MINDFULNESS-BASED COGNITIVE THERAPY (MBCT) FOR STROKE SURVIVORS: AN APPLICATION OF A NOVEL INTERVENTION

by

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Abstract

Stroke can affect neurological, cognitive, and emotional functioning and have a negative impact on overall quality of life (QoL). Published research in the area of psychological intervention for stroke patients suggests that therapy directed toward managing depression and anxiety can result in general improvement in emotional health and QoL. The purpose of this study was four-fold: (1) to adapt and implement Mindfulness Based Cognitive Therapy (MBCT) for stroke survivors; (2) to evaluate the psychometric properties of generic and stroke-specific measures; (3) to evaluate the effectiveness of MBCT on aspects of quality of life, emotional factors, and adjustment for participants, as well as caregiver burden; and (4) to determine the predictors of success. Participants (n = 23) completed questionnaires on initial assessment, after the 9-week MBCT Program, and at 3-month follow-up. Questionnaires included the Beck Anxiety Inventory (BAI), Hospital Anxiety and Depression Scale (HADS), Beck Depression Inventory – II (BDI-II), Short Form-36 General Health Survey (SF-36), Stroke Specific Quality of Life Scale (SSQoL), and the Mental Adjustment to Stroke Scale (MASS). Overall, findings indicate that MBCT lends itself to be adapted to clinical groups. Psychometric analysis of measures used showed moderate to strong internal consistency (α = .57 - .95), significant convergent and divergent validity, and adequate responsiveness with moderate to large effect sizes (0.32-1.43) on the non-physical indices. Independent t-test analyses showed significant improvement ($p < .05$) in participant scores (n = 8) on the BAI, BDI-II, HADS, and QoL indices when compared with dropout control scores (n = 4) in the initial control arm (Phase I). Phase II repeated measures analysis of variance for all completers (n = 21) reflected significant change from baseline to program completion, with

maintained improvements at follow-up in all domains, including those related to anxiety (F_{BAI}= 20.42, $p < .001$; $F_{HADS\text{-}A}$= 35.99, $p < .001$), depression ($F_{BDI\text{-}II}$= 32.07, $p < .001$; $F_{HADS\text{-}D}$= 14.66, $p < .001$), and QoL ($F_{SF\text{-}36,\ MCS}$ = 9.38, $p < .01$; $F_{SF\text{-}36,\ PCS}$ = 19.95, $p < .001$; F_{SSQoL} = 9.96, $p < .01$). A decrease in scores on the MASS helplessness/hopelessness subscale significantly correlated with improvement in emotional constructs. MBCT may be useful in the treatment and prevention of depression and anxiety and may improve QoL and facilitate adjustment to changes secondary to stroke. Randomized controlled multi-center trials will be required to provide further evidence.

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MINDFULNESS-BASED COGNITIVE THERAPY (MBCT) FOR STROKE SURVIVORS: AN APPLICATION OF A NOVEL INTERVENTION

Section I: Introduction and Background Review

Stroke has been referred to as the most disabling chronic condition (Verbrugge, Lepkowski, & Imanaka, 1989) likely because the sequelae of stroke can affect a wide range of factors such as mood, speech, cognition, perception, motor skills, and capacity to carry out basic and instrumental activities of everyday living. Rehabilitation interventions typically place emphasis on the physical and functional impairments of stroke (Hochstenbach, 2000). Usually, it is not until improvements in these areas are seen that focus is placed on ameliorating the psychosocial deficits and losses, which are generally treated from a pharmaceutical approach. Research in the area of psychological interventions for stroke patients has been limited, however findings suggest that therapy directed toward managing depression and anxiety results in general improvement in emotional health and has positive effect on overall quality of life (QoL). Before discussing a novel approach to managing poststroke depression and anxiety, namely mindfulness-based cognitive therapy, some background information on stroke, clinical presentation and several of the residual impairments are presented.

Epidemiology of Stroke

Stroke has been the third leading cause of death in most developed countries for many decades (Bonita, Stewart, & Beaglehole, 1990; Thom, 1993; Uemura & Pisa, 1988). Worldwide, cerebrovascular accidents are the second leading cause of death (Murray & Lopez, 1997). In a recent study, the mortality trends in people between the

ages of 35 and 84 from around the world were investigated (Sarti, Rastenyte, Cepaitis, & Tuomilehto, 2000). The highest mortality rates were observed in Eastern Europe, Mauritius, and Trinidad and Tobago. The countries with the lowest stroke mortality rates included Australia, Canada, France, Switzerland, and the United States, with 25% more males being affected than women.

Within Canada, Sarti and colleagues (2000) found that the prevalence of stroke between the ages of 75 and 84 was 18 times greater (for both men and women) when compared with the younger age group (35-74 years). In 1997, approximately 70, 000 Canadians were hospitalized for stroke; cerebrovascular disease (mainly stroke) caused 16,048 deaths, accounting for 20% of all cardiovascular disease deaths; and overall, close to 300,000 Canadians are presently stroke survivors (Heart and Stroke Foundation of Canada, 1999). Over the past decade, there has been a 10% decline in the rate of hospitalization for cerebral infarcts in Canada, however, the rate of hospitalization for intracerebral hemorrhage increased by approximately 40% (Mayo, 1996).

Owing to the increasing size of the older population, the number of strokes is projected to increase in the coming years and the number of deaths (in both men and women) is expected to increase by 15% between 1995 and 2016 (Hakim, Silver, & Hodgson, 1998). This, coupled with the increase in the proportion of persons surviving acute stroke, means that the number of persons learning to cope with stroke-related disability is also increasing (Bronstein, 1991; Mayo et al., 1999).

The population in North Western Ontario is no exception to the national epidemiological statistics. In the Thunder Bay District, there has been a downward trend in mortality from ischemic heart disease, which roughly parallels the rest of the

provinces. For example, the Thunder Bay District rate of ischemic heart disease between 1991 and 1994 was 316/100,000 and between 1995 and 1997 this rate was 280/100,000 (Heart and Stroke Foundation of Ontario, 2002). Despite the decline, both of these rates were significantly higher than the average Ontario rate. Researchers suggest that because the bulge of the population in the "baby boom" generation is now reaching the age of fifty, the overall population burden from ischemic heart disease will grow (Heart and Stroke Foundation of Ontario, 2002). Further concerns for an increase in mortality are the self-reported risk factors from a public health unit sample in the Thunder Bay District. Specifically, more Thunder Bay District residents report being overweight, being less physically active, eating a diet high in fat (i.e., fat totaling more than 30% of total daily caloric intake), and smoking when compared with the provincial average. These are well-documented major risk factors for heart disease and a primary cause of death in Canada (Katzmarzyk, Gledhill, & Shepherd, 2000).

Residual Impairments of Stroke

The residual impairments and effects of stroke are wide-ranging. Neurological, cognitive, and emotional functioning can be affected and have a negative impact on overall QoL. Further, these impairments leading to an increase in responsibilities for the stroke patient's caregiver possibly resulting in burden effects for them. The following sections address these issues in turn.

Neurological and Neuropsychological Sequelae

Since oxygen and glucose are necessary in a nearly steady supply for normal brain functioning, the blood flow to the brain is of great importance. The vital need of oxygen for brain tissue is met through the sophisticated vascularization of the entire

cortical region. When the brain is not adequately perfused with blood and is deprived of oxygen, glucose and other nutrients, a variety of neurological, neuropsychiatric and neuropsychological abnormalities may result depending on how long and which portion of the cerebrum are involved (Rhawn, 1996). While the various mechanisms and types of stroke and related functional consequences go beyond the scope of this review (see Toole, 2002 for further review), some common sequelae of stroke are pointed out here.

Common to many individuals who have survived a stroke are motor and sensory impairments. Motor impairments can include hemipareisis, aphasia, dysphasia, dysarthria, dysphagia, ataxia, vertigo, incontinence, among others (Reitan & Wolfson, 1992). Such impairments impede normal large muscle activity on one-side of the body (e.g., walking, lifting, feeding, writing), understanding of speech, articulating words, chewing, swallowing, balance, among others. Sensory deficits following stroke can involve parathesias (lack of receptivity to touch, pain, heat, cold) in the contralateral arm, leg and face, visual disturbances, and disequilibria (Chusid, 1982).

Neuropsychological outcomes of stroke will vary depending on the location of the ischemia or hemorrhage. Damage to or blockage of the vertebral basilar artery, posterior cerebral artery or posterior inferior cerebellar artery can cause ataxia, possible hemiplegia, nystagmus (and other visual problems), dizziness, sensory loss (thermal or pain), and can affect the functioning of many cranial nerves (Adams & Victor, 1989; Malm, Kristenssen, Karlsson, Carlberg, Fagerllund & Olsson, 1998; Rhawn, 1996). Occlusion of the superior cerebellar artery may cause ipsilateral ataxia and contralateral hemianesthesia, and impaired cognitive functioning in the areas of working memory, attention, visuospatial skills and cognitive flexibility (Malm et al., 1998). Infarcts to the

anterior communicating artery, a frequent site of cerebral infarct (McCormick, 1984), can create changes in affect and emotion, social judgment, ability to plan, and memory (Damasio, Neill, Graff-Radford, Eslinger, Damasio, & Kassell, 1985; Fischer, Alexander, D'Eposito, & Otto, 1995). Occlusion to the main trunk of the anterior cerebral artery (which supplies the anterior three fourths of the medial surface of the hemispheres) may cause contralateral hemiplegia (mainly in lower extremities), mild sensory deficits, speech and language impairments (when dominant hemisphere is involved) and can cause affective and personality changes (when nondominant hemisphere is involved; Heilman & Valenstein, 1993). While it is convenient to discuss possible impairments with respect to vascular location of the stroke, it is important to note that natural lesions, such as stroke, do not necessarily respect the functional boundaries of cortical matter (Heilman & Valenstein, 1993).

Emotional Sequelae

Research has demonstrated that recovery from stroke is influenced by several psychological factors. Psychological disturbances and behaviours, including depression, adjustment disorders, negative attitudes, emotionalism, and anxiety can significantly impact the rehabilitative outcome (Robinson, 1997). Individuals who have sustained a physical loss secondary to stroke have been shown to be more depressed but no different than those without physical loss in indices of anxiety (Lower, 1995). The following sections draw from the empirically and clinically-based literature to address the nature of such psychological disturbances and how these become barriers to rehabilitation and, effectively, barriers to overall QoL.

Depression.

Prevalence

Estimates of the prevalence of depression, the most frequently cited and studied psychological reaction to stroke, vary widely depending on the study. Rates of poststroke depressive disorder have ranged form 8% to 61% (Burvill, Johnson, Jamrozik, Anderson, Stewart-Wynne, & Chakera; House et al., 1991; Remer-Osborn, 1998; Robinson, 1997). Robinson and Starkstein (1990) have stated that up to 50% of patients with stroke develop depression during the acute poststroke period, and another 30% of patients do so during the first two years after stroke. The highest prevalences have come from studies examining patients with stroke admitted to acute hospitals or to rehabilitation units (Johnson, 1991). The lowest reported rates have come from community-based studies (Burvill et al., 1995) in which patients in the community and hospitals were included. Despite its high frequency and negative influence on the overall recovery of stroke patients, it has been reported that poststroke depression (PSD) was underdiagnosed by nonpsychiatric physicians in 50-80% of reported cases (Schubert et al., 1992). This is concerning as research has suggested that depression predicts poorer QoL (King, 1996) and limits the effect of rehabilitation (Nelson, Cicchetti, Salz, Sowa, & Mitrushina, 1994).

Diagnosis of PSD

Prompt detection and treatment of depression in stroke survivors may improve recovery (Parikh, Robinson, Lipsey, Starkstein, Fedoroff, & Price, 1990). The Diagnostic and Statistical Manual 4th Edition (DSM-IV; American Psychiatric Association, 1994) categorizes poststroke depression as "mood disorder due to a general

medical condition (e.g., stroke)" with the specifiers of (a) depressive features, (b) major depressive-like episodes, (c) manic features, or (d) mixed features. Studies using patient data from acute hospital admissions, community surveys, and outpatient clinics have identified two types of depressive disorders associated with cerebral ischemia: major depression, and minor depression (Eastwood, Rifat, Nobbs & Ruderman, 1989; Robinson, Starr, Kubos, & Price, 1983). The DSM-IV criteria for major and minor depression are applicable to patients with PSD, and the depressions appear to be similar to those found in elderly patients with primary depressions (Gustafson, Olsson, & Eriksson, 1991). Diagnosis, however, should be cautioned as some investigators have suggested that several symptoms used in the DSM-IV criteria, such as loss of energy and appetite, and insomnia are also found in nondepressed stroke patients as a result of the hospital environment, medications, and the stroke itself (Gass & Lawhorn, 1991). The diagnosis of PSD may be further complicated in some groups of patients with stroke as a result of the presence of language deficits and/or generalized cognitive impairment which may limit an adequate assessment of depressive symptoms (Chemerinski & Robinson, 2000).

Course and Outcome of PSD

The duration and course of depression has been examined in several longitudinal studies. In a prospective study of mood disorders in 65 acute stroke patients Robinson, Bolduc, and Price (1987) found that 9 patients (14%) had an in-hospital symptom cluster of major depression, whereas 12 patients (18%) had a symptom cluster of minor depression. At a 2-year follow-up all of the patients diagnosed with major depression were improved, but only 3 patients (30%) with minor depression had recovered. In

another study it was found that the mean duration of PSD was 34 weeks (Morris, Robinson, & Raphael, 1990). Astrom and colleagues (1993) reported 30% of patients with in-hospital PSD remained depressed at 2-year follow-up and 20% were still depressed at the 3-year follow up. Because these studies samples were not randomized, antidepressant medications were not consistent and/or not indicated, and the extraneous environmental, social and emotional risk factors were not controlled for.

Pohjasvaara, Vataja, Leppavuori, Kaste, and Erinjuntti (2001) found the prevalence of depression to be over 40% at 3 and 15 months after stroke, with major PSD being present in 25% of these patients. Moreover, the authors found that poor functional outcome (e.g., activities of daily living; ADLs) was predicted by major but not minor depression. Altogether it seems that the mean duration of PSD is about 9 months (Chemerinski & Robinson, 2000), however there are a significant number of patients with major or minor depression who remain depressed at least 1-year poststroke. Similarly, Ouimet, Primeau, and Cole (2001) reviewed the psychosocial risk factors for PSD and found positive associations in several areas. Specifically, a past history of depression or psychiatric illness, functional impairment, isolation, living alone, and speech impairments were all identified as consistent risk factors. Risk factors consistently found to not be associated with PSD were dementia and cognitive impairments. The contribution of age, socioeconomic status, and sex to PSD remains controversial. Despite the debate about which factors are and are not implicated in an increased risk of PSD, these studies do illustrate that factors other than biological ones are relevant to the presentation of PSD.

Cognitive Model of Depression after Stroke

It has been over 25 years since the cognitive model of depression has been proposed (Beck, Rush, Shaw, & Emery, 1979). This model has conceptualized how thoughts about ourselves, the world, and the future (cognitive triad) can affect our emotions and behaviour. It is proposed that negative thoughts within this triad can have a congruently adverse affect on how we feel and interact with our environment until rumination of the thoughts subsides. These negative thoughts are said to stem from inherent dysfunctional attitudes and beliefs that lend an individual susceptible to depression. In the general population, most individuals experience negative events and have periods of feeling blue, however this is generally transient and time and situationally limited. When faced with a life-changing event, in this case stroke, individuals can be more susceptible to negative thoughts and ensuing depression, especially when there is associated loss (Lower, 1995). In a novel investigation Eccles and colleagues demonstrated that stroke survivors with negative mood symptoms (sadness, irritability) and higher degrees of loss, experienced higher levels of negative intrusive thoughts (Eccles, House, & Knapp, 1999). Avoidant coping styles were found to perpetuate the dysfunctional attitudes. This finding fits well with the cognitive conceptualization of onset and maintenance of depression. Negative thoughts after stroke (e.g., "I am useless"; "I am incompetent"; "I am unlovable") in combination with the often-physical changes from stroke (e.g., fatigue, weakness, paresis, language impairments) can be seen as a recipe for depression. As negative thoughts are replayed in one's mind (ruminated) and the physical disabilities (resulting in a change in social and functional roles) remain, emotions become negatively congruent. This can result in a recurrent and spiraling

pattern where sad mood perpetuates negative thinking and negative thinking reinforces the sad mood. Cognitive therapy is directed toward challenging the veracity of the negative thoughts and changing the content thereby mediating beliefs and dysfunctional attitudes. How cognitive therapy has become integrated to MBCT is described in a later section.

Neuroanatomical Correlates of PSD

Over the last two decades there has been growing interest in finding a correlation between lesion location and PSD in order to delineate a pathophysiological hypothesis to explain the mood disorder (Chemerinski & Robinson, 2000). By determining whether damage in certain anatomic regions predicts subsequent depression, clinicians can hope to better identify patients at risk for the development of depression and offer earlier treatment. It has been suggested that if successful treatments were initiated early in the rehabilitation process, rehabilitation might be shortened, costs reduced, quality of life improved, and unnecessary premature deaths prevented (Sing, Herrmann, & Black, 1998).

These investigations on the etiology of PSD have not been without controversy. Specifically, there is question as to what role psychological factors play as opposed to how neurological factors are involved. Some researchers have suggested that stroke patients become depressed as a psychological reaction to limited physical functioning and other losses (Charatan & Fisk, 1978; Ramasubbu, Robinson, Flint, Kosier, & Price, 1998; Tanner & Gerstenberger, 1988) and others have postulated that physical disabilities and loss of function can be both a cause and effect of PSD (Eastwood, Rifat, & Nobbs, 1989; Staub & Bogousslavsky, 2001). Methodological limitations to this area of research (e.g.,

sample type, sample size, assessment tools) have been identified and implicated in these discrepancies (Ramasubbu et al., 1998). Younger age, being female, past history of depressive illness, increased physical disability, and loss of social role functioning have been implicated as risk factors for the development and maintenance of PSD (Gall, 2001; Schultz, Castillo, Koster, & Robinson, 1997), however these findings have not been consistent (Andersen, Vestergaard, Ingemann-Nielsen, & Lauritzen, 1995; Astrom, et al., 1993a).

The evidence in support of an endogenous hypothesis comes from studies reporting a significant improvement from depression following the use of certain psychopharmacological drugs. The dominant theory of depression is the monoamine theory. It is based on the fact that monoamine oxidase-inhibitors (MAOIs), tricyclic antidepressants (TCAs), and selective serotonin-reuptake inhibitors (SSRIs) all block the reuptake of monoamines, particularly serotonin and norepinephrine. The monoamine theory of depression is that depression is associated with underactivity at serotonergic and noradrenergic synapses (Pinel, 1997). The effectiveness of Prozac (the trade name for fluoxetine, a SSRI) against depression might imply that the mechanism of depression are specifically serotonergic, but in some individuals, depression is alleviated by some selective norepinephrine-reuptake inhibitors. In studies specific to PSD, evidence suggests that ischemic brain lesions are associated with disturbances in the serotonergic system (Ferrarise, Bassie, Frattola, Locatelli, Piolti, & Trabucchi, 1986). Notably, there has been demonstration of a negative correlation between severity of depression and serotonin receptor binding in the left temporal cortex in left hemisphere stroke (Ferrarise et al., 1986). In other words, as the ability of the serotonin neurotransmitters to bind to

the serotonin receptors decreases, severity of depression increases. Further, Prozac, and Paxil (SSRIs), have been shown to be effective in moderating depression in stroke patients (Andreasen & Black, 1995).

The association between major depression and left frontal cortical or left basal ganglia lesions provides further support for the organic hypothesis (Hermann, Bartles & Wallesh, 1993). It is understood that the vascular lesions that occur as a result of stroke cause direct damage to specific brain structures and all aspects of their neurochemical and physiological systems. The damage results in disruption of the neural organization underlying emotions as well as neurotransmitters involved in cognitive processing (e.g., memory, comprehension, communication).

According to a model presented by Mayberg, Robinson, Wong, Parikh, and colleagues (1988), depletion of serotonin following right-sided lesions might lead to the upregulation of serotonin receptors while there might be a failure in upregulation following left-sided lesions. This hemispheric regulation of serotonin function might therefore be said to be lateralized. This might explain why major depression is commonly associated with left anterior lesions while right anterior lesions are frequently associated with undue cheerfulness or emotional indifference (Ramasubbu et al., 1999).

With respect to lateralization and the development of PSD, both the dorsolateral prefrontal cortex and subcortical region in the left frontal anterior region, appear to be related to depression in patients with left hemisphere damage (Astrom, Adolsson, & Asplund, 1993; Starkstein & Robinson, 1989; Starkstein, Robinson, & Price, 1988). In the first large MRI-based study that explored the radiological correlates of depression after ischemic stroke, it was found that patients with depression had a higher number and

larger volume of infarcts affecting the prefrontosubcortical circuits, especially the caudate, pallidum, and genu of the internal capsule, predominantly within the left hemisphere (Vataja, Pohjasvaara, Leppavuori, Mantyla, Aronen et al., 2001). In patients with right-hemisphere stroke, depression has been related to posterior lesions (Starkstein et al., 1989). These findings however have not been consistently found. Specifically, the severity of depression is not always proportional to the distance of the lesions from the frontal pole nor is it consistently related to laterality (Herrmann, Bartels, & Wallesch, 1993; Sinyor, Jaques, Kaloupek, Becker, et al., 1986).

In a study of acute stroke, Starkstein, Robinson and Price (1988) found 63% of patients with left-hemisphere lesions to have major or minor PSD, but only 14% of patients with right-hemisphere lesions had such a presentation. The authors implicated the presence of subcortical atrophy as being associated with the presence of PSD. In a later study, it was reported that a larger proportion of patients with right-sided lesions, both right-frontal and right-parietal lesions, presented with PSD symptoms (Starkstein, Robinson, & Honig, 1989). This underlines the inconsistency of reports found in the literature. It has been suggested that patients with left hemisphere lesions are no more likely to present with depression than other patients, rather depression is associated with the severity and amount of cortical damage, regardless of laterality. Further, it is postulated that by nature, the left hemisphere is more prone to more diffuse damage subsequent to stroke (Berg, Palomaki, Lehthalmes, & Lonnqvist, 2001).

Singh and colleagues (1998) systematically reviewed 13 hemispheric lesion localization studies, which included a total of 1028 subjects. Overall, 6 studies found no difference between right- and left-hemisphere lesions leading to depression. Two studies

found right-sided lesions more likely to be associated with depression, and 4 studies found depression associated more often with left sided lesions. Altogether, the authors reported that no lesion variable appeared to predict against the development of depression. In another systematic review, including 35 reports relating lesion location to depression, similar findings were reported. Specifically, no overall association between lesion location and the presence of depression was found (Carson, MacHale, & Allen, 2001). Both studies suggest that the development of depression is multifactorial in nature and that psychological and social factors, in addition to the biological ones, should be taken into consideration.

Taken together the majority of studies suggest that in the early stages following stroke, the serotonergic systems play a role in the development of PSD, a finding that is strongly associated with left-hemisphere stroke patients. As the length of time increases following stroke, other factors including aspects of ADLs and social functioning become a problem and this is correlated with the onset of PSD in right-hemisphere patients.

Emotionalism and Negative Attitude.

