hr/wk for 4–6wks and then 2/month. Place: Outpatient Rehabilitation Individual Based with antidepressants	OAHHQ LSS CAC	<ul style="list-style-type: none"> Significant improvements in OAHHQ, LSS and CAC scores were seen in the treatment group compared to the control ($p<0.001$).
Kemp et al. (2004) Level 2 Prospective Controlled Trial	N=43 N _{Control} =28 N _{Treatment} =15 Gender =32M/11F Mean Age= 42.3yrs YPI=18yrs	Time:6 months; 1/wk for 2 months and then 2/month. Place: Outpatient Rehabilitation Individual Based with antidepressants	OAHHQ LSS CAC	<ul style="list-style-type: none"> Significant decrease in depressive symptoms, CAC scores and life satisfaction scores were seen post CBT, $p<0.001$. Post CBT, 8 participants with major depressive disorder were no longer depressed.

Study	Participants	Therapy Characteristics	Outcome Measure	Results
Kennedy et al. (2003) Level 2 Prospective Controlled Trial	N=85 N(Control)=40 N(Treatment)=45 Gender =69M/16F Mean Age= 34.7yrs YPI=20weeks	Time:60–75 min 2 times a week up to 7 sessions. Place: Inpatient Rehabilitation Group based	BDI STAI COPE	<ul style="list-style-type: none"> Significant decrease in depression and anxiety symptoms were seen in the treatment group post CBT compared to the control, $p<0.001$. No significant decrease in coping was seen between the two groups; however, suppression of competing activities decreased overall, $p<0.001$ and alcohol use was significantly lower in the treatment group compared to the control, $p=0.003$.
King & Kennedy (1999) Level 2 Prospective Controlled Trial	N=38 N(Control)=19 N(Treatment)=19 Gender =29M/9F Mean Age= 33.4yrs YPI= 18.7weeks	Time:60–75 min 2 times a week up to 7 sessions. Place: Inpatient Rehabilitation Group based	BDI STAI COPE	<ul style="list-style-type: none"> Significant decrease in BDI scores were found in the treatment group post CBT compared to the control, $p<0.05$. No significant change was seen in COPE scores between the two groups.
Schulz et al. (2009) Level 1 RCT PEDro=6	N=104 N(Control)=49 N(Treatment)=55 Gender =24M/80F Mean Age= not stated YPI=8yrs	Time:7 individual session 60–90 mins and 5 group session over 6 months. Place: Home	CES-D	<ul style="list-style-type: none"> Significant improvements in CES-D scores were seen in the dual treatment group compared to the caregiver only group, $p=0.014$.

Note: ADS-R=Adaptation to Disability Scale-Revised; BDI=Beck Depression Inventory; CAC=Community Activities Checklist; CES-D=Center of Epidemiologic Studies of Depression Scale; DASS-21=Depression Anxiety Distress Scale-21; HADS=Hospital Anxiety and Depression Scale; LCB=Locus of Control of Behavior Scale; LSS=Life Satisfaction Scale; OAHMQ=Older Adult Health and Mood Questionnaire; SES=Self-Esteem Scale; STAI=State Trait Anxiety Inventory; YPI=years post injury. Gender coded as M (male) and F (female).

Table 3

Effect sizes (SMD) for each outcome measure

Study Name	Follow-up Time	BDI	CES-D	DASS	LCB	OAQM	SES	STAI
Craig et al. 1997	1 yr	0.332					0.452	0.050
Craig et al. 1998	1 yr	0.213			0.102			
Dorstyn et al 2010	3 m			D-0.410 A-0.373				
Duchnick et al. 2009	3 m		0.442					0.231
Duchnick et al. 2009	6 m		0.237					0.0006
Kahan et al. 2006	6 m					1.529		
Kemp et al. 2004	6 m					1.503		
King & Kennedy 1999	2 yr	0.700						0.439
Schulz et al. 2009	1 yr		0.168 [*] 0.222 ^{**}					

Note: A=anxiety; BDI=Beck Depression Inventory, CES-D=Center of Epidemiologic Studies of Depression Scale; D=depression; DASS=Depression Anxiety Distress Scale-21; LCB=Locus of Control Behavior Scale; OAQM=Older Adult Health and Mood Questionnaire; SES=Self Esteem Scale; STAI=State Trait Anxiety Inventory;

* care recipient outcomes;

** caregiver-care recipient outcomes.