Emotional lability or emotionalism is a common complication of stroke (Robinson, 1997) and may be present for as long as one year in stroke survivors (Morris, Robinson, & Raphael, 1993). The presentation is characterized by sudden, easily provoked episodes of crying or laughing where there is little or no warning, usually out of context. Emotional lability reportedly affects 20-25% of stroke survivors (Allman & House, 1990; Calvert, Knapp, & House, 1998; House, Dennis, Molyneux, Warlow, & Hawton, 1989) and co-occurs with depressed mood and irritability (Calvert et al., 1998). Discussion of sad situations or the individual's symptoms may trigger the manifestation

of symptoms. Often times, the ability to inhibit emotional responses toward relatively innocuous events or topics is reduced (Remer-Osborn, 1998). This disorder is termed pseudobulbar affect when it is associated with bilateral lesions of the cortical projections to the brainstem (Robinson, 1997). Unfortunately, the neuroanatomical correlates of emotionalism after stroke have received most of the research. In a sample of stroke patients Eccles, House, and Knapp (1999) demonstrated there to be some element of a sense of personal control over crying and suggest that psychological factors may play a role in the cause and perpetuation of affective expression.

In an investigation of the relationship between attitudes and survival after stroke Lewis and colleagues (2001) administered the Mental Adjustment to Stroke Scale as well as a number of mood questionnaires to individuals 6 months and 3 years after stroke. The authors found that fatalism and helplessness/hopelessness were both associated with decreased survival, but fighting spirit, anxiety, depression and denial were not; patients who felt that there was nothing they could do to help themselves (at 6 months poststroke) had a shorter survival rate.

It is evident that, together, emotionalism and negative attitude can inhibit appropriate social functioning as well as overall emotional health. These, in combination with another mood disorder, can only serve to negatively impact the overall QoL of a stroke survivor.

Anxiety.

Depression after stroke has been extensively studied and, as mentioned, is considered to be the most common post-stroke affective condition. In contrast, anxiety disorders after stroke seem to have been disregarded in the research literature. This may

be due to several reasons. It may be a confounded result of the considerable symptom overlap and diagnostic issues that exists between anxiety disorders and major depression (Astrom, 1996). Alternatively, from a diagnostic perspective, a diagnosis of depression is given priority over anxiety (Burvill, Johnson, Jamrozik, Anderson, Stewart-Wynne & Chakera, 1995) and with advancing age, difficulties arise in discriminating anxiety and depression (Robinson & Starkstein, 1991). Clinically, anxiety can be potentially serious and disabling with multiple adverse consequences on the post-stroke survivor's daily functioning, interpersonal relationships and QoL (Astrom, 1996). Moreover, when an anxiety disorder is present in combination with depression, the patient has a higher risk of mortality (Shimoda & Robinson, 1998).

Prevalence

A handful of studies have investigated the prevalence rates for poststroke anxiety disorders. When diagnosed in the presence of depression, prevalence rates for Generalized Anxiety Disorder (GAD) have ranged from 20% (Sharpe, et al., 1990) to 28% (Astrom, 1996; Gillespie, 1997). Other anxiety disorders have been reported in the stroke population. House, Dennis, Mogridge, Warlow, Hawton, and Jones (1991) reported prevalence rates of 3% for agoraphobia, 1% for GAD, and 3% for adjustment disorder with anxiety. Similar rates were reported by Burville and colleagues (1995) where four months post-stroke, 5% of men and 19% of women had an anxiety disorder. The majority of this study's cases were agoraphobia, with a prevalence rate of 4% in men and 17% in women. Altogether, only 5% were diagnosed as having GAD and there were no cases of panic disorder. Unfortunately, this study did not have a follow up nor did it ascertain the true nature of the agoraphobia. For example, the fear of leaving the home

may have been related to physical inability to physically function on their own or the inability to remember routes, lists, and names. It seems that future revisions of the diagnostic criteria for agoraphobia, as well as other anxiety disorders should consider the complications that stroke (as well as other medical conditions) can cause.

Course

Astrom's (1996) longitudinal study indicates that the prevalence of post-stroke GAD is stable over at least the first three years post-stroke. Specifically, the prevalence of GAD after stroke was 28% in the acute stage, and there was no significant decrease through the 3 years of follow-up. At 1-year, only 23% of the patients with early-onset GAD had recovered and those who had not recovered at this point had a high risk of a chronic development of GAD. Further, those who had a comorbid diagnosis of depression at 1-year (approximately 70%) were more likely to present with GAD and depression at the 3-year follow-up.

In an investigation of the clinical presentation of early-onset poststroke generalized anxiety (i.e., during initial hospitalization) and late-onset poststroke generalized anxiety (i.e., 3-24 months following acute stroke), Castillo and colleagues (1995) found that the two forms of anxiety differed. The authors reported that early onset anxiety patients (27%) were more likely to have had a psychiatric history than patients with late-onset anxiety (23%). In addition, the longitudinal course of late-onset poststroke generalized anxiety was twice as long as the early-onset form and was highly associated with depression. This is supported by Burvill and colleagues (1995) who reported 80% of the anxiety disorders to remit at 1-year, but those with a comorbid diagnosis had a longer morbidity.

Cognitive Model of Anxiety after Stroke

As with the cognitive model of depression, the relationship between thoughts and emotional and physiological arousal in anxiety can also be conceptualized under the cognitive model. As mentioned earlier, GAD is the most prominent form of anxiety after stroke. Worry about further strokes, about social evaluation, and functional independence are typically key components in stroke patients with GAD (Astrom, 1996; Sharpe et al., 1990). Cognitive researchers in the area of GAD (e.g., Dugas, Gagnon, Ladoucer, & Freeston, 1998; Roemer, Molina, & Borkovec, 1997; Wells & Carter, 1999) have sought to define and conceptualize worry. Individuals diagnosed with GAD do not experience fears per se, instead they frequently engage in worry about a range of topics. These worries take the form of catastrophic predictions of low-probability negative events in the future (Borkovec, Shadick, & Hopkins, 1991), which generally do not occur thus reinforcing the belief that worrying is "effective". Wells and Carter (1999) have demonstrated that individuals with GAD will vacillate between topics of worry and this can include worrying about worry. Roemer and Orsillo (2002) have proposed that worry is negatively reinforcing as it permits the individual to avoid unpleasant internal experiences, but that worry can also become an unpleasant experience. Attempts to avoid worry have the potential to increase worrisome thoughts or negative emotions associated with those thoughts. To date, the cognitive conceptualization has been important in furthering understanding of the putative mechanism of anxiety, however, Roemer and Orsillo (2002) propose that incorporating a therapeutic orientation of awareness and detachment from habitual ways of responding may be useful in altering worry patterns.

From a theoretical perspective, this approach may meld well with a clinical population who present both with worry but also physiological changes.

Neuroanatomical correlates of anxiety

In a study with 288 stroke patients (who were divided into groups of anxiety-only, anxiety plus depression, depression-only, and no mood disorder), CT scans revealed differential results (Castillo, Schultz, & Robinson, 1995). Anxiety-only was associated with right-hemisphere lesions and anxiety plus depression was associated with left-cortical lesions (greater in frequency than in the depression-only group). Interestingly, the depression-only group showed a significantly higher frequency of subcortical lesions than the anxiety plus depression group. In Astrom's 3-year longitudinal study (1996) GAD was significantly associated with right-hemisphere lesions, whereas comorbid anxiety-depression was significantly associated with left-hemisphere lesions. Distinct from Castillo and colleague's finding (1995), GAD was significantly associated with both cortical and subcortical atrophy. It was suggested that the degree of atrophy might play a role in the prolonged maintenance of GAD after stroke.

In general, the literature indicates that the incidence of anxiety disorders in stroke patients is high, especially when making corrections for the diagnostic issues outlined earlier. Anxiety disorders, with or without depression, can be very disturbing and in cases with agoraphobia, restriction of the patients' lives outside of the home, thus decreasing their QoL. Suggestions have been made (e.g., Gillespie, 1997) that clinical management of post-stroke survivors should place emphasis on limiting avoidant coping strategies as they are positively correlated with the maintenance of anxiety.

Quality of Life after Stroke

Many definitions of quality of life (QoL) can be found in the stroke-related literature, and a variety of constructs have been used to measure it. While a precise and universal definition of QoL is yet to be accepted, there seems to be some agreement on some of the conceptual aspects that should be incorporated. Lau and McKenna (2001) delineate some of these aspects. Specifically, the authors hold that: 1. QoL is not synonymous with happiness, well-being or health; 2. QoL is multidimensional and contains elements that share common properties; 3. these elements can be objective (e.g., health) and subjective (e.g., emotional states); and 4. the QoL may vary with time, age, gender, race, culture, illness, financial status, and society.

With respect to QoL following stroke, the abovementioned conceptual aspects of QoL apply. Earlier research has focused on physical and functional outcome measures to determine QoL (e.g., Shah, Vanclay, & Cooper, 1991; Thorngren & Westling, 1990). Recent studies, however, have concluded that neuropsychiatric complications associated with stroke (i.e., emotional, behavioural and cognitive disorders) may have a negative effect on both the survivor's social functioning and their overall QoL (King, 1996). As a result, the definition of stroke-related QoL has evolved to encompass the domains of physical, functional, social and psychological health, as well as financial, environmental and cultural factors (Gottlieb, Golander, Bar-Tal, & Gottlieb, 2001; Lau & McKenna, 2001). In fact, the Stroke-Specific Quality of Life Scale has been recently developed (Williams, Weinberger, Harris, Clark, & Biller, 1999) and includes items that target these areas.

In a study that investigated QoL after stroke, which included measures of physical, psychological, functional, social, and general health, it was found that depression, being married, and being younger than 65 were predominantly associated with low QoL (as assessed using the RAND-36, Barthel Index, and Rankin scale) despite improvements in physical functioning over the first year post stroke (Kauhanen, Korpelainen, Hiltunen, Nieminen, Kyosti, et al., 2000). On a similar vein, Fernandez-Concepcion and colleagues (2001) reported that psychosocial aspects of stroke had more influence on the QoL than did the clinical variables. Specifically, social isolation, depression, fatigue, and anxiety were highly correlated with QoL scores (Nottingham Health Profile) but chronic diabetes, physical mobility and pain were not.

Caregiver Effects

The concept of caregiver burden is often referred to as the strain or load on people caring for ailing or disabled family member (Montgomery, Gonyea, & Hooyman, 1985; Thommessen, Wyller, Bautz-Holter, & Laake, 2001). The support of family caregivers has an impact on whether patients return home or remain under rehabilitation care (Anderson, Linto, & Steward-Wynne, 1995). Given the high prevalence of stroke (Bugge, Alexander, & Hagen, 1999) and the fact that more than one-half of stroke survivors are left with residual disabilities that require assistance with daily activities such as eating, bathing and dressing (Grant, Bartolucci, Elliot, & Giger, 2000), the impact of being a caregiver for these people is an important one.

Studies have sought to identify the effect caregiving has on the overall psychosocial functioning of the caregivers. The most consistent outcome of caregiving for stroke patients in caregivers is elevated levels of depression at both the acute stroke

phase and the chronic stroke phase (Han & Haley, 1999; King, Carlson, Shade-Zeldow, Barrres, Roth, & Heinenmann, 2001). Thommessen and colleagues (2001) reported that frequent worrying, changes in lifestyle, sleep disturbances and feelings of depression and frustration all predicted increased stress in the family-member caregivers. Similarly, Bugge and colleagues (1999) found that over 40% of their caregiver sample reported feeling confined, lifestyle changes, family changes, changes in the patient and disturbed sleep all contributed to overall strain and, in general, lower QoL. The authors reported that the predictors of increased caregiver strain included increased time spent with the patient, increased time spent helping and being female. Van den Heuvel, de Witt, Schure, Sanderman, and Meyboom-de Jong (2001) also found that female caregivers were more susceptible to strain, however, time spent as a caregiver was not related. High perceived self-efficacy, social support, and effective coping strategies were found to be protective of burn-out, while severe cognitive, behavioural and emotional changes in the patient were the main risk factors for caregiver burn-out.

In terms of proximity, it may be more likely for spouses of stroke patients to be adversely affected (Schulz, Tomkins, & Rau, 1988), but it is the spouse who plays an important role in the rehabilitation process of the stroke patient (Forsberg-Warleby et al., 2001). The emotional and practical support of the caregiver is known to affect the functional and psychological outcome of the stroke patient (Clark & Smith, 1999). Overall psychological health of the caregiver is typically compromised even in the acute phase after stroke (Forsberg-Warleby, Moller, & Blomstrand, 2001), however this may not be the case in younger patients (e.g., less than 50 years old; Smout, Koudstaal, Ribbers, Janssen, & Passchier, 2001). Again, cognitive, emotional, physical, and

behavioural changes in the stroke patient are predictive of the overall well being of the caregiver (Forsberg-Warleby, Moller, & Blomstrand, 2001; Jones, Charlesworth, & Hendra, 2000). Research findings have also shown that despite no decline in the stroke survivors' condition, caregivers who are overwhelmed, especially those residing with the patient, are more likely to place family members in nursing homes (Grant et al., 2000). One can see then, that the relationships in the rehabilitation process are not linear, but are circular and interrelated. A psychologically healthy patient may predict better emotional functioning in the caregiver, thus improving the caregiver's QoL, which, in turn, fosters a more positive rehabilitative environment.

A few studies have investigated the effectiveness of intervention programs directed toward preventing or moderating some of the adverse effects of care giving. Mant, Carter, Wade, and Winner (2000) conducted a randomized controlled trial aimed at assessing the impact of a family support program on stroke patients and their carers. The aims of the support program were to improve knowledge about stroke, services, social activities and handicap, and to improve emotional state, and QoL. This 6-week service was offered to all caregivers of stroke patients within 6 weeks of stroke and was carried out through home and hospital visits, telephone contacts, information brochures, and local group meetings for caregivers and patients. At a 6-month follow-up, caregivers in the intervention group had significantly higher QoL scores based on Short Form – 36 General Health Survey (SF-36) scores, QoL on the Dartmouth co-op chart, and satisfaction with understanding of stroke than those in the control group. It was concluded that family support significantly increased social activities and improved quality of life for carers, with no significant effects on patients. The nature of "family

support" was not clearly defined, and different levels of support may hold varied levels of importance for the caregivers. Despite this limitation, this study is an improvement on a previous study using a similar intervention (Dennis, O'Rourke, Slattery, Staniforth, Warlow, 1997) where it was shown that although there were psychological benefits for carers, these were offset by adverse effects on mental health and social adjustment of patients.

Grant and colleagues (2000) sought to determine the predictors of caregiver depression with those caring for stroke survivors. Based on the assessment of 52 caregivers one-to-two days before discharge from hospital 37% of the caregivers met the Centre for Epidemiologic Studies Depression scale (CES-D) criteria for depression. Using the SF-36 and measures of social support, life satisfaction, preparedness and reaction, the authors reported that caregiver depression was best predicted by lower life satisfaction and lower physical functioning (in the caregivers) and a lack of tangible social support. While this seems to make sense, this study is flawed in a number of areas. First, the depressed caregivers had not begun full care giving duties at the time of assessment. Second, the nature and meaning of the correlation between depressive symptoms and scores on the measures is not clear. Specifically, no assessment of prior history of depression was made and there was no delineation between 'loss' of their loved one's capacities and the measured areas (i.e., bereavement). Finally, the design and analysis is based on a small sample size, random selection of caregivers was not evident, and there was no follow up data.

While the importance of examining the relationship between improvement in mood and QoL in stroke patients with the level of caregiver strain and caregiver QoL

may seem intuitively obvious, no studies were found to systematically do so. While there are several limitations to this area of study (i.e., few studies address comorbid risk factors associated with depression, the majority of studies view the relationship of caregiver burden and strain as linear) it does provide some empirical support for further investigation. If such issues of caregiver burden and health are not considered in policy and practice the cost of stroke will not be limited to that of the individual patient, but also to a larger circle of individuals involved in their care.

Current Rehabilitation Interventions

Rehabilitation can be seen as a learning process, aimed at learning new skills or regaining old ones, with the main goal aimed at regaining optimal functional independence (Hochstenbach & Mulder, 1999). Given the evidence for the extent to which psychosocial factors are affected by stroke, it is logical to assume that managing these would play an important role in the rehabilitation process. Although still not abundant, there are a growing number of studies trying to establish early intervention for these psychosocial variables (e.g., Lincoln et al., 1997; Rozelle & Budzynski, 1995).

Stroke is different from many other disabling conditions in that the onset is sudden, leaving the individual and the family with immediate necessity for adjustment and accommodation. A distinguishing feature of stroke is that its natural history is one of physical improvements over a finite period, usually set at the first 3-6 months poststroke (Mayo, Wood-Dauphinee, Ahmed, Gordon, Higgins, McEwen, & Salbach, 1999). As a result of this, the focus of treatment during this time is directed toward physical recovery and cognitive and emotional aspects are neglected (Hochstenbach, 2000). In fact, some individuals may receive little or no interventions related to these covert processes. For

example, if a patient or a family member sought to find information on the internet using the keywords "stroke" and "rehabilitation" most of the information found would be related to the medical physiological interventions and the functional deficits associated with stroke. While there is some mention of possible cognitive deficits (i.e., memory loss, aphasia), one has to look carefully for headings related to emotional issues or depression.

Pharmacological Interventions

Much effort has been made to determine the feasibility and effectiveness of antidepressive treatments for PSD. Mianserin, a tetracyclic antidepressant, has been widely used and shown to be efficacious in the treatment of depression (Feighner, Jacobs, & Jackson, 1983) but ineffective in the treatment of PSD (Palomaki, Kaste, Berg, Lonnqvist, & Lonnqvist, 1999). The majority of the research literature suggests that selective serotonin reuptake inhibitors (SSRIs) are most effective. Fluoxetine and paroxetine, both SSRIs, have been deemed the drug of choice in elderly patients because they have few side effects and are very effective (NIH Consensus Conference, 1992). There remains, however, a contraindication rate of 11% for this form of pharmacotherapy (Cole, Elie, McCusker, Bellavance, & Mansour, 2001) and doubt about the effectiveness of antidepressant treatment. Lipsey and colleagues (1984) compared a tricyclic antidepressant, nortriptyline, with placebo. They suggested some benefits with the drug, however 33% of patients failed to complete treatment (or suffered problems with side-effects) and analysis of the results was based on participants who remained on the treatment rather than on intention-to-treat analysis.

In another study that compared two poststroke groups (one positive for PSD and one negative for PSD) it was reported that the patients without PSD were twice as likely to show an excellent recovery on both ADL and mobility compared to patients with PSD (Paolucci, Antonuccie, Grazia, Morelli, Trisi, et al., 2001). The patients with PSD, who were all prescribed fluoxetine, scored significantly higher on the Hamilton Depression Rating Scale (HDRS) both pre- and post-drug treatment and this was correlated with unfavorable functional outcome. Altogether, it has been suggested that a short-term course of SSRI treatment can be moderately effective of stroke survivors, however, long term effectiveness is questionable and side-effect rates are high (Cole et al., 2001; Lincoln et al., 1997).

In a non-stroke, but depressed, population it is said that the proportion of patients who do not take the prescribed medication is estimated in the 30-40% range (Basco & Rush, 1995). A recent online survey of 1400 patients in the United States, conducted by the National Depressive and Manic Depressive Association, found that only one-third of patients receiving maintenance antidepressant therapy were satisfied with the quality of their treatment (Reuters, 1999). This leaves considerable room for alternate approaches.

Non-pharmacological Interventions

Supportive Therapy.

An alternative or adjunct to antidepressant medication is to provide emotional support and active therapy. Supportive therapy, for example, provides a forum for patients to express their feelings in a safe, non-judgmental and caring environment. It has been suggested that interactive sessions may be the only forum where patients can find an understanding that they are not alone and how other people are managing to cope. A

range of novel approaches such as music therapy (Purdie, Hamilton, & Baldwin, 1997), neurotherapy and biofeedback (Rozelle & Budzynski, 1995), and self-management education programs (Lorig, Sobel, Stewart, Brown, Bandura, et al., 1999) have shown to have some benefit in ameliorating mood, functional abilities, cognitive and behavioural skills.

Cognitive Behavioural Therapy.

The more traditional approach of cognitive behavioural therapy (CBT) has been of proven benefit in depressive illness. By design, this active, directive, time-limited and structured approach helps the patient delineate specific goals and attempts to restructure irrational and catastrophic thought processes by replacing them with realistic and rational self-statements and to replace maladaptive behaviours with functional behaviours (Remer-Osborn, 1998). It is based on the theory that affect and behaviour are largely determined by the way an individual structures his or her experiences. Numerous outcome studies attest to the efficacy of CBT, which has been found to be equivalent or superior to medication. Across a number of studies, the mean percentage change was 66% for CBT (Williams, Watts, MacLeod, & Matthews, 1997), with a number of studies demonstrating that most patients maintain their improvements 12 months later. Cognitive behavioural therapy has been shown to be as effective as medication in the treatment of severe depression (e.g., DeRubeis, Gelfand, Tang, & Simons, 1999) and generalized anxiety disorder (Ladouceur, Dugas, Freeston, Léger, Gagnon, & Thobodeau, 2000).

In a prospective study, Scott, Palmer, Paykel, Teasdale, and Hayhurst (2003) investigated both the utility of cognitive therapy in the treatment and prevention of relapse of depression as well as its economic feasibility. Findings indicate that the

addition of cognitive therapy to intensive clinical treatment is more costly, but was more effective than intensive treatment alone. Further, the cost of providing this additional psychological treatment was offset by savings of up to approximately $7500 (CAN) per prevented relapse (Scott et al., 2003). Comparisons of rates of recurrence of depression (at 12-24 month follow-up) following trials of antidepressant medication versus cognitive therapy revealed a reduction of symptoms between 20-36% following cognitive therapy as compared to antidepressant medication (Blackburn, Eunson & Bishop, 1986; Evans, Hollon, DeRubeis, et al., 1992; Shea, Elkin, & Imber, 1992).

In a review of 13 controlled GAD treatment outcome studies, Borkovec and Ruscio (2001) concluded that cognitive behavioural approaches yield significant positive changes and these changes were greater than waitlist control and nonspecific therapy conditions. Despite this, Brown and colleagues reported GAD to be the least successfully treated of the anxiety disorders (Brown, Barlow, & Liebowitz, 1994; Butler, Fennel, Robson, & Gelder, 1991). Roemer and Orsillo (2002) propose that integrating mindfulness elements into the traditional CBT approach may improve level of functioning in such patients.

While CBT has been shown to be effective with physically disabled patients in a variety of settings (Bates, Burns, & Moorey, 1989; Larcombe & Wilson, 1984; Thomson, Gallagher, & Breckenridge, 1987) the effectiveness of CBT in depressed stroke patients remains to be thoroughly evaluated. In one such study, Lincoln and colleagues (1997) reported patient scores on the Beck Depression Inventory –II (BDI-II), but not the Hamilton Anxiety and Depression Scale (HADS), to be improved following a series of CBT sessions. This study is not without methodological limitations (i.e., not randomized,

not controlled), however, it does provide some empirical support for therapeutic responsiveness to CBT by stroke patients with PSD.

The extent to which patients believe that they are in control of their own recovery and feel empowered to contribute to their own total rehabilitation is likely to be influenced by interactions with the professionals involved in their care (Remer-Osborn, 1998). Establishing this empowerment has been said to be a vital prerequisite to making and maintaining healthy lifestyle changes (Hassed, 2000). With respect to psychological interventions, it must be understood that empowering is a delicate process, which enables and encourages control on patients' own terms, rather than being controlled by their therapists. One form of therapy that bases empowerment with the individual is mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002).

Mindfulness-Based Stress Reduction & Mindfulness-Based Cognitive Therapy.

Mindfulness-based cognitive therapy (MBCT) combines mindfulness techniques from Kabat-Zinn's Mindfulness-Based Stress Reduction (MBSR) program with aspects of CBT for depression in a comprehensive treatment package (see Segal et al., 2002). While the specific format of MBCT is discussed later (see methods section), important operational definitions and empirical support for this approach are reviewed here. To begin with, it is important to delineate religiously-based meditative practices from meditation intended for self-regulation, without religious subscription. The etymology of contemplation originates from the Latin prefix "con-" and "-templum". "Con" means "to join with", and "templum" refers to "a large space for observation" (Hassed, 2000). The latter also carries connotations of openness, quiet and sanctity. In modern practice, contemplation and meditation (which are sometimes erroneously interchanged) take on a

sense of quiet consideration of some issue, concentration, reflection or absorption. In this state, there is happiness, connectedness, inner peace, and harmony with the mind and the body's physiology, without inclusion of religious attributions (Hassed, 2000). The method used in the present study adopts the self-regulation approach of mindfulness meditation techniques, in combination with cognitive therapy.

Mindfulness is a form of meditation that derives primarily from Buddhist traditions (Thera, 1962; Goleman, 1977; Kabat-Zinn, 1982) in which the practitioner (the person meditating) intentionally regulates attention to achieve a state of detached moment-to-moment awareness. Mindfulness means "paying attention in a particular way: on purpose, in the present moment, and nonjudgementally" (Kabat-Zinn, 1994, p. 4). The field of awareness may include proprioceptive input, sense perceptions, cognitions, emotions, and situational factors. The practitioner attempts to maintain stability of attention as the objects of attention change over time as well as a nonjudgmental awareness of present-moment experience (Kabat-Zinn & Chapman-Waldrop, 1988). Rather than becoming absorbed, as in contemplative practice, the mindfulness practitioner attends to the full range of whatever is present in the experience (Kabat-Zinn, Massion, Herbert, & Rosenbaum, 1998). In this sense, individuals who have suffered a loss (e.g., through stroke) can be helped in facing and embracing such change through mindful attention. Specifically, the meditation instructions require the patient to make efforts to gain insight and be self-reflective when observing, nonjudgmentally, the experience of pain, sadness, and loss. Gradually, the patient learns to observe these experiences with nonattachment over more extended periods of time. The MBSR approach allows participants to see how negative thoughts and feelings are

often expressed though the body. Emphasis is placed on turning toward the sensations (rather than pushing them away) with the use of the breath as a neutral base. Through this, the individual learns to differentiate between thoughts and feelings and actual physiological sensations. Ultimately, reductions in emotional arousal and emotional pain are established.

Kabat-Zinn and colleagues (1998) emphasize that any mindfulness-based intervention is fundamentally different from relaxation techniques in that there is no meditative state (as one would seek to achieve through relaxation); rather the orientation is one of "nonstriving" and "nondoing". (Note: in MBCT Segal et al. (2002) refer to this as the "being" mode.) In meditation there is no 'goal state'. Instead, awareness of what is happening at any moment is the aim and pleasant, unpleasant, and neutral feeling states (e.g., deep relaxation) can arise through the process of achieving this aim.

Mindfulness-based cognitive therapy combines these mindfulness techniques with aspects of CBT. Kabat-Zinn (in Segal, Williams, & Teasdale, 2002) refers to MBCT as a unity of "what are commonly thought as Eastern meditative practices and perspectives with Western psychological epistemologies and practices" (p. vii). The synthesis of mindfulness with cognitive therapy is natural in that mindfulness, by definition involves refining one's capacity of paying attention and for "emergent insight that is beyond thought, but that can be articulated through thought" (p.viii). It is through use of thought in combination with mindfulness that one can move beyond habitual behaviours, which can be sometimes detrimental, and be aware of "thoughts" and observe thoughts as thoughts without trying to change them. In MBCT, emphasis is placed on awareness, acceptance, and letting go. The core skill developed through the MBCT program is the

ability to recognize and disengage from patterned rumination of negative or dysfunctional thoughts while maintaining an objective awareness of the process.

More specifically, MBCT trains practitioners to become more aware of the thoughts, positive or negative and to be able to identify and "be with" associated emotional and physiological responses. By the end of the fifth session in the MBCT program the participants have been introduced to mindfulness (being mode), have practiced being aware of positive and negative events around them, and are trained in mindful breathing and guided meditation. The sixth session integrates all of these prerequisite "tools" with a more formal cognitive framework. At this point, time is spent learning about the nature of thoughts and their often-misinterpreted veracity. Further, because the participants are able to recognize different internal arousal patterns, they are able to attribute the associated experiences with the dysfunctional thoughts. Where cognitive therapy targets changing beliefs in irrational or dysfunctional thoughts in the treatment of anxiety or depression, MBCT on the other hand, encourages participants to identify the dysfunctional thoughts as they arise and then to stand back (disengage) to evaluate the accuracy of the thought content and simply be with the associated and sometimes uncomfortable emotions. Here, thoughts become objects of awareness and are discrete entities that are encouraged to be accepted at which point the emotional response can also be seen in a different way. When effective, this leads to a general shift in their perspective and relationship with the thoughts. This distancing is felt to be the mediating factor, rather than change in thought content per se. The combination of cognitive awareness and distancing skills, increased awareness of emotional and physiological arousal, and the mindful notions of "being" and "accepting" creates the opportunity for

the participants to break habitual ruminative thought patterns. In doing so, the perpetuation of a downward spiral thought-affect cycle is disengaged and overt symptoms of affective disturbance are prevented.

Mindfulness meditation and MBCT have been shown to provide variable degrees of benefit to a range of physical and emotional conditions (see Bishop, 2002; Grossman, Niemann, Schmidt, & Walach, 2003, for review of MBSR efficacy). Individuals with cerebrovascular disease (Castillo-Richmond, Schneider, & Alexander, 2000), dermatological conditions (Kabat-Zinn, Wheeler, Light, Skillings, Scharf et al., 1998), anxiety (Astin, 1997; Miller, Fletcher & Kabat-Zinn, 1995), depression (Mason & Hargreaves, 2001; Teasdale, Segal, Williams, Ridegway, Soulsby & Lau, 2000), chronic pain (Kabat-Zinn, Lipworth & Burney, 1985), traumatic brain injury (Bédard, Felteau, Mazmanian, Fedyk, Klein, et al., 2003) and cancer (Massion, Teas, Hebert, Wertheimer, & Kabat-Zinn, 1995) have benefited from such interventions. Health-related QoL has also been shown to improve following MBSR (Bédard et al., 2003; Reibel, Greeson, Brainard, Rosenzweig, Reibel, et al., 2001). Moreover, these improvements tend to be maintained at follow-up evaluation up to three years post MBSR or MBCT intervention (Kabat-Zinn et al., 1992; Mason & Hargreaves, 2001; Miller et al., 1995). A brief summary of selected findings follows.

In a landmark study (Castillo-Richmond et al., 2000) patients with cerebrovascular disease (CVD) were divided into intervention and control groups with the intervention group taking up meditation for 20 minutes twice a day. The control group had a CVD health education program aimed at lowering risk factors and also were encouraged to spend 20 minutes a day in relaxing leisure activities (other than

meditation). At a 6 to 9 month follow-up it was found that the meditation group was reversing their vascular disease (0.1 mm average reduction in intima thickening of the carotid arteries) compared to the control group whose disease advance (by an average of 0.05 mm). The improvements were not reported to be attributable to changes in other cardiovascular risk factors. The authors postulated that such reductions in arterial wall thickness would translate into reductions of acute myocardial infarction by 11% and of stroke by 15%. Larger and more prolonged studies are needed to fully measure the cumulative effects of meditation on CVD, however this study provides a good foundation for future investigation.

In an evaluation of the influence of a MBSR intervention for individuals with moderate to severe psoriasis, Kabat-Zinn and colleagues (1998) reported positive findings. Specifically, patients with psoriasis about to undergo ultraviolet phototherapy or photochemotherapy were randomly assigned to a MBSR or control condition. Through blind and double-blind ratings of changes in skin physiology, it was found that those in the MBSR group improved significantly more and significantly faster. In a large-scale study ($\underline{N}$ = 225) of MBSR with chronic pain patients, similar significant findings were reported (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987). While pain remained to be high, significant improvements in psychological status was made and maintained at the four-year follow-up.

In a group format, mindfulness-based programs have worked to improve anxiety and depression. In a group of 22 patients diagnosed with GAD or panic disorder who completed an 8-week program, Kabat-Zinn and colleagues (1992) reported significant reductions in anxiety and depression scores and these reductions were maintained at 12

week follow-up. Greeson and colleagues (2001) examined the effects of mindfulness-MBSR on health-related quality of life and physical and psychological symptomatology in a heterogeneous patient population. The patients (N=136) participated in an 8-week MBSR program and were required to practice 20 min of meditation daily. Health-related quality of life was enhanced in the areas of vitality, bodily pain, role limitations caused by physical health, and social functioning on the Short-Form Health Survey (SF-36). Decreased psychological distress was indicated on the Symptom Checklist – 90-Revised (SCL-90-R) by a 44% reduction on the anxiety subscale, and a 34% reduction on the depression subscale ($p < .0001$). One-year follow-up revealed maintenance of these initial improvements. The authors concluded that a group mindfulness meditation training program can enhance functional status and well-being and reduce physical symptoms and psychological distress in a heterogeneous patient population and that the intervention may have long-term beneficial effects.

MBCT has been shown to be effective in preventing relapse (over 15 months) of depression in patients who had experienced 3 previous depressive episodes (Teasdale et al., 2000). When compared to a group receiving treatment as usual, risk of relapse was decreased in the MBCT group by 44%. These findings have been replicated showing that MBCT is reliably an effective and efficient way of preventing relapse in recovered depressed patients (Ma & Teasdale, 2004). Related to this, a study of autobiographical memory (Williams, Teasdale, Segal, & Soulsby, 2000) found that MBCT reduced recovered depressed patients' general memory for negative events, suggesting that the encoding and retrieval of negative personal events can be altered by MBCT. In a qualitative analysis of the application of MBCT for depression, Mason and Hargreaves

(2001) found that the development of an attitude of "acceptance" was an important prerequisite for change. It was reported that the improvement of mindfulness skills in a MBCT intervention program was seen to hold a key role in the development of change and generalization of these skills to everyday life was seen as essential.

To date, there has been no reported study that has investigated the effect of MBCT on the various aspects included in health-related QoL (i.e., psychosocial, emotional, functional factors) with stroke patients. Given the aforementioned findings, however, one might predict that equally beneficial outcomes would result in a stroke survivor population. The conceptual premise of MBCT shows intuitive potential to be applied to those with stroke. People who have had a stroke have gone through loss and/or change in ability and self-image that, unless accepted and realized, can foster emotional turmoil. A core feature of most medical illnesses or events with residual effects is the change in the way individuals view themselves, their environment and often their future. Given the unremitting physical sequelae of stroke and the prevalence rates of anxiety and depression after stroke, it is felt that MBCT is well suited to teach acceptance of what will not change and to disengage ruminative thought patterns that perpetuate adverse affective symptoms.

Purpose

The purpose of this study was four-fold. First, the aim was to adapt and implement a novel intervention, namely MBCT, for individuals who have suffered cerebrovascular trauma (e.g., stroke). Adaptations to the MBCT program involved making considerations for language sensitivity, physical limitations and disabilities that many of the participants had. Also, the focus on prevention and treatment of depression

was expanded to include anxiety, bereavement/loss and other forms of coping response. Data obtained with other client populations (e.g., chronic pain, cancer, depression, brain injury) suggest that such an intervention may have a benefit beyond that obtained with conventional forms of treatment. It was hypothesized that the proposed intervention may improve QoL, decrease depressive and anxiety symptoms, and increase the sense of control experienced by individuals with stroke regardless of change in functional abilities. Further, it is postulated that an improvement in these areas will alleviate some of the burden of the caregivers and will therefore improve the rehabilitation "environment".

The second aim involved psychometric analyses of measures used. The intention was to evaluate the psychometric properties, specifically, validity, reliability and responsiveness of generic and stroke-specific measures. It was hypothesized that the specific measures would demonstrate a larger degree of responsiveness based on participant's item endorsement. Further, the aim was to evaluate differences, if any, on measures said to reflect the same construct (e.g., BDI-II and HADS – depression subscale) and determine such aspects of validity. It was hypothesized that measures including physiological items which can be affected by stroke (e.g., numbness, tingling, dizziness, insomnia, loss of appetite) would misrepresent the degree of emotional disturbance (e.g., false-positive depression scores), but that in general the measures would reflect the same construct.

The third aim or purpose was to evaluate the effectiveness of MBCT (through repeated assessment immediately after the program and in a three-month follow-up) on aspects of QoL, emotional factors, adjustment, functional activities, and general aspects

of strain or burden placed on the caregiver. It was hypothesized that MBCT would be therapeutically beneficial as observed through positive changes in overall mood (e.g., symptoms associated with depression and anxiety), the psychological components on the general and specific measures of quality of life, and in turn, level of strain or burden on the caregiver. The participant's method of coping (e.g., denial vs. fighting spirit vs. hopelessness) was anticipated to have an interaction with the overall findings. No changes were anticipated on measures targeted toward physical functioning.

The final purpose was to determine the predictors of success. Predictors included scales from the Mental Adjustment to Stroke Scale (MASS), demographic features, length of time since stroke, degree of impairment, level of family or spousal support, coping styles, commitment to the practice of MBCT (i.e., attendance, amount of daily practice), and change in health status through the period of the program and assessments. It was hypothesized that helplessness/hopelessness and the anxious preoccupation MASS subscales would positively correlate with heightened levels of depressive and anxious symptomatology. Further it was anticipated that specific attitudes would be amenable to change by means of MBCT (along with the educational and social aspects that accompanied the program) thus so would improvement in mood and general QoL.

General Methods

Recruiting

This study involved two separate recruiting periods for participants. Initially it was hoped that response rate would be high enough to have a wait-list control group. However, because of low response rate from participants who met the inclusion criteria an additional recruitment period was held. The participants were recruited from a variety

of community sources. Posters were placed at the Heart and Stroke Foundation, Diabetes Association, offices of area physicians, Thunder Bay 55+ Center, Lakehead University, and distributed through case workers with Community Care Access Center. Information was also disseminated through a talk at a local Stroke Recovery Association meeting, on area radio stations, through a press release by Lakehead University and on the televised Community Message Board.

Recruiting for the two MBCT programs took place between August and October, 2002 and November 2002 and January 2003. Participants were self-identified either by calling the researcher independently or by signed consents and paper-based referrals from community physicians. All prospective participants were asked to read or listen to the cover letter that explained the premise and format of the study and MBCT Program. For those who were interested, but preferred for the investigator to contact them, they were asked to complete the "pre-consent" form indicating their name and phone number. The researcher then followed up with the participant with a phone call and arranged a time to meet individually in order to explain what was required of the participant and what they could expect. After this, the participants were asked to sign the consent form (see Appendix A) and the initial interview was conducted. Initial screening for exclusion criteria took place at this time. The participants then completed the initial set of assessment measures.

Participants

Participants were screened (via interview in their homes) for confounding variables. Individuals (stroke survivors and caregivers) were excluded from the study if they were: (a) unable attend to and remember aspects of the classes (Mini Mental Status

Exam score < 25), (b) unable to hear and/or understand and communicate in English, (c) unable to physically participate in sessions (e.g., stamina, transportation to group sessions), (d) under the age of 30, (e) managing any other complicating illness that would be considered more compromising than the stroke (e.g., cancer treatment, daily dialysis, severe psychiatric diagnosis), and (f) dealing with any recent major life events (e.g., death in the family). While it was not a condition for participation to have a caregiver, the caregivers who agreed to participate were required to be the spouse and/or the primary caregiver of the individual who had a stroke.

Intervention

Mindfulness Based Cognitive Therapy (MBCT) is a group-based skill training approach that was initially developed with the intention to train individuals, presently in remission of depression, to develop some degree of protection against a recurrent depressive episode (Segal et al., 2002). In some ways MBCT has similar aims to CBT in treating depression. The program attempts to teach a greater awareness of thoughts and feelings, and to view them as mental events rather than as necessarily truthful reflections of reality (Mason & Hargreaves, 2001). It examines the role that thoughts have in triggering mood and aims to help participants understand the ways in which escalating depressive thinking patterns and worry promote depression. It also explicitly focuses on the identification of "warning signs" of impending depression. However, unlike CBT, MBCT does not explicitly suggest changing thought content nor does it set out to identify the schema or cognitive distortions related to depression. In fact, the participant may learn mindfulness skills in the absence of current depressive thinking; the skills taught

utilize an awareness of thoughts and feelings, whether depressive or not (Segal et al., 2002).

The specific content of the present intervention program is based on the combination of Kabat-Zinn's (1994) manualized MBSR program and Segal and colleagues's (2002) manual for MBCT. As mentioned previously, one of the primary purposes for this research was to implement the MBCT program with a group of individuals who have had a stroke. Because the target group was very different from the one in which the program was piloted, some important alterations were made. These included making considerations for physical and emotional needs. For example, altering aspects of the Yoga portions, discussing fears with doing floor-work activities, providing relevant examples, using a facility and room that was accessible to all forms of ambulation, and consideration of auditory and visual aids were essential. The MBCT program had to be adapted to include language that was pertinent and sensitive to the needs and limitations of the participants. Unlike the MBCT program developed by Segal and colleagues (2002), the stroke participants were possibly not only dealing with symptoms of depression but other emotional and functional difficulties directly related to the stroke. In addition to the focus on treatment and prevention of depression, the focus in the present study was extended to include other aspects of emotional and physical coping, adaptation to change (physical abilities, self view, role, etc.), barriers to functioning, change in personality, among others. This said, the core content and approach of MBCT was unaltered. Two facilitators, including the primary investigator (a third-year clinical psychology Ph.D. student; AM) and a certified and trained Mindfulness Meditation and Yoga Instructor (MF) were present at each session.

Instruments

The measurement instruments applied to this study were selected based on a number of criteria. The measures had to be psychometrically sound and together, it was desired that they capture a number of the emotional and physical changes frequently experienced after stroke. Further, determining the caregiving needs of the participants and the subsequent impact on the caregivers required a number of specifically designed instruments. Each measure is described below.

Mini-Mental Status Exam (MMSE).

The Mini-Mental Status Exam (MMSE) was designed to test cognitive functions simply and quickly (Folstein et al., 1975). The intent with this measure was to serve as a screening tool for those who may not be able to benefit from the intervention as cognitive capacity was limited. The MMSE has no abstraction items, but includes a diagnostically valuable verbal retention test. Administration takes from five to ten minutes. Sixty-three elderly (mean age = 73.9) normal control subjects comprised the standardization population. With a maximum obtainable score of 30, the elderly control subjects and younger patients with functional psychiatric disorders achieved scores in the 24.6 to 27.6 range. Scores of several groups of senile patients ranged from 9.6 to 12.2. There was no overlap between the aged control subjects and the senile patients. This test has proven to be useful in registering changes in the intellectual functioning of psychiatric patients as they respond to treatment.

The Beck Anxiety Inventory.

The Beck Anxiety Inventory (BAI) is a self-report scale that was designed to "measure symptoms of anxiety which are minimally shared with those of depression"

(Beck & Steer, 1993, p. 1). The BAI was originally developed from a sample of 810 outpatients of mixed diagnostic categories (predominantly mood and anxiety disorders). The 21 symptoms on the BAI were selected from three exiting measures: (a) The Anxiety Check List (Beck, Steer, & Brown, 1985); (b) the PDR Check List (Beck, 1978); and (c) the Situational Anxiety Check List (Beck, 1982). Two successive factor analyses on different samples then reduced the number of items to 21, with a minimum item-total correlation of .30. The original development has been very well done and is described in detail in Beck Epstein, Brown, and Steer (1988).

Each of the 21 items represents an anxiety symptom that is rated for severity on a 4-point Likert-like scale (0-3), ranging from *Not at all* to *Severely; I could barely stand it*. Responses are added to obtain a total score (maximum possible score is 63). The minimal or non-symptomatic range extends from 0-7; the mild range extends from 8-15; the moderate range is from 16-25; and a score of 26 or greater is indicative of severe anxiety. Internal consistency reliability coefficients range between .85 and .94 (Beck et al., 1988). Test-retest data from Beck et al. (1988) showed a reliability coefficient of .75 over one week. Creamer, Foran, and Bell (1995) reported a 7-week correlation of .62.

The factor validity of the BAI has been investigated in clinical (Beck et al. 1988; Hewitt & Norton, 1993) and nonclinical (Creamer et al., 1995) settings. Beck et al. (1988) found two factors ($r = .56$, $p < .001$) that seemed to reflect somatic and cognitive/affective aspects of anxiety. Scales within the BAI include neurophysiological, subjective, panic, and autonomic. In clinical samples, correlations between the BAI and BDI have ranged from .48 to .71 (Hewitt & Norton, 1993; Steer, Ranieri, Beck, & Clark, 1993). This suggests that the discriminant validity of the BAI is not high, however this

may be partially reflective of issues related to the diagnostic difficulty of teasing anxiety apart from depression. The BAI has been shown to be responsive to change in individuals diagnosed with anxiety disorders following completion of MSBR (Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat Zinn, 1995). Altogether, while it appears that more studies are warranted in evaluating the psychometrics of the BAI, the scale is highly reliable and easy to use.

The Beck Depression Inventory – II.

The BDI-II is a well used and psychometrically sound tool used to detect the presence of depressive symptomatology. While the items are consistent with the DSM-IV criteria for depression, the tool is not intended to serve as an independent diagnostic indicator. Each of the 21 items represents a depressive symptom that is rated for severity on a 4-point Likert-like scale (0-3). Scores range from zero to 63. A normal score (i.e., no depressive symptomatology) falls within the range of 0-13 ("minimal"). A score suggesting a "mild" degree of depressive symptomatology falls between 14 and 19. A score between 20 and 28 is considered "moderate", and a score of 29 or higher is considered "severe". In a normative sample of 127 patients at the University of Pennsylvania (Spitzer et al., 1990), it was found that the average score for the group of people deemed to be "severely depressed" was 32.96.

The BDI is said to be based on a strong empirical foundation of almost 40 years of research (Arbisi, 1998). The psychometric properties of the BDI-II were determined using two samples: a clinical sample (n = 500; 63% female; 91% White) who sought outpatient therapy on the east coast of the United States; and a convenience sample of Canadian university students (n = 120; 56% women; described as "predominantly

White"). The average ages of the clinical and student samples were 37.2 and 19.6, respectively. In terms of reliability, coefficient alpha estimates were .92 and .93 for the outpatient and nonclinical samples, respectively. Corrected item-total correlations ranged from .39 to .70 for the outpatient sample, and .27 to .74 for the non-clinical sample. Test-retest reliability over one week was .93.

Two factors have been identified within the BDI-II (Beck, Steer, & Brown, 1996). The first refers to the somatic affective component and the second is said to reflect the cognitive dimension of self reported depression. In support of its convergent validity, the BDI-II has moderately high correlations with the Beck Hopelessness Scale (r = .68) and the Revised Hamilton Psychiatric Rating Scale for Depression (r = .71). Concurrent validity is moderately higher with the Hamilton Psychiatric Rating Scale for Depression – Revised (r = .71) in psychiatric outpatients. In terms of discriminant validity, the BDI-II has been shown to have a moderate correlation with the Hamilton Rating Scale for Anxiety – Revised (r = .47), and a higher correlation with the BAI (r = .60). On a validation study assessing various measures of depression for people who have had a stroke, the BDI's optimum cutoff score was 10, with sensitivity being 80% and specificity being 61.4 % (Aben, Verhey, Lousberg, Lodder, & Honig, 2002). These authors reported this scale to be an acceptable screening instrument for PSD. The BDI has been shown to be responsive to change in individuals following completion of MSBR (Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat-Zinn, 1995).

The Hospital Anxiety and Depression Scale.

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) is an easily administered 14-item self-report measure designed specifically for individuals

with physical illness. Items are presented in a four-point Likert-like format (i.e., ranging from often to very seldom) with valences for responses alternated equally. Designed to assess both anxiety and depression, the authors (Zigmond & Snaith, 1983) were careful to limit the problem in distinguishing anxiety from depression and did not include items that related to both of the emotional disorders (i.e., somatic symptoms). A separate score is calculated for both depression and anxiety.

Based on responses of general outpatient adults (n = 100) between the ages of 16 and 65, the anxiety item correlations ranged from .41 to.76 and the depression item correlations ranged from .30 to .60 (Zigmond & Snaith, 1983). Internal consistency alpha scores were found to be high (anxiety: .93; depression: .90) in a large sample (n = 568) of cancer patients (Moorey, Greer, Watson, Gorman, Rowden et al., 1991). In a confirmatory factor analysis study of the HADS, Johnston, Pollard, and Hennessey (2000) administered the scale to individuals with breast disease, myocardial infarction and stroke. Results indicate high levels of internal consistency with two distinct factors, anxiety and depression. Concurrent validity of the HADS was assessed through comparison of scores with the General Health Questionnaire-12 (GHQ) based on the responses of 79 patients receiving care in a hospice setting (Le Fevre, Devereux, Smith, Lawrie, & Conrbleet; 1999). The authors found no significant difference between the two subscales in their ability to detect depressive illnesses. The GHQ was found to perform less well than the HADS and the HADS was recommended as a valid screening tool for these affective disorders. Further support for the HADS comes from Aben et al. (2002) who reported the specificity and sensitivity for the depression and anxiety subscales as 73.1%, 81.6% and 91.7%, 65.3%, respectively. Results from this validation

study support the use of the HADS as an acceptable screen instrument for PSD (Aben et al., 2002).

Clinically significant scores on the HADS have been identified to be 9 or more (Gillespie, 1997), but a higher cutoff score of 20 is reported to have a sensitivity of .77, a specificity of .85 and a positive predictive value of .48 (Le Fevre et al., 1999). Altogether, researchers in a variety of clinical populations have indicated the reliability and validity of the HADS to be acceptable and that it is a tool that can satisfactorily be used with clinical populations.

Mental Adjustment to Stroke Scale.

Based on the Mental Adjustment to Cancer Scale (MAC; Watson, Greer, Young, Inayat, Burgess, & Roberston, 1988), this 40-item self-report measure assesses survivors' psychological adjustment to stroke (Lewis, Dennis, O'Rourke & Sharper, 2001). It includes 5 subscales: fighting spirit, helplessness/hopelessness, anxious preoccupation, fatalism, and denial/avoidance. Patients with fighting spirit are determined to get well and are optimistic. Patients with feelings of helplessness/hopelessness are overwhelmed and are afraid they are dying. Patients with anxious preoccupation seek information and worry about their symptoms, while those with a fatalistic attitude acknowledge their situation but seek no further information. Those in denial/avoidance either deny having had a stroke or minimize the severity (Lewis et al., 2001). A high score in all subscales except for fighting spirit reflects a more negative attitude which predicts decreased survival. Items are presented in a four-point Likert-like format ranging from "*definitely does not apply to me*" to "*definitely applies to me*".

The psychometric properties of the original MAC have been well established on large-scale (i.e., $\underline{n} > 455$) clinical populations with strong indication that it is reliable and valid (Akechi, Kukue-Saeki, Kugaya, Okamura, Nishiwaki, et al., 2000; Nordin, Berglund, Terje, & Glimelius, 1999; Osborne, Elsworth, Kissane, Burke, & Hopper, 1998). Internal consistency analyses have revealed subscale alpha coefficients ranging from .60 to .81 (Akechi et al., 2000; Nordin et al., 1999). Test-retest reliability coefficients have ranged from .38 (Watson et al., 1988) to .81 (Akechi et al., 2000), suggesting moderate to high stability. Convergent validity was shown to be adequate with significant correlations found between the MAC and the Profile of Mood States (Akechi et al., 2000) and the HADS (Nordin et al., 1999). Construct validity analysis conducted by Akechi and colleagues (2000) demonstrated some overlap between subscales with helplessness/hopelessness and fatalism sharing 25% of the variance and anxious preoccupation and helplessness/hopelessness sharing 17%. Osborne and colleagues (1999) suggested that the MAC may be measuring six independent constructs, and this may account for the high shared variance found in previous analyses.

The original analyses on the MASS (i.e., same scale with a different population) revealed similar psychometric properties. In this study, Lewis and colleagues (2001) administered the MASS to 372 stroke patients at stroke onset, 6-months after, and 3-5 years after the initial stroke. As seen in evaluations of the MAC, internal consistency alpha values ranged from .67 to .81. Test-retest reliability ranged from .18 to .89. The difference between these scores and the generally higher values obtained with the MAC is likely reflective of improvement in physical and emotional status over the course of time, therefore suggesting that the MASS is sensitive to state characteristics of the

patients. This indicated that a shorter time span between administrations of the MASS might give a better picture of the course of change in mental adjustment and negative attitude with improvement in physical and emotional status. The authors found an overall difference between what the HADS measured and what the MASS measured, namely between depression and helplessness/hopelessness. They suggested that the helplessness/hopelessness is not purely a measure of depression since it predicted survival in the stroke patients whereas HADS depression did not.

Stroke-Specific Quality of Life Scale.

The Stroke Specific Quality of Life Scale (SS-QOL; Williams, Weinberger, Harris, Clark, & Biller, 1999) was designed to assess health-related QoL in stroke patients. It is a patient-derived measure that is designed specifically for use in clinical trials. Items were generated based on review of other health-related QoL measures as well as on clinical interviews with ischemic stroke survivors ($\underline{n} = 32$), which identified common domains affected by stroke. Within this American standardization sample, 63% were male, 25% were black, and 18% had no health insurance. The authors did not indicate whether patients lived in urban or rural residential locations. Through neuroimaging 58% of strokes were seen to occur in the deep gray or subcortical white matter. Overall the health-related quality of life was not reported to change as a result of the stroke in 59% of survivors at 3 months after stroke.

Based on the 78 items generated (ultimately 49 items were retained), 12 domains were identified (Williams et al., 1999). All domains were unidimensional, with adequate internal reliability measures ($\alpha \geq 0.73$). The domains include: mobility, energy, upper extremity function, work productivity, mood, self-care, social roles, family roles, vision,

language, thinking, and personality. Construct validity was assessed using concomitant measures including, Short Form-36 (SF-36), the Barthel index (BI), and the BDI-II. All domains were linearly associated with the SF-36 ($r = .80$), with the exception of the Social Roles domain, which was not significantly related to the SF-36 social functioning subscale ($p = .42$). This is not surprising since earlier researchers (Anderson, Laubscher & Burns, 1996) had found a poor performance of the SF-36 social function subscale in stroke patients. The Self Care domain showed strong association with the BI ($r = .70$) as did the mood and personality domains with the BDI (.70 and .65, respectively, $p < .001$).

Between one and three months after stroke, the SS-QOL was found to be moderately responsive to change with standardized effect sizes greater than 0.5 in most domains, with mood and personality domains being less responsive. It is questioned whether the same result would be found for mood if the BDI-II were used (instead of BDI) and if another aspect of emotional functioning was assessed (i.e., anxiety). The unresponsiveness of personality likely reflects a trait rather than state effect. When compared to the SF-36 but not the BI, the SS-QoL performed similarly.

Altogether, the SS-QoL has, at the outset, shown to be a valid and reliable measure of stroke-specific health-related quality of life. Compared with other more generic health-related QoL measures, this one appears to be broader in terms of content area and includes items that are specific to individuals who have had a stroke. In a comparative study that investigated the responsiveness of generic versus specific QoL instruments, Wiebe and colleagues found that specific instruments were more responsive to change than generic instruments and their analogous domains (Weibe, Guyatt, Weaver, Matijevic, & Sidwell, 2003). For this reason the combination of specific (SS-QoL) and

generic (SF-36) QoL measures were used in this study to ensure responsiveness, breadth and comparability.

36-Item Short-Form General Health Survey.

This is a widely used measure (Ware & Kosinski, 2001) that has been included in over 500 clinical trials that was first used in the Medical Outcomes Study, but designed for general use in multiple populations (Golomb, Vickrey, & Hays, 2001). The domains said to be covered by the 36 items on the SF-36 include: physical function, role function, pain, emotional well-being, social function, and general health perceptions (Ware & Sherbourne, 1992). Together, these domains factor into two main component summary measures: physical health (PCS) and mental health (MCS), which are said to reflect general QoL. Canadian normative data have been developed for the SF-36 (Hopman, Towheed, Anastassiades, Tenenhouse, Poliquin et al., 2000) and were used in the present study to assess the effect of the intervention (MBCT) on health-related QoL. General population internal reliability estimates calculated from ten different countries and with tens of thousands of subjects ranged from .90 to .94 for PCS and from .86 to .90 for MCS (Ware & Kosinski, 2001). Test-retest reliability has been reported as .88 and .77 for PCS and MCS, respectively. In terms of external validity, Ware and Kosinski (2001) reported that the moderate correlations (.53 to .63) suggest that the PCS reflects overall satisfaction with physical ability and mobility. Also, both the PCS and the MCS correlated substantially with the eight physical and psycho-physiologic symptoms measured by the Medical Outcomes Study (-.55 to .41; Ware & Kosinski, 2001). Both stroke survivors and caregivers were administered this measure in the present study.

Zarit Burden Interview – Short Version.

Based on the 22-item version of the Zarit Burden Interview (ZBI; Zarit, Orr, & Zarit, 1985), the Short version (ZBI-S; Bédard, Molloy, Squire, Dubois, Lever, & O'Donnell, 2001) is designed to be used to assess the impact of caregiving, for a range of clinical populations, in a range of study designs (e.g., cross-sectional, longitudinal, intervention). Development of the ZBI-S was based on the collection of data from 413 caregivers of people with Alzheimer Disease and with other forms of cognitive impairment. The number of items was reduced to 12. The correlations between the short version and the full version ranged from .92 to .97. Internal consistency for the two factors identified in the scale, namely personal strain and role strain, was .89 and .77, respectively. These were equivalent to previous investigations of a short form, which used a different group of items. The ZBI-S was found to correlate with a number of measures of activities of daily living (ADL) in a similar pattern to that of the original ZBI. Altogether, the ZBI-S offers a shorter version of the ZBI and has been shown to be sensitive and responsive to a range of clinical populations. The tool is psychometrically sound and is feasible in terms of ease of administration and scoring.

Lawton Scale.

The Lawton Scale is a combination of The Physical Self-Maintenance Scale (PSMS) and the Instrumental Activities of Daily Living Scale (IADL; Lawton & Brody, 1969), to reflect an objective perspective of the daily functioning of the stroke survivor. Caregivers complete the questionnaire with responses generating two domains depicting the basic and instrumental activities of daily living of the caregivee. This 14-item Likert-like scale addresses fourteen areas of daily functioning that are typically seen to decline

along with impairment in neuropsychological functioning (Lawton & Brody, 1969). Evaluated on a random sample from a range of health care services, the Lawton Scale was found to have high convergent validity with other scales related to functional and mental health. Interrater and test-retest reliability were also found to be high, with correlations of .91 and .96, respectively.

The Dysfunctional Behaviour Rating Inventory.

This 22-item Likert-like scale addresses the major areas of problem behaviour that can be seen subsequent to stroke. Examples include temper outbursts, wandering, indecisiveness, and frustration. For each item the caregiver respondent was required to indicate the frequency of occurrence of the problem and indicate the degree to which the behaviour was a problem. There are four subscales or domains into which the items factor. These include psychotic, difficult, emotional, and repetitive behaviours. Caregivers were administered this measure in order to determine the behavioural functioning of the stroke survivor.

The Health-Promoting Lifestyle Profile.

This scale was developed on the premise that a healthy lifestyle is a multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization, and fulfillment of the individual (Walker, Sechrist, & Pender, 1987). The HPLP was empirically validated on a diverse Midwestern United States sample ($\underline{n}$ = 952; 436 females, 516 males) that ranged in ages between 18 and 88. This Likert-like measure includes 48 items that combine into six conceptually valid subscales (Walker et al., 1987). These include self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management.

Inter-item correlations range from -.10 to .65 and total scale internal consistency is reflected by an alpha coefficient of .92. Test-retest reliability over a two- week period was .93 for the total scale and ranged from .81 to .91 for the subscales (Walker et al., 1987). Altogether, the HPLP appears to have sufficient validity and reliability for use in research for the purpose of describing the health behaviours in various populations and to measure changes in health-promoting life-style as a result of intervention. Caregivers completed this measure based on their own health behaviours.

Log Book Entries.

In order to establish some form of monitoring of participants outside of the "classroom", they were required to engage in regular self-monitoring of at-home tasks. "Homework" tasks are a central premise of CBT and patients were encouraged to use self-monitoring forms to log such activities (Beck, 1995). Segal and colleagues (2002) incorporate daily formal practice of mindfulness in homework assignments. The intention was to enable participants to generalize what they have learned into everyday life. Due to limitations in upper extremity function, some participants were unable to record homework themselves. In these cases, they would ask their caregiver to assist, make brief notes for themselves, and/or rely on memory for reporting activities, asking questions, and making comments. While log books were not required to be completed during the 3-month period following the second assessment, participants were asked to report on the frequency and form of mindfulness practice in which they engaged (see Appendix C). Results are discussed in Section IV.

Qualitative Reports.

While the qualitative reports are not included in the psychometric analysis (below), the use of this informal measure will be introduced here as it is part of the "measures used". As part of the last session for each group, participants were asked (in class) to talk about what they had learned. The discussion was recorded on chart paper and is summarized in the following section. As part of the Time-2 assessment, participants were asked to rate the importance of the MBCT Program on a scale of 1 to 10, with 10 being "very important" and 1 being "not at all important". Following this, they were asked to discuss why they gave that rating and what they liked and disliked about the Program (see Appendix D for verbatim responses). A summary of qualitative reports is presented in Section IV.

Section II: Modification of a Novel Intervention

Just as Segal, Williams and Teasdale (2002) exerted significant energy and time when faced with the challenge of developing an economical and time efficient program for the prevention of relapse of depression the same was true for the present study. The modification and adaptation of their MBCT program for the treatment and prevention of mood related concerns for a group of people who had sustained a stroke was a multistage process. While the general structure and theoretical and practical aspects of the MBCT Program were relevant to this form of applied research, it was initially clear that modifications to aspects of content and format were needed in order to accommodate for the needs of the participants.

Method

The adaptation process for the application of MBCT for stroke survivors was a fluid one, but can be best described as a two-stage process. The first, or preliminary stage, took place over a five-month period between April and September 2002. During this stage the commitment of an experienced Mindfulness and Yoga Instructor (referred to herein as "the MBSR expert") was secured and the collaborative effort began. First, the MBSR expert educated the primary investigator (via discussion and through provision of reading materials) on the nature and basis of Mindfulness Based Stress Reduction (MBSR) as well as the historical aspects of Mindfulness Meditation as a whole. Together, the MBSR expert and primary investigator practiced both Buddhist and Mindfulness forms of meditation after which the primary investigator was able to maintain her own personal practice independently. This point is important, as Segal et al. (2002) point out, as they realized (through trial and error) that "a vital part of what the MBSR instructor conveyed was his or her own embodiment of mindfulness in interactions with the class" (p. 56). The authors further liken this with a parallel to rock climbing, where those who are learning need to be able to trust the instructor's skill and experience to deal with difficult situations as they arise.

In addition to gaining familiarity with MBSR, the primary investigator had to become intimately aware of how this can be combined with the already familiar cognitive therapy approaches to create the basis for MBCT. Again, this had to be understood both theoretically and experientially. Once grasped, the primary investigator was able to educate the MBSR expert on the theoretical and practical aspects of cognitive therapy. While the MBSR expert was not going to be involved in the direct application of

cognitive therapy principles, it was important in the process of understanding MBCT and in presenting the two epistemological approaches as one.

The second stage involved the adaptation of specific aspects of the MBCT Program in order to be applied to those with stroke. A draft was initially designed prior to meeting individually with the prospective participants, and then based on determining the general physical abilities of the participants, additional revisions were made. Generally, this adaptation process looked at format and content. In order to ensure that participants had time to reflect on their experiences and time to practice and complete exercises that might be more physically challenging, both facilitators agreed that it was important to not try to "cram" too much into each session. For this reason, an additional ninth session was added to the original MBCT format. By distributing new concepts and exercises over an additional session, this allowed for extra time throughout each class.

In terms of content changes attention was paid to exercises requiring physical ability and also to language. Physical activities that required walking, balance, the ability to get down and up to complete floor activities, upper extremity function for writing and arms movements, and yoga movements in general were either removed from the program or adapted to accommodate the participants based on their needs. Language changes were made to encompass stroke and its effects as a whole. This meant sensitivity (e.g., to not include examples of mindfulness during an activity that a person with hemiplegia could not do) as well as inclusion of the heterogeneity of outcomes that can occur within a supposedly homogenous population. Application of all themes and concepts in the MBCT to stroke were identified and highlighted (e.g., awareness, allowing, letting be, accepting, negative events). Educational components were included throughout the

sessions, both formally and informally to include topics related to mood, coping, caregivers, and physical functioning. The outcome of this process is outlined in the following section.

Results

Subsequent to the adaptation stage a comprehensive MBCT program package was developed. The package includes products for the facilitators as well as the participants. The facilitators worked from the "facilitator binder" that includes session agendas, notes, and the handouts provided to the participants. The package for the participants includes information for session location and times, a description and summary of each session, handouts for each session, and log forms in which to complete homework assignments. Contents of the facilitator package are provided in Appendix A. Note that references to Box numbers in the facilitator notes in Appendix B refer to information or scripts that are published in the manual by Segal and colleagues (2002). Copyright restrictions preclude reproduction of participant handouts outside of the clinical setting and therefore are not included in this manuscript.

Discussion

Altogether, the task of learning and practicing MBCT together with adapting the program in a way that would make it applicable to individuals with stroke was both personally challenging and fulfilling. The importance of being practiced and confident with the skills before working with others can not be stressed enough. While the MBSR expert facilitated the majority of meditation sessions, it was essential that the primary investigator also have an appreciation for the experience and the difficulties that can arise

when practicing in order for her to help guide the participants with their issues. Gaining this appreciation does not come quickly and is not a finite skill, one always learns.

In terms of how the adaptation process worked, it was beneficial that both facilitators were flexible and amenable to change. As this was a pilot project with stroke survivors the groundwork for specific content issues had not yet been done. One might be able to predict most difficulties the participants may have, however not all. For this reason, it was essential to learn from the participants and to make changes along the way. This helped to create a collaborative milieu with the participants and, based on their informal reports, made them feel "part of the process". While the format has been completed with two different groups, this does not ensure that future adaptations will not need to be made. Each individual will come with physical and emotional issues that work into their own personal history. This said, future applications of this program for people with stroke can confidently use the basic shell structure as described, however sensitivity to the individual will always be essential.

Section III: Psychometrics

The purpose for this section was to evaluate the psychometric properties of the battery of measures. Specifically, the convergent validity, reliability (internal consistency) and responsiveness (effect size) of generic and stroke-specific measures were evaluated. Based on previous research that compared responsiveness of generic and specific instruments (e.g., Wiebe et al., 2003) it was hypothesized that the specific measures would more accurately assess the participant's general state and show response to the intervention.

Method

Both the stroke survivors and the caregivers completed questionnaires in their homes at the beginning, end, and three-months following completion of the MBCT program. Upon completion of data collection, information was inputted into a spreadsheet database, with any specific participant features numerically coded. The psychometric analysis was carried out using Statistical Package for the Social Sciences (SPSS) 10.0. Reliability analysis for internal consistency used Cronbach's alpha calculations. Convergent and divergent validity analysis was performed using bivariate Pearson correlations. Responsiveness was evaluated by calculating the mean effect size for the change scores for each scale used, specifically reflected by the equation d = T2 – T1/SD pooled. Effect size values were interpreted according to Cohen's Benchmarks (Cohen, 1988). Statistical significance between effect sizes of different scales was calculated with paired sample t-tests.

Results

Reliability

Reliability analyses were performed by evaluating the internal consistency (Cronbach's alpha). Results for each subscale are summarized in Tables 1-9 with values for baseline (time 1) and for change scores (time 2 minus time 1). Within the Beck Anxiety Inventory (BAI) the Cronbach alpha values ranged between .58 and .71 for baseline scores and between .46 and .70 for change scores (with the exception of the alpha of .18 on the neurophysiological subscale; Table 1). The range of values for the two subscales within the Beck Depression Inventory – Revised (BDI-II) was .65 and .71 for baseline scores and .61 and .73 for change scores on the cognitive and somatic-

affective domains, respectively (Table 2). Cronbach's alpha values for the Hospital Anxiety and Depression Scales for baseline and change scores were .79 and .69 for the anxiety subscale and .79 and .73 for the depression subscale (Table 3). The Mental Adjustment to Stroke (MASS) subscales generally showed good internal consistency on baseline scores with alpha values ranging from .62 to .87, with the exception of an unusually low value of .05 on the anxious preoccupation subscale. Change score internal consistency showed a similar pattern with values ranging from .56 to .74, again with anxious preoccupation being low at .13 (Table 4).

The Stroke Specific Quality of Life (SSQoL) and the Short Form General Health Survey (SF-36) were the measures used to reflect quality of life. Within the SSQoL subscales (see Table 5), most Cronbach alpha values ranged from .81 to .95 on baseline scores. The "thinking" and "self care" subscales were an exception with alpha values of .51 and .63, respectively. SSQoL alpha values on the change contrast showed a similar pattern, with the exception of lower alpha values on upper extremity function ($\alpha = .48$) and self care ($\alpha = .17$). Internal consistency was similar for the SF-36 subscales, with most baseline alpha values ranging from .72 to .93 (Table 6). The mental health subscale and the overall Mental Component Score (MCS) were both having a slightly lower alpha value of .67.

The internal consistency of the caregiver measures was also assessed. Baseline Cronbach alpha values were .72 and .82 on the role burden and personal burden subscales of the Zarit Burden Inventory (ZBI; Table 7). On the Lawton Scale, the basic and instrumental subscales had alpha values of .76 and .81, respectively (Table 8). Table 9 reflects the internal consistency of the Health Promoting Lifestyle Profile (HPLP).

Generally alpha levels on the HPLP ranged from .57 to .85. On the Dysfunctional Behaviour Rating Inventory (Table 10) the subscales of difficult, emotional and repetitive behaviours had consistent alpha levels at baseline and at change, ranging from .60 to .73. The internal consistently of the psychotic behaviours subscale was poor at baseline (α= -.10) but this improved marginally on change score comparison (α= .28).

Table 1
Internal Consistency of BAI Subscales

BAI subscale	All initiated participants	
	Baseline (α)	Change (α)
Neurophysiological	0.70	0.18
Subjective	0.70	0.61
Panic	0.58	0.70
Autonomic	0.71	0.46

Table 2
Internal Consistency of BDI-II Subscales

BDI-II subscale	All initiated participants	
	Baseline (α)	Change (α)
Somatic-Affective	0.71	0.73
Cognitive	0.65	0.61

Table 3
Internal Consistency of HADS Subscales

HADS subscale	All initiated participants	
	Baseline (α)	Change (α)
Anxiety	0.79	0.69
Depression	0.79	0.73

Table 4
Internal Consistency of MASS Subscales

MASS subscale	All initiated participants	
	Baseline (α)	Change (α)
Fighting Spirit	0.76	0.64
Helplessness/Hopelessness	0.87	0.74
Anxious Preoccupation	0.05	0.13
Fatalism	0.62	0.56

Table 5 Internal Consistency of SSQoL Subscales

SSQoL subscale	All initiated participants	
	Baseline (α)	Change (α)
Mobility	0.94	0.88
Energy	0.81	0.81
Upper extremity function	0.85	0.48
Work productivity	0.88	0.78
Mood	0.81	0.76
Self Care	0.63	0.17
Social Roles	0.88	0.77
Family Roles	0.82	0.81
Vision	0.85	0.88
Language	0.95	0.88
Thinking	0.51	0.41
Personality	0.89	0.82

Table 6
Internal Consistency of SF-36 Subscales

SF-36 subscale	All initiated participants	
	Baseline (α)	Change (α)
Physical Function	0.81	0.74
Role Physical	0.89	0.77
Bodily Pain	0.75	0.67
General Health	0.83	0.47
Vitality	0.84	0.67
Social Functioning	0.93	0.88
Role Emotional	0.86	0.80
Mental Health	0.68	0.50
PCS	0.72	0.70
MCS	0.67	0.77

Table 7
Internal Consistency of ZBI Subscales

ZBI subscale	Caregivers	
	Baseline (α)	Change (α)
Role Burden	0.72	0.41
Personal Burden	0.82	0.09

Table 8
Internal Consistency of Lawton Subscales

Lawton subscale	Caregivers	
	Baseline (α)	Change (α)
Basic	0.76	0.58
Instrumental	0.81	0.34

Table 9
Internal Consistency of HPLP Subscales

HPLP subscale	Caregivers	
	Baseline (α)	Change (α)
Self Actualization	0.65	0.49
Health responsibility	0.80	0.07
Exercise	0.85	0.59
Nutrition	0.71	0.23
Interpersonal Support	0.57	0.64
Stress Management	0.63	0.32

Table 10
Internal Consistency of Dysfunction Behaviour Rating Instrument Subscales

DBRI subscale	Caregivers	
	Baseline (α)	Change (α)
Psychotic behaviours	-0.10	0.28
Difficult Behaviours	0.69	0.67
Emotional Behaviours	0.60	0.70
Repetitive Behaviours	0.73	0.74

Validity

In order to evaluate the validity of the measures used, Pearson bivariate correlations were calculated for both the baseline scores (i.e., T1) and change scores (i.e., T2-T1). The following results are organized according to general domain.

Depression Domain.

Within the depression domain, it was anticipated that there would be strong correlations between the subscales related specifically to emotional or mental health. Moderate correlations were predicted to occur on measures related to energy and psychosocial functioning. While these constructs are sometimes affected in periods of low mood or depression, this is not always the case. Low correlations were predicted to occur between measures of mood and depression and physical health as well as with healthy coping styles. In general, these predictions were accurate. On the baseline validity correlations (see Table 11), the BDI-II had strong correlations with SSQoL "mood" subscale ($r = -.78$), HADS depression subscale ($r = .66$), MASS "helplessness-hopelessness" subscale ($r = .79$), and the SF-36 role vitality ($r = -.61$), role emotional ($r = -.64$), mental health ($r = -.77$) and mental component ($r = -.73$) scores. Significant correlations were also seen between the SSQoL "thinking" subscale and SF-36 social functioning subscale ($r = .65$, $p < .05$). The HADS depression scale had correlations similar to those in other measures of mood, with the additional significant correlation with the MASS "fatalism" subscale ($r = .44$, $p < .05$).

Moderate to strong correlations ($.42 \leq r \leq .63$) were observed between SF-36 role emotional and other scales in the depression domain, with the exception of the non significant correlation with MASS fighting spirit scale ($r = -.16$, $p = .48$) and fatalism

scale (r = .04, p = .87). Moderate to low correlations (-.24≤ r ≤.34) were found between SSQoL "energy" and the other mood scale scores, with the exception of significant correlations with SF-36 "role emotional" (r = .53, p = .001) and "mental health" (r = .54, p <.01) and SSQoL "mood" (r = .50, p < .05), SF-36 "vitality" (r = .48, p = .02) and SF-36 "mental component score" (r = .44, p = .03).

Low correlations were found with the SF-36 'physical component scale' and the MASS 'fatalism' subscale when correlated to all other measures thought to relate to depression and mental health (r < .33). The correlational analysis with the change scores within the depression domain generally reflected the same trends as in the baseline scores, however, significance levels were not reached as consistently (see Table 12).

Table 11

Validity Correlations: Depression domain – baseline scores

	BDI – II total	BDI-II somatic	BDI-II cognitive	SSQoL Energy	SSQoL Mood	SSQoL thinking	HADS Dep	MASS fs	MASS h/h	MASS fatal	SF-36 vitality	SF-36 role emot'l	SF-36 Social function	SF-36 mental health	SF-36 MCS	SF-36 PCS
BDI –II total																
BDI-II somatic	.96 ** (.001)															
BDI-II cognitive	.87** (.001)	.68** (.001)														
SSQoL Energy	-.33 (.13)	-.34 (.11)	-.24 (.27)													
SSQoL Mood	-.78** (.001)	-.83** (.001)	-.54** (.01)	.50* (.02)												
SSQoL thinking	-.47* (.02)	-.49* (.02)	-.34 (.11)	.02 (.92)	.43* (.04)											
HADS Depression	.66** (.001)	.56** (.001)	.68** (.001)	-.26 (.24)	-.46* (.03)	-.30 (.16)										
MASS fs	-.15 (.50)	-.24 (.27)	.04 (.86)	.02 (.92)	.22 (.31)	.22 (.31)	-.18 (.43)									
MASS h/h	.79** (.001)	.68** (.001)	.80** (.001)	-.25 (.24)	-.64** (.001)	-.29 (.19)	.72** (.001)	-.18 (.41)								
MASS fatal	.25 (.26)	.21 (.34)	.26 (.22)	.06 (.78)	-.30 (.17)	-.27 (.21)	.44* (.04)	-.03 (.90)	.46* (.03)							
SF-36 vitality	-.61** (.002)	-.66** (.001)	-.41 (.05)	.48* (.02)	.56** (.01)	.41* (.05)	-.64** (.001)	.54** (.01)	-.40 (.06)	-.05 (.81)						
SF-36 role emotional	-.64** (.001)	-.58** (.004)	-.62** (.002)	.53** (.001)	.40 (.06)	.33 (.12)	-.39 (.07)	-.00 (.10)	-.41 (.05)	-.04 (.87)	.41 (.06)					
SF-36 social functioning	-.45* (.03)	-.32 (.14)	-.58** (.004)	.03 (.90)	.32 (.13)	.65** (.001)	-.29 (.19)	-.04 (.86)	-.48* (.02)	-.34 (.11)	.16 (.48)	.42* (.05)				
SF-36 Mental health	-.77** (.001)	-.71** (.001)	-.72** (.001)	.54** (.01)	.64** (.001)	.32 (.14)	-.76** (.001)	.19 (.38)	-.65** (.001)	-.11 (.63)	.68** (.001)	.59** (.003)	.23 (.20)			
SF-36 MCS	-.73** (.001)	-.65** (.001)	-.69** (.001)	.44* (.03)	.50* (.02)	.51* (.01)	-.59** (.003)	.17 (.42)	-.50* (.01)	-.11 (.61)	.61** (.002)	.89** (.001)	.54** (.01)	.779** (.001)		
SF-36 PCS	-.29 (.12)	-.33 (.08)	-.15 (.43)	.28 (.14)	.33 (.08)	-.23 (.22)	-.18 (.35)	.10 (.40)	-.33 (.07)	-.16 (.40)	.43* (.02)	-.21 (.28)	.21 (.34)	-.218 (.25)	-.274 (.14)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 12

Validity Correlations: Depression domain – change scores

	BDI-II total	BDI-II somatic	BDI-II cognitive	SSQoL Energy	SSQoL Mood	SSQoL thinking	HADS Dep	MASS fs	MASS h/h	MASS fatal	SF-36 vitality	SF-36 role emot'l	SF-36 Social funct'n	SF-36 mental health	SF-36 MCS	SF-36 PCS
BDI –II total																
BDI-II somatic	.94** (.001)															
BDI-II cognitive	.87** (.001)	.64** (.001)														
SSQoL Energy	-.12 (.60)	-.11 (.62)	-.10 (.66)													
SSQoL Mood	-.50* (.02)	-.54** (.01)	-.32 (.13)	.40 (.07)												
SSQoL thinking	-.38 (.07)	-.41 (.06)	-.26 (.24)	.43* (.05)	.59** (.003)											
HADS Dep	.50* (.01)	.45* (.03)	.47* (.02)	-.20 (.38)	-.30 (.16)	-.12 (.58)										
MASS fs	.17 (.43)	.08 (.72)	.27 (.22)	.14 (.54)	.01 (.95)	.13 (.55)	-.09 (.70)									
MASS h/h	.69** (.001)	.62** (.001)	.63** (.001)	-.07 (.75)	-.30 (.16)	.02 (.94)	.48* (.02)	.04 (.99)								
MASS fatal	-.20 (.36)	-.09 (.68)	-.32 (.14)	.12 (.60)	-.10 (.66)	.16 (.46)	.14 (.52)	-.17 (.44)	-.13 (.56)							
SF-36 vitality	-.42* (.04)	-.45* (.03)	-.30 (.17)	.49* (.02)	.42* (.05)	.41* (.05)	-.47* (.02)	.02 (.95)	-.10 (.64)	.02 (.94)						
SF-36 role emotional	-.56** (.01)	-.42* (.05)	-.63** (.001)	.46* (.03)	.38 (.08)	.38 (.07)	-.15 (.51)	-.16 (.48)	-.63** (.001)	.27 (.21)	.06 (.78)					
SF-36 soc function	-.34 (.105)	-.27 (.209)	-.37 (.076)	.25 (.233)	.35 (.098)	.31 (.144)	-.39 (.060)	-.07 (.751)	-.41* (.050)	-.22 (.307)	.24 (.264)	.52* (.011)				
SF-36 Mental health	-.56** (.01)	-.44* (.04)	-.62** (.002)	.39 (.07)	.24 (.28)	.16 (.46)	-.71** (.001)	.06 (.78)	-.55** (.001)	-.03 (.89)	.52* (.01)	.38 (.08)	.50* (.02)			
SF-36 MCS	-.74** (.001)	-.63** (.001)	-.77** (.001)	-.19 (.35)	-.71** (.001)	.02 (.93)	.64** (.001)	.53** (.01)	-.58** (.002)	.74** (.001)	.83** (.001)	.79** (.001)	.77** (.001)	.83** (.001)		
SF-36 PCS	-.26 (.20)	-.34 (.79)	-.07 (.74)	.13 (.52)	-.16 (.42)	-.33 (.09)	-.00 (.99)	.07 (.73)	-.20 (.31)	-.01 (.97)	.23 (.25)	-.01 (.97)	-.46 (.84)	.23 (.25)	.01 (.97)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Anxiety Domain.

Two measures specific to anxiety were used, namely the Beck Anxiety Inventory (BAI) and the Hospital Anxiety and Depression Scale (HADS). Other measures included subscales that were said to target specific aspects of anxiety and general mental health. It was predicted that there would be strong correlations (i.e., convergent validity) between the overall HADS and BAI scores as well as between the HADS and the subjective and panic subscales of the BAI. Strong convergent validity correlations were also predicted between the SF-36 mental component scale (MCS) and the BAI scales, the HADS and the somatic scale of the BDI-II. The SF-36 physical component scale (PCS) was predicted to have moderate to strong correlations with physical components of anxiety (i.e., BAI neurophysiological and autonomic, BDI-II somatic) as well as with MASS helplessness/hopelessness since optimism would decrease with decreasing physical health. Only moderate correlations were predicted to exist between the MASS anxious preoccupation with the BAI subscales and the HADS as the MASS anxious preoccupation scale includes items that typically centre on worry and cognitive components of anxiety. Because the HADS does not include items of neurological or autonomic content (which contain symptoms often seen after stroke) low correlations were predicted between the HADS and the somatic and autonomic BAI scales, the somatic BDI-II scale, and the SF-36 PCS, thus reflecting divergent validity. Fatalism was not predicted to have strong correlations with any of the other anxiety domain scales, but a moderate correlation with the SF-36 PCS was anticipated.

In general, most of these hypotheses were supported by the data (see Table 13). Convergent validity was seen within anxiety-measures as a whole. Scales said to reflect

more physiological aspects of anxiety were strongly correlated. Similarly, scales with a more cognitive or subjective component were strongly correlated (e.g., HADS and BAI subjective). Interestingly, the BAI panic subscale had a low correlation with the HADS. As predicted, the SF-36 MCS had strong correlations with most of the BAI scales and the HADS. Moderate correlations were found between the MASS anxious preoccupation with the BAI subscales and the HADS. The SF-36 PCS had strong correlations with the phsysiological aspects of anxiety as reflected on the BAI subscales. Moderate, but not low correlations were found between the HADS and the somatic and autonomic BAI scales, the somatic BDI-II scale. Divergent validity was reflected through low correlations between the HADS and the SF-36 PCS. Fatalism had a moderate correlation with the SF-36 PCS and low correlations with the anxiety domain. In terms of the validity correlations with the change scores, the relationship trends appear consistent (see Table 14).

Table 13
Anxiety Domain – validity baseline scores

	BAI total	BAI neuro	BAI subjective	BAI panic	BAI autonomic	BDI-II somatic	HADS anxiety	MASS h/h	MASS anxious	MASS fatal	SF-36 PCS	SF-36 MCS
BAI total												
BAI neuro	.81 ** (.001)											
BAI subjective	.63** (.001)	.25 (.25)										
BAI panic	.82** (.001)	.75** (.001)	.26 (.24)									
BAI autonomic	.62** (.002)	.26 (.24)	.21 (.33)	.45* (.03)								
BDI-II somatic	.57** (.004)	.40 (.06)	.41 (.05)	.40 (.06)	.44* (.04)							
HADS anxiety	.48* (.02)	.27 (.21)	.64** (.001)	.07 (.74)	.30 (.17)	.34 (.11)						
MASS h/h	.52** (.01)	.48* (.02)	.26 (.24)	.43* (.04)	.36 (.10)	.68** (.001)	.15 (.48)					
MASS anxious	-.14 (.54)	-.16 (.47)	.05 (.84)	-.14 (.53)	-.16 (.46)	-.07 (.75)	-.14 (.52)	-.25 (.25)				
MASS fatal	.13 (.57)	.27 (.21)	-.17 (.44)	.17 (.45)	.09 (.69)	.21 (.34)	-.02 (.95)	.46* (.03)	-.34 (.11)			
SF-36 PCS	-.45* (.01)	-.58** (.001)	.04 (.86)	-.35 (.06)	-.36* (.05)	-.33 (.08)	.10 (.61)	-.33 (.07)	.03 (.88)	-.16 (.40)		
SF-36 MCS	-.37* (.05)	-.14 (.46)	-.44* (.01)	-.16 (.40)	-.33** (.01)	-.56** (.001)	-.53** (.003)	-.47** (.01)	-.03 (.87)	-.06 (.74)	-.274 (.142)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 14
Validity Correlations: Anxiety Domain – change scores

	BAI total	BAI neuro	BAI subjective	BAI panic	BAI autonomic	BDI-II somatic	HADS anxiety	MASS h/h	MASS anxious	MASS fatal	SF-36 PCS	SF-36 MCS
BAI total												
BAI neuro	.69** (.001)											
BAI subjective	.78** (.001)	.42 * (.05)										
BAI panic	.83** (.001)	.46* (.03)	.46* (.03)									
BAI autonomic	.60** (.003)	.12 (.60)	.18 (.41)	.60** (.002)								
BDI-II somatic	.44* (.03)	.30 (.13)	.27 (.18)	.37 (.06)	.37 (.06)							
HADS anxiety	.32 (.14)	.39 (.07)	-.27 (.21)	-.04 (.86)	.25 (.24)	.51** (.01)						
MASS h/h	.46* (.03)	.30 (.17)	.41 (.06)	.40 (.07)	.20 (.36)	.70** (.001)	.09 (.69)					
MASS anxious	-.17 (.44)	-.13 (.55)	-.15 (.50)	-.06 (.79)	-.13 (.54)	-.07 (.73)	-.24 (.27)	-.21 (.34)				
MASS fatal	-.17 (.43)	-.05 (.82)	-.11 (.62)	-.22 (.31)	-.14 (.53)	.04 (.86)	.26 (.23)	-.13 (.56)	-.03 (.89)			
SF-36 PCS	-.09 (.65)	-.04 (.85)	.07 (.74)	.17 (.40)	.13 (.53)	-.34 (.08)	-.36* (.04)	-.16 (.42)	.06 (.78)	-.33 (.09)		
SF-36 MCS	-.32 (.11)	-.15 (.46)	-.20 (.33)	-.24 (.24)	-.41* (.04)	-.63** (.001)	-.63** (.001)	-.71** (.001)	.05 (.79)	.02 (.93)	.01 (.97)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Physical Domain.

The SF-36, the Stroke Specific Quality of Life (SSQoL) and the Lawton scales offer score components that reflect a physical domain. In general strong convergent validity was expected to be found with the SF-36 PCS and all other scales; between the Lawton scales and SSQOL self-care, SSQoL upper extremity, SF-36 physical and role physical; and between SF-36 MCS and self-care, Lawton scales, and SSQoL upper extremity function. Moderate correlations were predicted between SF-36 bodily pain and most other physical domain scores. Moderate to low correlations were anticipated between the SF-36 MCS score and most physical domain scores and between general health perceptions with scales reflective of physical functioning. Low correlations were predicted between SSQoL mobility and upper extremity and SF-36 role physical and MCS.

Table 15 summarizes the Pearson correlations for the Physical domain. Strong convergent validity was found between the SF-36 PCS and all other scales, with the exception of SSQoL upper extremity function and the Lawton scales. Strong convergent validity was indicated between the Lawton scales and SSQOL self care, SF-36 physical and role physical, and between the Lawton basic scale and SSQoL upper extremity. Strong correlations were found between SF-36 MCS and self-care, Lawton basic scale, and SSQoL upper extremity function. SF-36 bodily pain subscale had strong correlations with SF-36 physical and PCS and moderate correlations with most other scales (with the exception of the Lawton and self-care scales). Moderate to low correlations were found between the SF-36 MCS score, along with the SF-36 general health perceptions score

with scales reflective of physical functioning. Low correlations were highlighted between SSQoL mobility and upper extremity and SF-36 role physical and MCS.

In examining the change scores (Table 16), the general trends remained the same, with a few exceptions. The Lawton basic scale, showed only low to moderate correlations with most scales ($\underline{r}$ = .01 to .49, not significant). The SF-36 MCS had only low to moderate correlations (.01 to .37) with the caregiver scale scores. The SF-36 PCS showed strong correlation with the SSQoL self-care scale ($\underline{r}$ = .86).

Table 15
Validity Correlations: Physical domain – baseline scores

	SSQoL mobility	SSQoL self-care	SSQoL upper extremity	SF-36 physical	SF-36 role physical	SF-36 bodily pain	SF-36 general health	Lawton basic	Lawton instrumental	SF-36 PCS	SF-36 MCS
SSQoL mobility											
SSQoL self-care	.33 (.12)										
SSQoL upper extremity	.17 (.45)	.80** (.001)									
SF-36 physical	.69** (.001)	.52* (.011)	.38 (.08)								
SF-36 role physical	.33 (.13)	.40 (.07)	.19 (.38)	.38 (.08)							
SF-36 bodily pain	.36 (.09)	-.08 (.73)	-.23 (.30)	.34 (.11)	.29 (.17)						
SF-36 general health	.17 (.44)	-.09 (.69)	.05 (.83)	.17 (.43)	.06 (.78)	.33 (.13)					
Lawton basic	.23 (.42)	.81** (.001)	.65** (.01)	.64** (.01)	.44 (.10)	-.03 (.92)	-.24 (.39)				
Lawton instrumental	.13 (.64)	.77** (.001)	.36 (.18)	.49 (.06)	.52* (.05)	-.01 (.97)	-.36 (.19)	.81** (.001)			
SF-36 PCS	.69** (.001)	.31 (.100)	.23 (.23)	.78** (.001)	.65** (.001)	.66** (.001)	.56** (.001)	.24 (.30)	.09 (.70)		
SF-36 MCS	-.21 (.26)	-.49** (.01)	-.58** (.001)	-.34 (.06)	-.06 (.76)	.25 (.16)	.24 (.20)	-.46* (.04)	.31 (.17)	-.27 (.14)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 16
Validity Correlations: Physical domain – change scores

	SSQoL mobility	SSQoL self-care	SSQoL upper extremity	SF-36 physical	SF-36 role physical	SF-36 bodily pain	SF-36 general health	Lawton basic	Lawton instrumental	SF-36 PCS	SF-36 MCS
SSQoL mobility											
SSQoL self-care	.39 (.067)										
SSQoL upper extremity	-.00 (.10)	.37 (.09)									
SF-36 physical	.55** (.01)	.49* (.02)	.07 (.76)								
SF-36 role physical	.49* (.02)	.42* (.05)	-.05 (.82)	.15 (.49)							
SF-36 bodily pain	.13 (.56)	.03 (.89)	.20 (.37)	.08 (.72)	-.02 (.92)						
SF-36 general health	.11 (.60)	.23 (.29)	-.21 (.35)	.04 (.87)	.15 (.49)	-.08 (.72)					
Lawton basic	.01 (.99)	.22 (.47)	.36 (.23)	.23 (.46)	.20 (.51)	.30 (.33)	-.04 (.90)				
Lawton instrumental	-.17 (.58)	.31 (.30)	.00 (.99)	.35 (.24)	.62 (.02)	-.21 (.49)	.22 (.46)	.48 (.09)			
SF-36 PCS	.59** (.001)	.86** (.001)	.09 (.66)	.70** (.001)	.82** (.001)	.16 (.43)	.52** (.01)	.14 (.65)	.45 (.12)		
SF-36 MCS	.21 (.30)	-.09 (.67)	.30 (.14)	.37 (.06)	.36 (.06)	.27 (.17)	.24 (.23)	.35 (.24)	.17 (.58)	.007 (.972)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Quality of Life Domain.

Two quality of life measures were used in this study: the generic SF-36 and the specific SSQoL. In terms of validity evaluation, it was anticipated that many of the scales from each measure have moderate to strong correlations, within their respective domains (i.e., physical and mental/emotional) that contribute to overall quality of life. It was anticipated that there would be poor correlation between the SF-36 social functioning subscale and the SSQoL total score based on a previous validation study that found the SF-36 social function scale to have poor performance among stroke patients (Anderson, Laubscher, & Burns, 1996). Subscales with a physical component were not expected to be well correlated to the emotionally and cognitively-oriented subscales.

Altogether, the QoL scales had the moderate to strong correlations that were anticipated (see Table17). The SF-36 MCS showed strong correlations with most of the expected SSQoL scales, namely, energy, mood, personality, self-care, social functioning, thinking, and upper extremity functioning and the related SF-36 scales which included vitality, social function, role emotional and mental health. The SF-36 PCS had strong correlations with its composite scale scores and moderate to strong correlations with SSQoL mobility, self care, upper extremity, work and total scale scores. The divergent validity with both the PCS and MCS were confirmed. Of the SSQoL scales vision, family role and language had little relationship with the SF-36 scales. The SSQoL total score was not significant with the SF-36 MCS, but was significant with the SF-36 PCS. As expected, there was poor correlation between the SSQoL total score and the SF-36 social functioning.

Pearson correlation change scores (as shown in Table 18) showed patterns consistent with the baseline scores. Specifically, areas of convergent validity showed strong

correlations (e.g., SF-36 PCS and SSQoL mobility, $r = .56$, $p < .01$) and areas thought to be divergent showed low correlations (e.g., SF-36 role emotional and SSQoL vision, $r = .18$, $p = .37$).

Table 17
Validity Correlations: QoL domain – baseline scores

	SF-36 physical	SF-36 role physical	SF-36 bodily pain	SF-36 general health	SF-36 vitality	SF-36 social function	SF-36 role emot'l	SF-36 mental health
SF-36 physical								
SF-36 role phys	.38 (.08)							
SF-36 bodily pain	.34 (.11)	.29 (.17)						
SF-36 gen health	.17 (.43)	.06 (.72)	.33 (.13)					
SF-36 vitality	-.50* (.02)	.14 (.54)	.42* (.05)	.49* (.02)				
SF-36 soc function	.06 (.80)	.34 (.12)	.47* (.02)	.04 (.85)	.16 (.48)			
SF-36 role emot'l	-.31 (.15)	.11 (.61)	.20 (.37)	.30 (.16)	.41 (.06)	.42* (.05)		
SF-36 gen health	.07 (.77)	.19 (.39)	.38 (.07)	.39 (.07)	.68** (.001)	.28 (.20)	.59** (.003)	
SF-36 MCS	-.35 (.11)	.06 (.79)	.25 (.24)	.30 (.16)	.61** (.002)	.54** (.01)	.89** (.001)	.78** (.001)
SF-36 PCS	.80** (.001)	.58** (.004)	.69** (.001)	.39 (.07)	.18 (.42)	.21 (.34)	-.26 (.23)	.05 (.82)
SSQoL energy	.27 (.22)	.10 (.03)	.33 (.13)	.30 (.16)	.48* (.02)	.03 (.90)	.53** (.01)	.54** (.01)
SSQoL family role	.45* (.03)	.18 (.14)	-.03 (.90)	.25 (.26)	.13 (.57)	-.28 (.20)	.04 (.85)	.15 (.51)
SSQoL language	-.24 (.27)	.16 (.48)	.26 (.23)	.06 (.78)	.14 (.51)	.07 (.40)	.27 (.22)	.24 (.26)
SSQoL mobility	.69** (.001)	.33 (.128)	.36 (.09)	.17 (.44)	-.04 (.86)	.20 (.37)	-.20 (.37)	-.11 (.62)
SSQoL mood	.24 (.27)	.41* (.05)	.45* (.03)	.23 (.29)	.56** (.01)	.32 (.13)	.40 (.06)	.64** (.001)
SSQoL personality	-.28 (.19)	.04 (.87)	.52* (.01)	.25 (.25)	.53** (.01)	.53* (.01)	.62** (.002)	.39 (.07)
SSQoL self care	.52* (.01)	.39 (.07)	-.08 (.73)	-.09 (.69)	-.22 (.32)	-27 (.22)	-.30 (.17)	-.35 (.11)
SSQoL social	.21 (.33)	.45* (.03)	.25 (.24)	.28 (.20)	.43* (.04)	.27 (.22)	.36 (.09)	.45* (.03)
SSQoL thinking	-.12 (.60)	.25 (.26)	.33 (.13)	.34 (.11)	.41* (.050)	.65** (.001)	.33 (.12)	.32 (.14)
SSQoL upper ext	-.38 (.08)	.19 (.38)	-.23 (.30)	.05 (.83)	-.23 (.30)	-.45* (.03)	-.37 (.08)	-.39 (.06)
SSQoL vision	.12 (.59)	.22 (.32)	.19 (.38)	.00 (.99)	-.14 (.53)	.18 (.42)	.35 (.10)	-.03 (.90)
SSQoL work	.45* (.03)	.51* (.01)	.37 (.08)	.34 (.12)	.29 (.18)	.06 (.78)	.21 (.35)	.34 (.11)
SSQoL total	.59** (.004)	.55** (.01)	.44* (.04)	.36 (.10)	.33 (.13)	.15 (.51)	.25 (.26)	.32 (.14)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 17 (cont'd)
Validity Correlations: QoL domain – baseline scores

	SF-36 MCS	SF-36 PCS	SSQoL energy	SSQoL family	SSQoL language	SSQoL mobility	SSQoL mood	SSQoL persn'ty
SF-36 physical								
SF-36 role phys								
SF-36 bodily pain								
SF-36 gen health								
SF-36 vitality								
SF-36 soc function								
SF-36 role emot'l								
SF-36 ment health								
SF-36 MCS								
SF-36 PCS	-.28 (.20)							
SSQoL energy	.44* (.03)	.15 (.49)						
SSQoL family role	-.09 (.70)	.26 (.23)	.44* (.03)					
SSQoL language	.25 (.24)	-.01 (.96)	.18 (.40)	.15 (.49)				
SSQoL mobility	-.27 (.22)	.67** (.001)	.10 (.64)	.19 (.34)	-.02 (.94)			
SSQoL mood	.50* (.02)	.30 (.17)	.50 (.02)	.02 (.92)	.29 (.18)	.13 (.57)		
SSQoL personality	.67** (.001)	-.00 (.99)	.29 (.18)	-.17 (.44)	.17 (.45)	-.05 (.81)	.17 (.43)	
SSQoL self care	-.508* (.013)	.415* (.049)	.126 (.567)	.651** (.001)	-.042 (.848)	.333 (.120)	-.098 (.657)	-.339 (.113)
SSQoL social	.38 (.07)	.26 (.22)	.39 (.06)	.25 (.26)	-.13 (.55)	.01 (.97)	.44 (.04)	.38 (.08)
SSQoL thinking	.51 (.01)	.15 (.50)	.02 (.92)	-.34 (.12)	.03 (.90)	.00 (.99)	.43 (.04)	.48* (.02)
SSQoL upper ext	-.56** (.01)	.29 (.18)	.01 (.98)	.50* (.02)	-.12 (.59)	.17 (.45)	-.12 (.59)	-52 (.01)
SSQoL vision	.11 (.63)	.13 (.56)	.36 (.09)	.06 (.79)	.01 (.94)	.21 (.33)	.27 (.21)	.14 (.53)
SSQoL work	.12 (.59)	.51* (.01)	.50* (.02)	.50* (.02)	.21 (.34)	.18 (.41)	.58** (.004)	-.00 (.99)
SSQoL total	.12 (.59)	.61** (.003)	.62** (.002)	.63** (.002)	.31 (.16)	.54* (.01)	.55** (.01)	-.15 (.51)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 17 (cont'd)
Validity Correlations: QoL domain – baseline scores

	SSQoL self care	SSQoL social	SSQoL think	SSQoL upper	SSQoL vision	SSQoL work	SSQoL total
SF-36 physical							
SF-36 role phys							
SF-36 bodily pain							
SF-36 gen health							
SF-36 vitality							
SF-36 soc function							
SF-36 role emot'l							
SF-36 ment health							
SF-36 MCS							
SF-36 PCS							
SSQoL energy							
SSQoL family role							
SSQoL language							
SSQoL mobility							
SSQoL mood							
SSQoL personality							
SSQoL self care							
SSQoL social	.15 (.51)						
SSQoL thinking	-31 (.15)	.495* (.016)					
SSQoL upper ext	.80** (.001)	-.01 (.96)	-.26 (.23)				
SSQoL vision	.24 (.28)	.26 (.24)	.05 (.82)	.23 (.26)			
SSQoL work	.31 (.15)	.50* (.02)	.09 (.67)	.25 (.26)	.38 (.07)		
SSQoL total	.61** (.003)	.61** (.003)	.18 (.42)	.43* (.05)	.50* (.02)	.72** (.001)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 18
Validity Correlations: QoL domain – change scores

	SF-36 physical	SF-36 role physical	SF-36 bodily pain	SF-36 general health	SF-36 vitality	SF-36 social function	SF-36 role emot'l	SF-36 mental health
SF-36 physical								
SF-36 role phys	.62** (.001)							
SF-36 bodily pain	.11 (.58)	.06 (.76)						
SF-36 gen health	.21 (.30)	.41* (.04)	-.02 (.94)					
SF-36 vitality	.43** (.03)	.65** (.001)	..08 (.68)	.24 (.22)				
SF-36 soc function	.37 (.06)	.35 (.08)	.12 (.56)	.24 (.22)	.34 (.08)			
SF-36 role emot'l	.33 (.09)	.26 (.18)	.50** (.01)	.10 (.63)	.24 (.24)	.56** (.002)		
SF-36 ment health	.56** (.002)	.47* (.01)	.14 (.49)	.34 (.08)	.63** (.001)	.54** (.003)	.48* (.01)	
SF-36 MCS	.27 (.18)	.36 (.06)	.27 (.17)	.24 (.23)	.58** (.002)	.79** (.001)	.79** (.001)	.83** (.001)
SF-36 PCS	.51** (.01)	.82** (.001)	.16 (.43)	.52** (.01)	.44* (.02)	.13 (.53)	-.01 (.97)	.23 (.25)
SSQoL energy	.26 (.21)	.25 (.21)	.28 (.11)	-.15 (.45)	.60** (.001)	.35 (.08)	.53** (.01)	.51** (.01)
SSQoL family role	.35 (.07)	.50** (.01)	.18 (.36)	.43* (.02)	.46 (.02)	.14 (.50)	.22 (.27)	.46* (.02)
SSQoL language	.08 (.68)	.16 (.43)	.19 (.34)	.29 (.15)	.31 (.12)	.09 (.64)	.18 (.36)	.32 (.11)
SSQoL mobility	.57** (.002)	.48 (.012)	.15 (.471	.19 (.35)	.36 (.06)	.36 (.07)	.15 (.47)	.24 (.22)
SSQoL mood	.16 (.42)	.38 (.05)	.52** (.01)	-.02 (.91)	.55** (.003)	.42* (.03)	.45* (.02)	.37 (.06)
SSQoL personality	.27 (.17)	.40* (.04)	.15 (.44)	.20 (.31)	.65** (.001)	.49* (.01)	.63** (.001)	.57** (.002)
SSQoL self care	.45* (.02)	.41* (.04)	.05 (.82)	.24 (.23)	.20 (.31)	.03 (.89)	-.12 (.54)	.10 (.61)
SSQoL social	.23 (.25)	.30 (.13)	.07 (.73)	.28 (.15)	.47* (.01)	.26 (.20)	.46* (.02)	.60* (.001)
SSQoL thinking	.02 (.92)	.26 (.19)	.28 (.16)	.21 (.29)	.55** (.003)	.36 (.07)	.44* (.02)	.28 (.15)
SSQoL upper ext	.19 (.34)	.17 (.38)	.22 (.27)	-.01 (.96)	.30 (.13)	.17 (.40)	.33 (.10)	.19 (.34)
SSQoL vision	.30 (.13)	.24 (.23)	.05 (.79)	-.21 (.30)	.42* (.03)	.06 (.78)	.18 (.37)	.21 (.29)
SSQoL work	.60** (.001)	.45* (.02)	-.05 (.81)	.45* (.02)	.41* (.03)	.13 (.52)	.11 (.60)	.53** (.004)
SSQoL total	.50** (.01)	.62** (.001)	.33 (.10)	.27 (.18)	.79** (.001)	.47* (.02)	.56** (.003)	.71** (.001)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 18 (cont'd)
Validity Correlations: QoL domain – change scores

	SF-36 MCS	SF-36 PCS	SSQoL energy	SSQoL family	SSQoL language	SSQoL mobility	SSQoL mood	SSQoL persn'ty
SF-36 physical								
SF-36 role phys								
SF-36 bodily pain								
SF-36 gen health								
SF-36 vitality								
SF-36 soc function								
SF-36 role emot'l								
SF-36 ment health								
SF-36 MCS								
SF-36 PCS	.01 (.97)							
SSQoL energy	.64** (.001)	-.00 (.99)						
SSQoL family role	.33 (.11)	.45* (.02)	.46* (.02)					
SSQoL language	.28 (.15)	.12 (.55)	.12 (.55)	.17 (.41)				
SSQoL mobility	.21 (.30)	.56** (.003)	-.01 (.96)	.12 (.56)	.54** (.003)			
SSQoL mood	.53** (.01)	.18 (.38)	.49* (.01)	.01 (.10)	.18 (.37)	.18 (.38)		
SSQoL personality	.75** (.001)	.09 (.67)	.52** (.01)	.37 (.05)	.12 (.55)	-.10 (.61)	.33 (.09)	
SSQoL self care	-.09 (.67)	.59** (.001)	.20 (.33)	.61** (.001)	.10 (.61)	.38 (.05)	-.14 (.49)	-.12 (.54)
SSQoL social	.59** (.001)	.05 (.80)	.45* (.02)	.40* (.04)	.25 (.22)	.02 (.94)	.25 (.21)	.57** (.002)
SSQoL thinking	.52 (.01)	.07 (.73)	.52** (.01)	.19 (.35)	.18 (.36)	-.03 (.87)	.65** (.001)	.63** (.001)
SSQoL upper ext	.30 (.14)	.09 (.66)	.63* (.001)	.36 (.06)	.15 (.46)	.07 (.73)	.32 (.10)	.19 (.34)
SSQoL vision	.21 (.29)	.13 (.53)	.38 (.05)	.08 (.68)	.10 (.63)	.21 (.30)	.24 (.24)	.29 (.15)
SSQoL work	.27 (.18)	.51** (.01)	.08 (.68)	.37 (.06)	.04 (.83)	.22 (.26)	-.06 (.78)	.31 (.12)
SSQoL total	.73** (.001)	.43* (.03)	.70** (.001)	.59** (.001)	.46* (.02)	.46* (.02)	.57** (.003)	.67** (.001)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 18 (cont'd)
Validity Correlations: QoL domain – change scores

	SSQoL self care	SSQoL social	SSQoL think	SSQoL upper	SSQoL vision	SSQoL work	SSQoL total
SF-36 physical							
SF-36 role phys							
SF-36 bodily pain							
SF-36 gen health							
SF-36 vitality							
SF-36 soc function							
SF-36 role emot'l							
SF-36 mntl hlth							
SF-36 MCS							
SF-36 PCS							
SSQoL energy							
SSQoL family role							
SSQoL language							
SSQoL mobility							
SSQoL mood							
SSQoL personality							
SSQoL self care							
SSQoL social	.11 (.58)						
SSQoL thinking	-.16 (.42)	.52** (.01)					
SSQoL upper ext	.33 (.09)	.55** (.003)	.43* (.03)				
SSQoL vision	-.05 (.79)	-.09 (.64)	.08 (.70)	.02 (.91)			
SSQoL work	.38 (.05)	.53** (.004)	.11 (.59)	.18 (.37)	.17 (.40)		
SSQoL total	.37 (.06)	.71** (.001)	.65** (.001)	.65** (.001)	.31 (.12)	.45* (.02)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Caregiver Domain.

Within the caregiver domain a few measures were used to evaluate the caregivers' sense of role and personal burden (Zarit Burden Inventory; ZBI), the level of care required for the person with stroke (Lawton scale), the frequency and degree of dysfunctional behaviour on part of the individual with stroke (Dysfunctional Behaviour Rating Inventory; DBRI), their general quality of life (SF-36), and their health behaviours (Health Promoting Lifestyle Profile; HPLP). It was predicted that high degree of burden and dysfunctional behaviours would result in lower QoL and prevent adequate health-promoting behaviours. Strong correlations between ZBI, Lawton, and DBRI scales were expected. Moderate correlations were expected between the aforementioned and the SF-36 and HPLP.

Tables 19 and 20 show the Pearson correlations for the caregiver domain. Fewer than expected moderate and strong correlations were found, however there were a number of relationships identified as predicted. The SF-36 general health perceptions scale was strongly correlated with the ZBI total and HPLP stress management. The SF-36 vitality and the HPLP exercise subscale, intuitively known to be related, were strongly correlated. The SF-36 social functioning and role emotional were strongly correlated with the ZBI personal burden scale. The DBRI intensity of behaviour scale and the Lawton instrumental scale were strongly correlated with the ZBI role burden. No significant differences between initial and change scores were identified.

Table 19
Validity Correlations: Caregiver domain – baseline scores

	SF-36 physical	SF-36 role phys	SF-36 pain	SF-36 health	SF-36 vitality	SF-36 social	SF-36 Role emot'l
SF-36 physical							
SF-36 role phys	.67** (.001)						
SF-36 bodily pain	.70** (.001)	.06 (.76)					
SF-36 gen health	.60** (.01)	.41* (.04)	-.02 (.94)				
SF-36 vitality	-.16 (.51)	.65** (.001)	.08 (.68)	.24 (.22)			
SF-36 soc function	.20 (.40)	.35 (.08)	.12 (.56)	.24 (.22)	.34 (.08)		
SF-36 role emot'l	-.10 (.68)	.26 (.18)	.50** (.01)	.10 (.63)	.24 (.24)	.56** (.002)	
SF-36 ment health	-.36 (.12)	.47* (.01)	.14 (.49)	.34 (.08)	.63** (.001)	.54** (.003)	.48* (.01)
SF-36 MCS	-.52* (.02)	-.19 (.42)	.40 (.08)	-.15 (.53)	.76 (.001)	.24 (.31)	.68** (.001)
SF-36 PCS	.92 (.001)	.78 (.001)	.79** (.001)	.63** (.003)	-.23 (.34)	.24 (.31)	-.16 (.52)
ZBI total	.30 (.20)	.08 (.74)	.06 (.80)	.50* (.04)	-.14 (.57)	.41 (.07)	.06 (.79)
ZBI role burden	.30 (.20)	-.11 (.65)	.01 (.97)	.35 (.13)	-.35 (.14)	.16 (.50)	-.17 (.48)
ZBI pers'l burden	.07 (.79)	.38 (.10)	.12 (.63)	.33 (.16)	.38 (.10)	.56** (.01)	.46* (.04)
DBRI frequency	-.26 (.26)	-.25 (.29)	-.34 (.14)	.06 (.80)	-.23 (.33)	-.21 (.39)	-.42 (.06)
DBRI Intensity	-.12 (.63)	-.19 (.43)	-.15 (.52)	.05 (.84)	-.38 (.10)	-.30 (.20)	-.37 (.11)
Lawton total	-.21 (.37)	.15 (.53)	-.17 (.48)	-.42 (.06)	.04 (.88)	-.34 (.14)	-.09 (.71)
Lawton basic	-.21 (.39)	.17 (.47)	-.10 (.67)	-.38 (.10)	-.16 (.49)	-.26 (.27)	-.06 (.79)
Lawton Instrumt'l	-.20 (.40)	.13 (.60)	-.19 (.42)	-.41 (.07)	.14 (.55)	-.36 (.12)	-.10 (.69)
HPLP self-actual	-.37 (.11)	-.29 (.27)	-.39 (.09)	-.07 (.78)	.20 (.41)	.09 (.71)	-.09 (.70)
HPLP health responsibility	-.42 (.07)	-.49* (.03)	-.69* (.001)	-.14 (.57)	.19 (.42)	.03 (.91)	-.21 (.37)
HPLP exercise	.02 (.93)	.13 (.58)	-.29 (.22)	.25 (.29)	.46* (.04)	.24 (.30)	-.17 (.48)
HPLP nutrition	-.21 (.37)	-.26 (.27)	-.50* (.03)	-.28 (.23)	.09 (.70)	-.00 (.99)	-.22 (.36)
HPLP Interpersonal	-.16 (.51)	-.20 (.40)	-.27 (.25)	-.25 (.29)	-.09 (.71)	.10 (.67)	-.34 (.15)
HPLP stress management	-.49* (.03)	.14 (.56)	-.23 (.34)	-.60** (.01)	.11 (.65)	.13 (.59)	-.06 (.81)
HPLP total	-.34 (.15)	-.26 (.27)	-54** (.01)	-.18 (.44)	.27 (.26)	.13 (.58)	-.23 (.34)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 19 (cont'd)
Validity Correlations: Caregiver domain – baseline scores

	SF-36 gen health	SF-36 MCS	SF-36 PCS	ZBI total	ZBI Role	ZBI Personal	DBRI freq'cy
SF-36 physical							
SF-36 role phys							
SF-36 bodily pain							
SF-36 gen health							
SF-36 vitality							
SF-36 soc function							
SF-36 role emot'l							
SF-36 ment health							
SF-36 MCS	.90** (.001)						
SF-36 PCS	-.50* (.02)	-.62** (.003)					
ZBI total	-.21 (.38)	-.11 (.63)	.26 (.27)				
ZBI role burden	-.25 (.28)	-.28 (.24)	.20 (.39)	.88** (.001)			
ZBI pers'l burden	.05 (.84)	.29 (.22)	.16 (.49)	.43 (.05)	-.05 (.84)		
DBRI frequency	-.19 (.41)	-.21 (.38)	-.16 (.51)	.34 (.13)	.43 (.05)	-.10 (.66)	
DBRI Intensity	-.27 (.24)	-.33 (.16)	-.03 (.90)	.43* (.05)	.56** (.01)	-.15 (.51)	.86** (.001)
Lawton total	.13 (.59)	.03 (.90)	-.19 (.43)	-.41 (.06)	-.37 (.10)	-.16 (.48)	-.11 (.62)
Lawton basic	.00 (1.00)	-.07 (.79)	-.13 (.58)	-.22 (.34)	-.16 (.50)	-.17 (.47)	-.05 (.82)
Lawton Instrumt'l	.19 (.43)	.08 (.74)	-.20 (39)	-.49* (.03)	-.46* (.04)	-.15 (.52)	-.14 (.56)
HPLP self-actual	.42 (.06)	.35 (.13)	-.39 (.09)	-.11 (.66)	.00 (.99)	-.23 (.33)	.31 (.19)
HPLP health responsibility	.19 (.43)	-.52* (.02)	.26 (.27)	.01 (.98)	.12 (.62)	-.21 (.37)	.14 (.57)
HPLP exercise	.14 (.55)	.17 (.49)	.01 (.98)	.12 (.62)	.05 (.83)	.16 (.50)	.33 (.15)
HPLP nutrition	.06 (.80)	-.34 (.14)	.10 (.69)	-.29 (.22)	-.10 (.67)	-.42 (.07)	-.13 (.60)
HPLP Interpersonal	.12 (.60)	.01 (.96)	-.23 (.34)	-.25 (.29)	.01 (.98)	-.54* (.02)	.08 (.74)
HPLP stress management	.39 (.09)	.33 (.16)	-.46* (.04)	-.28 (.23)	-.22 (.35)	-.18 (.46)	.19 (.43)
HPLP total	.28 (.24)	.27 (.24)	-.41 (.07)	-.13 (.57)	-.02 (.94)	-.25 (.29)	.21 (.38)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 19 (cont'd)
Validity Correlations: Caregiver domain – baseline scores

	DBRI intense	Lawton total	Lawton basic	Lawton instr'l	HPLP self-actual	HPLP health
SF-36 physical						
SF-36 role phys						
SF-36 bodily pain						
SF-36 gen health						
SF-36 vitality						
SF-36 soc function						
SF-36 role emot'l						
SF-36 ment health						
SF-36 MCS						
SF-36 PCS						
ZBI total						
ZBI role burden						
ZBI pers'l burden						
DBRI frequency						
DBRI Intensity						
Lawton total	-.12 (.60)					
Lawton basic	-.05 (.82)	.91** (.001)				
Lawton Instrumt'l	-.15 (.52)	.97** (.001)	.78** (.001)			
HPLP self-actual	.03 (.90)	-.12 (.62)	-.11 (.65)	-.11 (.63)		
HPLP health responsibility	-.11 (.64)	.15 (.53)	.18 (.45)	.12 (.62)	.64** (.002)	
HPLP exercise	.00 (.99)	.07 (.77)	.00 (.99)	.10 (.68)	.39 (.09)	.51* (.02)
HPLP nutrition	-.25 (.29)	.20 (.39)	.15 (.52)	.21 (.37)	.47* (.04)	.72** (.001)
HPLP Interpersonal	-.10 (.67)	.09 (.72)	.16 (.49)	.04 (.88)	.67** (.001)	.49* (.03).
HPLP stress management	-.01 (.96)	.36 (.12)	.36 (.12)	.34 (.15)	.60** (.01)	.43 (.06)
HPLP total	-.10 (.67)	.17 (.48)	.15 (.53)	.16 (.49)	.79** (.001)	.865** (.001)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 19 (cont'd)
Validity Correlations: Caregiver domain – baseline scores

	HPLP exercise	HPLP nutrition	HPLP Interprs'l	HPLP stress mngmt	HPLP total
SF-36 physical					
SF-36 role phys					
SF-36 bodily pain					
SF-36 gen health					
SF-36 vitality					
SF-36 soc function					
SF-36 role emot'l					
SF-36 ment health					
SF-36 MCS					
SF-36 PCS					
ZBI total					
ZBI role *burden*					
ZBI pers'l burden					
DBRI frequency					
DBRI Intensity					
Lawton total					
Lawton basic					
Lawton Instrumt'l					
HPLP self-actual					
HPLP health responsibility					
HPLP exercise					
HPLP nutrition	.31 (.18)				
HPLP Interpersonal	.12 (.61)	.69* (.001)			
HPLP stress management	.32 (.16)	.49* (.03)	.59** (.01)		
HPLP total	.67** (.001)	.69** (.001)	.69** (.001)	.70** (.001)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 20
Validity Correlations: Caregiver domain – change scores

	SF-36 physc'l	SF-36 role physical	SF-36 bodily pain	SF-36 general health	SF-36 vitality	SF-36 social function	SF-36 role emot'l
SF-36 physical							
SF-36 role phys	.09 (.08)						
SF-36 bodily pain	.48 (.12)	-.38 (.23)					
SF-36 gen health	-.42 (.17)	.18 (.57)	-.62* (.03)				
SF-36 vitality	-.53 (.08)	.25 (.43)	-.86** (.001)	.71** (.01)			
SF-36 soc function	.58* (.05)	.23 (.48)	.02 (.96)	.40 (.20)	.10 (.77)		
SF-36 Role emot'l	-.18 (.34)	.67* (.02)	-.39 (.21)	.54 (.07)	.48 (.11)	.18 (.57)	
SF-36 ment health	-.51 (.09)	.23 (.47)	-.58* (.05)	.31 (.33)	.60* (.04)	-.32 (.31)	.55 (.07)
SF-36 MCS	-.52 (.09)	.41 (.18)	-.71** (.01)	.70* (.01)	.83** (.001)	.03 (.93)	.83** (.001)
SF-36 PCS	.82** (.001)	.29 (.36)	.55 (.06)	-.41 (.19)	.62* (.04)	.52 (.08)	-.22 (.49)
ZBI total	-.07 (.82)	-.12 (.71)	-.13 (.69)	.60* (.04)	.44 (.15)	.46 (.13)	.33 (.29)
ZBI role burden	-.27 (.37)	-.19 (.56)	-.07 (.84)	.36 (.04)	.30 (.35)	.43 (.16)	.06 (.86)
ZBI pers burden	-.37 (.24)	-.11 (.74)	-.17 (.60)	.66* (.02)	.43 (.17)	.19 (.55)	.66* (.02)
DBRI freq	-.67* (.02)	-.04 (.90)	-.17 (.61)	.57 (.05)	.37 (.23)	-.21 (.52)	.33 (.29)
DBRI Intensity	-.70* (.01)	-.18 (.58)	-.18 (.58)	.60* (.03)	.37 (.23)	-.22 (.26)	.27 (.40)
Lawton total	.72** (.01)	.04 (.91)	-.03 (.92)	-.27 (.40)	-.17 (.60)	.35 (.26)	-.21 (.51)
Lawton basic	.66* (.02)	-.46 (.14)	.22 (.49)	-.40 (.19)	-.36 (.25)	.19 (.55)	-.57 (.05)
Lawton Instrmt'l	.66* (.02)	.32 (.31)	-.18 (.59)	-.15 (.64)	-.03 (.92)	.40 (.20)	.03 (.94)
HPLP self-actual	-.33 (.29)	.27 (.40)	-.09 (.79)	-.15 (.65)	-.21 (.52)	-.36 (.25)	-.05 (.88)
HPLP health responsibility	.17 (.60)	.12 (.71)	.07 (.83)	-.12 (.71)	-.02 (.91)	.08 (.80)	-.01 (.87)
HPLP exercise	.25 (.44)	-.01 (.98)	-.34 (.29)	.18 (.57)	.26 (.41)	-.58* (.05)	.21 (.52)
HPLP nutrition	-.54 (.07)	.12 (.71)	-.19 (.56)	.06 (.85)	.31 (.33)	-.17 (.60)	-.06 (.87)
HPLP Interpersonal	.81** (.001)	.19 (.56)	.44 (.15)	-.68* (.02)	-.54 (.07)	.34 (.29)	-.31 (.34)
HPLP stress management	-.54 (.07)	.34 (.28)	-.20 (.54)	-.10 (.77)	.27 (.40)	-.36 (.25)	.21 (.52)
HPLP total	-.34 (.15)	-.26 (.27)	-.55* (.01)	-.18 (.44)	.27 (.26)	.13 (.58)	-.23 (.34)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 20 (cont'd)
Validity Correlations: Caregiver domain – change scores

	SF-36 mental health	SF-36 MCS	SF-36 PCS	ZBI total	ZBI Role	ZBI Personal	DBRI freq'cy
SF-36 physical							
SF-36 role phys							
SF-36 bodily pain							
SF-36 gen health							
SF-36 vitality							
SF-36 soc function							
SF-36 role emot'l							
SF-36 ment health							
SF-36 MCS	.81** (.001)						
SF-36 PCS	-.73** (.01)	-.64* (.02)					
ZBI total	.06 (.86)	.41 (.19)	-.19 (.55)				
ZBI role burden	-.11 (.74)	.15 (.65)	-.03 (.92)	.92** (.001)			
ZBI pers'l burden	.35 (.27)	.65* (.02)	-.38 (.23)	.40 (.18)	.01 (.97)		
DBRI frequency	.33 (.30)	.46 (.13)	-.48 (.11)	.44 (.13)	.23 (.45)	.59* (.04)	
DBRI Intensity	.21 (.51)	.42 (.18)	-.54 (.07)	.48 (.10)	.25 (.42)	.65* (.02)	.95** (.001)
Lawton total	-.20 (.53)	-.28 (.38)	.40 (.20)	-.30 (.33)	-.19 (.53)	-.31 (.30)	-.79** (.001)
Lawton basic	-.40 (.20)	-.55 (.07)	.30 (.35)	-.06 (.84)	.13 (.67)	-.46 (.11)	-.69** (.01)
Lawton Instrumt'l	-.06 (.85)	-.08 (.80)	.40 (.20)	-.36 (.23)	-.32 (.28)	-.17 (.58)	-.69** (.01)
HPLP self-actual	.11 (.73)	.04 (.90)	-.01 (.98)	-.23 (.48)	-.24 (.46)	-.04 (.90)	.41 (.19)
HPLP health responsibility	.04 (.89)	-.03 (.92)	.16 (.61)	.46 (.14)	.67* (.02)	-.30 (.35)	.13 (.69)
HPLP exercise	.42 (.18)	.32 (.31)	-.56 (.06)	-.06 (.85)	-.25 (.44)	.36 (.25)	.61* (.04)
HPLP nutrition	.15 (.65)	.15 (.65)	.21 (.51)	.04 (.90)	.11 (.73)	-.13 (.68)	.25 (.44)
HPLP Interpersonal	-.47 (.12)	-.58* (.05)	.78** (.003)	-.34 (.27)	-.10 (.77)	-.61* (.04)	-.84** (.001)
HPLP stress management	.43 (.17)	.32 (.32)	-.28 (.37)	-.23 (.23)	-.29 (.37)	.05 (.88)	.16 (.63)
HPLP total	.28 (.24)	.27 (.24)	-.41 (.07)	-.13 (.57)	-.02 (.94)	-.25 (.29)	.21 (.38)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 20 (cont'd)
Validity Correlations: Caregiver domain – change scores

	DBRI intense	Lawton total	Lawton basic	Lawton instr'l	HPLP self-actual	HPLP health
SF-36 physical						
SF-36 role phys						
SF-36 bodily pain						
SF-36 gen health						
SF-36 vitality						
SF-36 soc function						
SF-36 role emot'l						
SF-36 ment health						
SF-36 MCS						
SF-36 PCS						
ZBI total						
ZBI role burden						
ZBI pers'l burden						
DBRI frequency						
DBRI Intensity						
Lawton total	-.72** (.01)					
Lawton basic	-.54 (.06)	.76** (.003)				
Lawton Instrumt'l	-.68* (.01)	.94** (.001)	.49 (.0919)			
HPLP self-actual	.28 (.38)	-.44 (.15)	-.50 (.10)	-.35 (.26)		
HPLP health responsibility	-.05 (.89)	-.10 (.76)	-.10 (.76)	-.08 (.80)	.12 (.72)	
HPLP exercise	.65* (.02)	-.45 (.14)	-.39 (.21)	-.42 (.17)	.44 (.15)	-.05 (.88)
HPLP nutrition	-.13 (.70)	-.62* (.03)	-.62* (.03)	-.55 (.07)	.46 (.13)	.24 (.45)
HPLP Interpersonal	-.90** (.001)	.58* (.05)	.49 (.10)	.55 (.06)	-.14 (.67)	.04 (.90)
HPLP stress management	.04 (.91)	-.55 (.07)	-.67* (.02)	-.40 (.20)	.50 (.10)	.82** (.001)
HPLP total	-.10 (.67)	.17 (.48)	.15 (.53)	.16 (.49)	.79** (.001)	.87** (.001)

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Table 20 (cont'd)
Validity Correlations: Caregiver domain – change scores

	HPLP exercise	HPLP nutrition	HPLP Interprs'l	HPLP stress mngmt	HPLP total
SF-36 physical					
SF-36 role phys					
SF-36 bodily pain					
SF-36 gen health					
SF-36 vitality					
SF-36 soc function					
SF-36 role emot'l					
SF-36 ment health					
SF-36 MCS					
SF-36 PCS					
ZBI total					
ZBI role burden					
ZBI pers'l burden					
DBRI frequency					
DBRI Intensity					
Lawton total					
Lawton basic					
Lawton Instrumt'l					
HPLP self-actual					
HPLP health responsibility					
HPLP exercise					
HPLP nutrition	.03 (.94)				
HPLP Interpersonal	.64* (.03)	-.08 (.80)			
HPLP stress management	.25 (.44)	.82** (.001)	-.03 .(92)		
HPLP total	.67** (.001)	.69** (.001)	.69** (.001)	.70** (.001)	

** Correlation is significant at the 0.01 level (2-tailed) * Correlation is significant at the 0.05 level (2-tailed)

Responsiveness

Assessing change over time in the health related field requires instruments capable of capturing any changes that, even if small, are important to the recipients of a given therapy. The instrument property, referred to as responsiveness, is an important piece of information when researchers are seeking out appropriate measurement tools. The intervention here (MBCT) was hypothesized to have the potential to help those with stroke improve mood, anxiety, coping, and general quality of life. Most measures selected have been evaluated in terms of responsiveness, however, no studies evaluated responsiveness with people neither with stroke nor with this form of intervention. Effect size is a statistical form of responsiveness where the difference between two means (i.e., T1 and T2) is divided by the pooled standard deviation. The following section discusses the findings of effect size (ES) analysis for each measure used (see Tables 21a and 21b). According to Cohen's Benchmarks (Cohen, 1988) ES values below .20 are considered small, .21 to .40 are small-moderate, .41 - .60 are moderate, .61 to .79 moderate to large, and greater than .80 are considered to be large. In addition, paired t-test analyses were completed to determine the utility of one domain-specific measure over another (see Table 22).

Anxiety.

The BAI total scale score showed a strong ES (1.11, SD = 1.19). The autonomic, panic and neurophysiological BAI subscale ES ranged in the moderate level between 0.43 and 0.67. The subjective BAI subscale showed a strong ES of 1.19. The HADS anxiety scale had a strong ES of 1.39 (SD = 1.03). The SF-36 MCS, which does not specifically address anxiety-related symptoms, but does reflect overall mental and emotional well being had a strong ES of 0.93 (SD = 1.01).

The difference between the BAI total and HADS anxiety scale scores was not significant ($t = 1.07$, $p > .05$). In removing the physiological and neurological components of the BAI (that can be confounded with effects of stroke) and in comparing with the HADS anxiety score, the subjective subscale was not significantly greater ($t = .66$, $p > .05$) however the autonomic subscale was significantly greater in ES power ($t = 3.48$, $p < .01$). In comparing the difference between the BAI and SF-36 MCS, the BAI was significantly stronger ($t = -5.56$, $p < .001$). This analysis is important in light of earlier discussion regarding the minimization of anxiety-related symptoms after stroke.

Depression.

The BDI-II total, somatic, and cognitive scores had strong ES values ranging between 1.10 to 1.43. The HADS depression score also had a strong ES of 1.00 ($SD = 1.06$). Within the SSQoL there are subscales that are felt to contribute to emotional functioning. The SSQoL mobility and self care scores showed a low ES (0.26, $SD = .55$ and 0.33, $SD = .55$, respectively) while the SSQoL mood and energy scale scores showed moderate ES (0.62, $SD = .97$; 0.58, $SD = .71$, respectively). The SSQoL personality and thinking scale scores were both reflective of strong ES (1.07, $SD = 1.05$, 1.04, $SD = .93$, respectively). The DBRI emotional behaviours showed a moderate ES of 0.60 ($SD = .83$).

The difference in ES between the BDI-II and HADS depression was not significant ($t = 1.96$, $p = .06$). The BDI-II was statistically stronger than all aspects of related SSQoL scales as well as the DBRI emotional scale. Further the BDI-II ES was significantly greater than that of the SF-36 MCS ($t = 6.11$, $p < .001$).

Coping Style / Attitude.

Effect size scores on the MASS varied, ranging from low to strong. The fatalism scale showed the lowest ES (0.32, SD = .87). The helpless/hopelessness and anxious preoccupation scales both had moderate to strong ES scores (0.67, SD = .91 and 1.83, respectively). The fighting spirit scale showed a strong ES of 0.78 (SD = 1.11).

Quality of Life.

Within the SSQoL scales, there was variability in terms of ES. Low ES scores (ranging from 0.14 to 0.35) were seen in the language, family role, mobility, self care, upper extremity and vision scales. Moderate ES values were observed in the energy, mood, and work productivity (ranging from 0.47 to 0.62) Moderate to strong ES values were observed in the total score, and personality, social function, and thinking scale scores (ranging between 0.71 to 1.07).

The SF-36 is broken down to two overall component scores the MCS and PCS. Within the MCS (ES mean = 0.93, SD = 1.01) the vitality, social function, role emotional and mental health subscales ranged from low to moderate ES (ES mean 0.27 to 0.62). The PCS (ES mean = 0.48, SD = .50) contributing subscales (physical, role physical, bodily pain, and general health perceptions) ranged from very low to moderate (ES mean from 0.05 to 0.47).

Paired t-test analysis indicated no difference between the SSQoL total ES score and the SF-36 MCS ES (t = .615, p = .55). The SSQoL total ES score was significantly greater than the SF-36 PCS (t = 2.43, p =.024). Because the SSQoL contains both physical and mental/emotional items, it was felt that a more reflective comparison with the SF-36 component scores would have to isolate these items. While the authors (Williams et al., 1999) have not published this approach (i.e., creating a mental and physical aggregated

subscale), the measure lends itself to this comparison, as the items are not weighted and simply aggregated. When the SSQoL mental aggregate was contrasted with the SF-36 MCS no significant difference was found ($t = .87$, $p = .39$). Comparison of the SSQoL physical aggregate with the SF-36 PCS was also not significantly different ($t = 2.06$, $p = .05$). This suggests that in terms of responsiveness, the specific measure was no more sensitive to change when compared to the generic measure.

Caregiver Burden.

The ZBI total score and contributing role burden scale reflected a moderate ES (ES mean = 0.46 and 0.41; SD = .76 and .78, respectively). The ZBI personal burden ES was low (ES mean = 0.22, SD = .71). The Lawton scale showed low ES scores, both overall and on the contributing subscales (ES mean ranging from 0.17 to 0.19). The DBRI had variable ES values. The overall score of "degree of problem of the behaviour" had a low ES (mean = 0.25, SD .89), whereas the overall score of "frequency of occurrence of behaviour" had a moderate ES (mean = 0.42, SD .91). The psychiatric, repetitive and difficult behaviour subscales had low ES scores ranging from 0.20 to 0.35. The emotional behaviour subscale, however, had a moderate ES of 0.60 (SD = .83). The HPLP overall and subscale scores had low ES.

Table 21a
Responsiveness Effect Size Summary

Scale	ES Mean	SD
BAI total	1.11	1.19
BAI neurophysiology	0.67	.75
BAI panic	0.64	1.20
BAI subjective	1.19	1.46
BAI autonomic	0.43	1.16
BDI-II total	1.43	1.00
BDI-II somatic	1.41	0.91
BDI-II cognitive	1.10	1.21
SSQoL total	0.81	0.59
SSQoL energy	0.58	0.71
SSQoL family	0.35	0.53
SSQoL language	0.14	0.45
SSQoL mobility	0.26	0.55
SSQoL mood	0.62	0.97
SSQoL personality	1.07	1.05
SSQoL self care	0.33	0.55
SSQoL social function	0.71	0.77
SSQoL thinking	1.04	0.93
SSQoL upper extremity	0.26	0.44
SSQoL vision	0.25	0.50
SSQoL work productivity	0.47	0.71
SSQoL Mental Aggregate	0.80	0.62
SSQoL Physical Aggregate	0.29	0.29
HADS anxiety	1.39	1.03
HADS depression	1.00	1.06
MASS fighting spirit	0.78	1.11
MASS help/hopelessness	0.67	0.91
MASS anxious	0.67	1.83
MASS fatalism	0.32	0.87

Scale	ES Mean	SD
SF-36 MCS	0.93	1.01
SF-36 PCS	0.48	0.50
SF-36 physical	0.21	0.32
SF-36 role physical	0.47	0.26
SF-36 bodily pain	0.05	0.19
SF-36 general health	0.22	0.37
SF-36 vitality	0.39	0.40
SF-36 social function	0.27	0.41
SF-36 role emotional	0.38	0.58
SF-36 mental health	0.62	0.56
ZBI total	0.46	0.76
ZBI role burden	0.41	0.78
ZBI personal burden	0.22	0.71
Lawton total	0.20	0.30
Lawton basic	0.17	0.31
Lawton instrumental	0.19	0.30
DBRI degree	0.25	0.89
DBRI frequency	0.42	0.91
DBRI psychiatric behaviours	0.35	1.26
DBRI emotional behaviours	-0.60	0.83
DBRI repetitive behaviours	-0.25	0.45
DBRI difficult behaviours	-0.20	0.92
HPLP total	0.15	0.33
HPLP self actualization	0.10	0.48
HPLP health responsibility	0.10	0.31
HPLP exercise	0.10	0.47
HPLP nutrition	0.14	0.34
HPLP interpersonal	0.19	0.71
HPLP stress mngt	0.23	0.72

Table 21b
Effect Size Summary According to Cohen's Benchmarks

Small (<0.20)	Small/Moderate (0.21 - 0.40)	Moderate (0.41 - 0.60)	Moderate/Large (0.61 - 0.79)	Large (>0.80)
SF-36 bodily pain	SF-36 physical	SF-36 PCS	SF-36 mental health	SF-36 MCS
Lawton total	SF-36 general health perception	SF-36 role physical	BAI neurophysiol.	BAI total
Lawton Basic	SF-36 vitality	ZBI total	BAI panic	BAI subjective
Lawton Instrumental	SF-36 social function	ZBI role burden	SSQoL mood	BDI-II total
HPLP total	SF-36 role emotional	DBRI frequency	SSQoL social function	BDI-II somatic
HPLP self actualization	ZBI personal burden	DBRI emotional behaviours	MASS fighting spirit	BDI-II cognitive
HPLP health responsibility	DBRI degree	BAI autonomic	MASS help/hopelessness	SSQoL total
HPLP exercise	DBRI repetitive behaviours	SSQoL energy	MASS anxious preoccupation	SSQoL personality
HPLP interpersonal support	DBRI psychiatric behaviours	SSQoL work productivity		SSQoL thinking
SSQoL language	HPLP stress mngmt	BAI autonomic		SSQoL Mental Component
DBRI difficult behaviours	HPLP interpersonal support			HADS depression
	SSQoL family funct.			HADS anxiety
	SSQoL mobility			
	SSQoL self care			
	SSQoL upper ext			
	SSQoL vision			
	SSQoL Physical			
	MASS fatalism			

Table 22
Statistical Comparison of Effect Sizes Between Construct-Related Measures

Comparison	Effect size difference	t	p
BAI total – HADS anxiety[+]	0.31	1.07	.30
BAI subjective[+] – HADS anxiety	0.21	0.66	.52
BAI autonomic – HADS anxiety[+]	0.97	3.48	<.01**
BAI total[+] – MCS	0.18	-5.56	<.01**
BDI-II total[+] – HADS depression	0.42	1.96	.06
BDI-II total[+] – SSQoL total	0.62	-7.80	<.01**
BDI-II total[+] – SSQoL mood	0.81	5.71	<.01**
BDI-II total[+] - DBRI difficult behs	1.16	3.33	.01**
BDI-II total[+] - DBRI emotional behs	.83	-2.62	.02*
BDI-II somatic[+] - SSQoL mood	0.79	-5.87	<.01**
BDI-II somatic[+] - SSQoL energy	0.83	-7.67	<.01**
BDI-II somatic[+] - SSQoL mobility	1.08	7.28	<.01**
BDI-II somatic[+] - SSQoL self care	.70	-8.72	<.01**
BDI-II cognitive[+] - SSQoLperson'ty	.03	-5.06	<.01**
BDI-II cognitive[+] - SSQoL thinking	.06	-6.01	<.01**
BDI-II total[+] – SF-36 MCS	0.50	6.11	<.01**
SF-36 MCS[+] – SSQoL total	0.12	0.62	.55
SF-36 PCS – SSQoL total[+]	0.33	2.43	.02*

[+] denotes the scale with greater effect size
** significant at the 0.01 level (two-tailed)
* significant at the 0.05 level (two-tailed)

Discussion

The purpose of the present section was to evaluate the psychometric properties of the measures used. The intention was to evaluate the validity, reliability and responsiveness of generic and stroke-specific measures that targeted emotional variables, quality of life indices, physical changes secondary to stroke and caregiver burden variables. Some of the generic measures used have been evaluated through numerous such analyses (e.g., BDI-II, HADS, SF-36); others however, including the stroke specific and relatively new MASS and SSQoL, have not. It was hypothesized that while most measures would have adequate validity and reliability, the specific measures would be more sensitive in accurately assessing the participant's benefit or response to the MBCT program. It was also postulated that measures including neurological and physiological items (e.g., numbness, tingling, dizziness, insomnia, loss of appetite, loss of limb use) would overestimate the degree of disturbance (i.e., false-positive depression scores) and would also not be as responsive to the intervention. The following sections summarize the overall findings from the psychometric analysis and relate the findings to previous analysis studies. Finally, recommendations for future use and refinements are made.

Reliability

The reliability of instruments used in this study was reflected by the internal consistency, or alpha values, for all measures. Altogether, alpha values ranged from moderate to strong. There were a few exceptions, however, with the BAI panic subscale, the MASS anxious preoccupation scale, and the SSQoL thinking and self care subscales.

With respect to the low internal consistency within the BAI panic subscale, it might be explained as a function of the heterogeneity of a relatively small sample size. Low

correlation suggests that the items contributing to the panic scale are not reflective of the same construct. Specifically, a person who is not of the best physical condition may experience frequent "heart pounding or racing" (item 7) or might have "difficulty breathing" (item 15), but this is not reflective of a panic response in the purest sense. As a result, all items on the panic scale may not be measuring the same thing (especially with a variant group with different physical qualities) and this is reflected with a lower alpha level. As compared to Beck and colleagues (1988) who obtained an internal consistency on the BAI subscales ranging from .85 to .94, the present data are slightly lower, but remain acceptable. The coefficient alpha for the HADS anxiety subscale was also very good and slightly higher than the .41 to .76 range reported by Zigmond and Snaith (1983).

As for the measures of depressive symptomatology, the internal consistency coefficient alpha scores within the HADS depression scale was good and, again, slightly higher than the .41 to .76 range reported by Zigmond and Snaith (1983), but close to findings by Aben and colleagues (2002). The BDI-II somatic and cognitive subscales, while acceptable, were not as high as levels reported by other authors (e.g., Arbisi, 1998; Aben et al., 2002).

With respect to the quality of life assessment indices, the internal consistency levels ranged from good to excellent, with only two exceptions within each measure. In the present study, the SSQoL domains demonstrated excellent internal reliability, similarly to what was reported by Williams and colleagues (1999), with the exception of the thinking and self care subscales which were reported by the authors as .73 and .89, respectively. The SF-36 also showed very good internal consistency but not as high as that described by Ware and Kosinski (2001).

The MASS internal consistency in the present study suggested reasonable Cronbach alpha levels, which were very similar to that reported by Lewis and colleagues (2001). The only exception to this was the peculiar alpha level found for the Anxious Preoccupation scale. It is felt that the items on this scale can reflect very different concepts, depending on how one views the statements. Specifically, many items contain activities that involve proactive behaviours in maintaining or establishing good health habits. These items will vary depending on the individual as, for example, one respondent may never have had to improve health habits or learn more about strokes (i.e., their stroke was not preventable), whereas another may need to make a number of health related changes, but this only reflects 'doctor's orders' and not a pathological degree of anxious preoccupation.

The caregiver measures in the present analysis reflect moderate to excellent internal consistency. The Zarit Burden Inventory (ZBI) Cronbach alpha values were slightly lower than those reported by Bédard and colleagues (2001), but still within acceptable limits. The Lawton alpha coefficients were well within acceptable limits. The HPLP alpha coefficients reflected some variability, and were lower than the values reported by Walker and colleagues (1986). The DBRI alpha values were variable and generally good, with the exception of the psychotic behaviours subscale. It should be noted that while none of the participants had any form of psychotic symptoms, some caregivers endorsed items sensitive to memory functioning that were not reflective of psychotic behaviours, rather a common symptom of forgetfulness.

With respect to the reliability for the change scores, there was only minimal change in internal consistency trends. The changes that were identified were expected and related to attrition and the resultant change in sample size.

Validity

On measures within the depression domain, convergent and divergent validity was demonstrated as predicted. Significant correlations were observed between the BDI-II, HADS and emotionally-related aspects of the quality of life measures, highlighting the convergent validity among these scales in the assessment of depressive symptoms. Evaluation of attitude and mood indicators also provided support for convergent validity with the negative attitudes of helplessness/hopelessness and fatalism being significantly correlated with mood. Similar convergent validity analyses provide support for these findings (e.g., Aben et al., 2002; Lewis et al., 2001; Schramke et al., 1998; Williams et al., 1999). Divergent validity was illustrated through the low correlations between the strictly physical indices as well as the positive attitude of fighting spirit (MASS) and those related to depression and mental health.

Within the anxiety domain, most of the predictions for convergent validity were observed. One exception to note was the low correlation between the HADS and the BAI panic subscale, which was anticipated to be greater. In retrospect, with the knowledge of the participant's general physical symptoms after their stroke, it is intuitive that this correlation should be low. Items related to the panic subscale can be permanent outcomes secondary to stroke (e.g., difficulty swallowing, deconditioned symptoms of difficulty breathing or heart pounding), rather than reflective of panic symptoms. In terms of divergent validity, the physical indices of the SF-36 had relatively strong correlation with the neurophysiological and somatic aspects of the BAI, but not the cognitive or panic BAI subscales or the HADS. Interestingly, the HADS had a stronger than expected correlation with the neurophysiological and somatic BAI subscales. Because the HADS had a low correlation with the SF-36 PCS

and these BAI subscales had strong correlations with the SF-36 PCS, this suggests that there are two constructs that mutually exist, namely anxiety as whole, and physical symptoms and characteristics which overlap.

The QoL measures demonstrated convergent validity as anticipated with the intuitively-related subscales showing significant correlations. The SSQoL total score was not significantly related to the SF-36 MCS, despite a number of significant relationships within the contributing subscales. Of course, an overall correlation between the total score and the MCS should not be expected for the reason that the SSQoL total score contains physically-related items. While the SSQoL was developed with the intention of addressing both the emotional and physical sequelae of stroke (Williams et al., 1999) more refinements need to be made in order to establish stronger validity. An equivalent number of items should contribute to the overall SSQoL score from each domain. Presently, only 17 items are emotionally related whereas 32 are of a physical nature. With additional items the measure could be further refined to include a mental and physical component scale such as the ones developed for the SF-36.

Caregiver measures demonstrated some aspects of convergent validity. Specifically, both emotional and physical aspects of caregiver burden correlated significantly with related subscales (e.g., vitality and exercise; degree of need for assistance with daily activities of living with level of caregiver burden).

Responsiveness

Assessing change over time in health-related QoL requires instruments capable of capturing any changes that, even if small, are important to patients (Wiebe et al., 2003). The analysis of responsiveness of the measures used to detect change in anxiety, mood, QoL and

caregiver burden both after the MBCT intervention and over time resulted in a range of variability among instruments. The majority of measures used demonstrated moderate to large effect sizes. Indices that were not responsive included those related to physical functioning (e.g., SF-36 bodily pain, SSQoL upper extremity functioning, Lawton basic and instrumental activities of daily living) and some that reflect or contribute to caregiver burden. With respect to the small to moderate effect size observed with the physically oriented indices, it was not the aim of the program to effect change in physical health in the participants and therefore not surprising that these items remained the same. Similarly, most of the caregiver burden indexes at Time 1 generally reflected a low level of burden and a high level of independence on the part of the participants, suggesting that there was little room for improvement in these areas. The caregiver ZBI total and role emotional, and the DBRI frequency and emotional behaviours were four areas that were responsive to change, all within the moderate effect size range.

Further analysis of the measures employed set out to identify instruments that were superior in terms of responsiveness. In general, there was no significant difference between the BAI and HADS anxiety subscale or between the BDI-II and the HADS depression subscale. In previous research by Aben and colleagues (2002), the sensitivity and specificity has not been found to be substantially different for HADS as compared to BDI-II in identifying symptoms in stroke patients. The BDI-II came out on top with respect to responsiveness when compared to aspects of the SSQoL that related to mood and when compared to the SF-36 MCS. This lends further support to the assertion that depression is one of the most important determinants of low QoL after stroke (Kauhanen et al., 2000).

No significant difference between the SSQoL Aggregate Mental Score and the SF-36 MCS or the SSQoL Aggregate Physical Score the SF-36 PCS, suggesting that overall, the specific QoL instrument was no better than the generic one. Wiebe and colleagues have suggested (2003) that, overall, specific QoL instruments are more responsive than generic tools. The present findings do not support this, however several explanations exist. First, the MBCT intervention was not intended to effect change in the participant's physical capabilities (e.g., mobility, strength, balance) and therefore no difference should have been found between the physical aspects of the QoL measures. Second, the small sample size could have contributed to representativeness of the clinical population as a whole on the SSQoL. Third, psychometric properties (e.g., number of items and item content) leave room for improvement. Specifically, 26 items were considered to be reflective of mental and emotional functioning. Of these, 7 items have a strong overlap with physical functioning that can change as a result of stroke (40 items reflected physical functioning). The SSQoL thinking and personality subscales (with the mood subscale taking a close third) capture many of the experiences individuals who have had a stroke report (e.g., emotional lability, frustrations with changes in ability, irritability, and memory difficulties) in only 8 items. Refinement of the SSQoL should include more items relating to the interpersonal, emotional and cognitive changes that can occur after stroke. Finally, weighted domains for the Mental and Physical components (as suggested by Williams et al., 1999) might also improve responsiveness in the specific measure as compared to the generic one.

Recommendations for Future Use

With the aforementioned psychometric analysis findings and with the experience of administering the instruments, some recommendations can be made for any future studies or

programs of this nature. Three measures specifically devoted to anxiety and depression were used. Many items among the measures were repetitive, thus making respondents feel a sense of redundant use of time. In the future, one can feel confident in choosing either the BAI and BDI-II or the HADS, depending on their interest. The benefit of the BAI and BDI-II is that these scales have subscales that may help provide more detailed information of the respondents. The benefit of using the HADS is its brevity.

With respect to QoL measures, both the SF-36 and SSQoL have their strengths. The SF-36 has been used in many large scale studies that have contributed to the documentation of its psychometric strengths. In terms of administration, the SF-36 is shorter and easier to use than the SSQoL. Both require the same amount of time. The SSQoL is relatively new and has shown good promise for future use despite being no more responsive than the SF-36 PCS or MCS when emotional and physical subscales were aggregated. As previously mentioned, additional items related to mental and emotional functioning as well as factor analysis toward the development of a weighted physical and emotional overall score would be beneficial.

A number of measures were needed to be administered to the caregivers in order to obtain a picture of their overall health and health behaviours, their perception of the participant's level of independence as well as dysfunctional behaviours, and their report of personal burden. This was relatively time consuming for the caregivers, some of whom declined participation due to the time commitment. In the future it would be desirable to include the ZBI, have one consolidated measure of the caregivers level of emotional and physical health (perhaps eliminating the HPLP and relying on the SF-36), and one

consolidated measure of the participant's level of need according to the degree, if any, of dysfunctional behaviours.

Section IV: Application and Effectiveness of MBCT

With the adaptation of the MBCT program made to accommodate needs and issues in individuals with stroke, the next step was to evaluate whether the MBCT program was beneficial in providing participants with skills to manage anxiety, depression, and irritability as well as improve their overall QoL. Further, did the MBCT program have simultaneous benefits for the caregivers of the participants in this program? Before answering these questions, the primary investigator had to recruit participants, screen them for exclusion criteria, complete interviews and assessment measures, run the 9-week program, and reassess both after completion and three months later.

Method

Intervention

Each of the nine sessions has a specific theme and the content for each is outlined (see Appendix B for specific details for each session). Each session included varying length and forms of mindfulness meditation, introductory to more advanced aspects of cognitive therapy (in group format), education about stroke and accompanying emotional changes, a weekly review of events and homework, and group work. Two sessions included introductory Yoga techniques (as described by Segal et al., 2002; Kabat-Zinn, 1988) that were integrated into the concept of mind and body. Time was made at the beginning and end of each session during which participants were encouraged to bring forth any comments,

questions or concerns. During this time, the group leaders met with the participants individually to review at-home task assignments and briefly review log book entries.

Sessions for the two MBCT groups ran over a 9-week period (one 1 ¾ hour group per week) between October 21 – December 16, 2002 and January 13 – March 24, 2003. Within ten days following the completion of the MBCT program assessment measures were re-administered. Three-month follow-up assessments were also completed for each group. Each assessment session was completed in person on an individual basis either at the participant's home or a location that was convenient for them.

Analysis

The effectiveness of the MBCT program was evaluated on two levels. Due to lower than expected levels of recruitment response (as outlined below), data collected from dropout participants in the Fall session was used as a parallel control arm. This first phase (Phase I) of the analysis involved evaluation of the demographic equivalency between dropouts and completers (95% confidence interval) followed by Independent t-test analyses between the change scores for groups on each measure at time 1 and time 2. The second phase (Phase II) entailed analysis of the combined data for the completers from both the Fall and Winter sessions from time 1, 2, and 3. Qualitative information, which was collected and recorded verbatim, was organized into themes and trends (see Appendix C). Statistical procedure for this analysis involved repeated measures Analysis of Variance (ANOVA). Post hoc comparisons were performed to determine significance of difference between assessments times, if any. This was completed by using protected t-tests (Fischer's LSD) with a Bonferroni correction. Comparisons were made between times 1 and 2, times 2 and 3, and times1 and 3. By determining point of significance between two given time periods this

would serve to support source for impetus of change. For example, a significant improvement between time 1 and 2 and time 1 and 3, but not 2 and 3 would suggest that positive change occurred during the course of the MBCT Program and was maintained over the three-month period. Correlations between demographic information and outcome measures were analyzed to determine whether certain participant and/or caregiver characteristics were predictors in the outcome findings. Descriptive characteristics (i.e., mean and frequency) of participant's responses to the questionnaire at the time of follow-up (Appendix D) were evaluated with respect to social, emotional and medical changes between the time of the second and third assessment.

Results

The following sections present the description of participants and caregivers who took part in the study and the analysis of effectiveness of the MBCT program. Both qualitative and quantitative findings are included.

Participants

Thirty participants met the inclusion criteria to participate in the study. Thirty-two individuals contacted the primary investigator over the course of the study period; however two were unable to find transportation to the sessions and opted not to take part. Fifteen were initiated into each session (Fall and Winter). Seven participants were lost to attrition in the Fall session. Of these seven, four agreed to be interviewed at time 2 as controls (of the remaining three, two had unforeseen medical concerns that required attention and one did not show up and could not be contacted). Control participants attended 1 or 2 sessions but could not complete the Program due to difficulty hearing within the group context ($n = 1$), transportation difficulties ($n = 2$), and schedule conflicts ($n = 1$). All fifteen participants

completed the Winter session. These 23 participants completed the initial and post-intervention assessment (17 males; 6 females), while 21 completed the 3-month follow-up questionnaires (two male participants experienced a severe decline in physical health).

The demographic characteristics of the Fall participants and control group are presented in Table 23a. Altogether, the participant and control groups were similar on most characteristics. It appears that the participant group was slightly more physically affected by the stroke (i.e., degree of hemiparesis) and one participant cohabited with a family member for this reason. One of the participants had experienced a remote period of depression while no one in the control group had.

The average age of the participant group at the time of the program was 63.3 (SD = 11.8). Average age of males at time of stroke was 64.7 (SD = 5.2 years) and of females was 58.5 (SD = 6.5). Twelve participants also had other chronic illnesses. One had heart problems, six had high blood pressure, four had high cholesterol, two had lupus, one had a diagnosis of ankylosing spondylitis, and one had congestive obstructive pulmonary disease. While only one participant had a present diagnosis of depression, 5 (21.7%) had previously received some form of short term therapy for depression. Table 23b outlines the demographic characteristics of the participants.

Of the twenty-three participants, fifteen had caregivers all of whom were cohabitating spouses. Two participants lived independently, four participants had spouses who were of ill health, and two did not want to participate in the questionnaire completion. None of the completing caregivers expressed having experienced depression in the past. Table 24 outlines many of the demographic characteristics of the caregivers who participated.

Table 23a. Demographic Features of Fall Participant Group and Control Group

Demographic Feature		Fall Completers (n = 8)			Controls (n = 4)		
		Frequency (%)	95% CI		Frequency (%)	95% CI	
			Lower	Upper		Lower	Upper
Sex	Male	7 (87.5)	59.79	100.00	3 (75)	23.69	100.00
	Female	1 (12.5)			1 (25)		
Age at stroke		56.75 (9.71)[+]	48.64	64.86	61.0 (17.38)[+]	54.55	69.05
Present age		62.13 (7.88)[+]	55.54	68.71	67.0 (17.11)[+]	56.52	71.62
Multiple strokes	Yes	1 (12.5)	0.00	40.21	1 (25.0)	0.00	76.31
	No	7 (87.5)			3 (75.0)		
Aphasia	Yes	1 (12.5)	0.00	40.21	1 (25.0)	0.00	76.31
	No	7 (87.5)			3 (75.0)		
Lateralization of stroke	Right	4 (50.0)	8.10	91.90	2 (50.0)	0.00	100
	Left	4 (50.0)			1 (25.0)		
	Brainstem	--			1 (25.0)		
Paresis	Mild weakness	3 (37.5)	0.00	78.07	4 (100.0)	n/a	n/a
	Moderate weakness	5 (62.5)			--		
Handedness	Right	8 (100)	n/a	n/a	4 (100.0)	n/a	n/a
Marital status	Married	6 (75)	38.72	100.00	3 (75.0)	23.69	100.00
	Single	1 (12.5)			1 (25.0)		
	Divorced	1 (12.5)			--		
Living situation	Home	7 (87.5)	0.00	40.21	4 (100.0)	n/a	n/a
	Family member's	1 (12.5)					
Chronic illness	None	6 (75.0)	38.72	100.00	3 (75.0)	23.69	100.00
	Lupus	1 (12.5)			1 (25.0)		
	Arthritis (spine)	1 (12.5)			--		
Education	<gr. 9	2 (25)	0.00	73.78	1 (25.0)	0.00	76.31
	10-13	3 (37.5)			--		
	College	3 (37.5)			1 (25.0)		
	University	--			1 (25.0)		
	Post graduate	--			1 (25.0)		
Employment Status	Retired	5 (62.5)	21.93	100.00	1 (25.0)	0.00	76.31
	Disability	2 (25.0)			2 (50.0)		
	Volunteer	1 (12.5)			1 (25.0)		
Diagnosis of Anxiety	No, never	8 (100.0)	n/a	n/a	4 (100.0)	n/a	n/a
Diagnosis of Depression	Yes, before stroke (single episode)	1 (12.5)	0.00	40.21	0 (0.0)	n/a	n/a
	No, never	7 (87.5)			4 (100)		

[+] Denotes mean and standard deviation, when appropriate

Table 23b
Demographic Summary of All Participants

Demographic Feature		Completers n = 23	
		Frequency	%
Sex	Male	17	73.9
	Female	6	26.1
Multiple strokes	Yes	2	8.7
	No	21	91.3
Aphasia	Yes	2	8.7
	No	21	91.3
Lateralization	Right	11	47.8
	Left	12	52.2
	Other		
Paralysis	Unilateral weakness	15	65.2
	Weak leg/paralysis arm	6	26.1
	Complete paralysis	2	8.7
Handedness	Right	21	91.3
	Left	2	8.7
Marital status	Married	17	73.9
	Single	1	4.3
	Separated/divorced	2	8.7
	Widowed	3	13.0
Living situation	Home	22	95.7
	Family member's	1	4.3
Number of people living with participant	1	2	8.7
	2	19	82.7
	3	1	4.3
	4	1	4.3
Education	<gr. 9	5	21.7
	10-13	8	34.8
	College	7	30.4
	University undergrad	2	8.7
	Post graduate	1	4.3
Employment	Retired	15	65.2
	Disability	5	21.7
	Volunteer	1	4.3
	Millright	1	4.3
	Civil aviation	1	4.3
Dx of Anxiety	Yes, before stroke	0	0
	Yes, after stroke	1	4.3
	No, never	22	95.7
Dx of Depression	Yes, before stroke	1	4.3
	Yes after stroke	7	30.4
	No, never	15	65.2

Table 24
Demographics Summary of Caregivers

Demographic feature		Frequency	%
Sex	Male	4	26.8
	Female	11	73.2
Relationship	Spouse	15	100.0
Education	<gr. 9	1	6.7
	10-13	7	46.9
	College	3	20.1
	University undergrad	2	13.4
	Post graduate	2	13.4
Employment	Retired	9	60.3
	Volunteer	1	6.7
	Manual labour	3	13.0
	Business owner	1	6.7
	Manager	1	6.7
Dx of Anxiety	Yes, before stroke	1	6.7
	No, never	14	93.3
Dx of Depression	No	15	100.0

Effectiveness Participants

Phase I.

To reiterate, this phase involved contrast analysis between the completing participants in the Fall session and those who were recruited but unable to participate for various reasons. As shown above, the groups, albeit small, are generally equivalent in their demographic characteristics. Statistically, the effectiveness of the MBCT program was evaluated using Independent t-test analysis. Tables 25 and 26 present the results of the Phase I analysis of effectiveness for the affective and QoL scales, respectively.

Affective scales

Of the BAI subscales, only the Autonomic subscale was significantly different between the groups ($t = -4.01$, $p < .01$). The trend of the BAI data for the participants reflects lower scores at time 2 (less symptomatology), while the control group scores remained

unchanged or reflected increase of anxiety symptoms. The HADS anxiety subscale scores were significantly different between the groups ($t = -4.99$, $p < .01$), with participant scores reflecting less symptomatology. The change scores for the BDI-II total and subscale scores reflected significant differences between the groups ($p < .01$), with the participant scores improved and the control scores worsened. The HADS depression subscale scores were significantly improved in the participant group ($t = -2.24$, $p = .05$).

Table 25
Independent Samples Test for Comparison of Controls vs. Participants on Mood Indices

Index	Change Score Controls (t2-t1; Mean (SD))	Change Score Participants (t2-t1; Mean (SD))	t-value	p-value	95% Confidence Interval	
					Lower	Upper
BAI Total	-0.67 (1.15)	-7.5 (8.8)	-2.15	.07	-14.24	.57
BAI Neurophysiological	-1.25 (0.50)	-2.13 (2.85)	-0.84	.42	-3.28	1.53
BAI Panic	0.50 (0.58)	-1.13 (2.47)	-1.76	.11	-3.73	0.48
BAI Subjective	-1.00 (2.00)	-3.13 (3.53)	-1.33	.21	-5.70	1.45
BAI Autonomic	1.33 (.58)	-1.13 (0.46)	-4.01	.003**	-3.85	-1.06
BDI Total	3.00 (1.41)	-8.63 (5.60)	-5.53	<.001**	-16.42	-6.83
BDI-II Somatic	2.00 (0.82)	-6.50 (4.38)	-5.31	.001**	-12.20	-4.80
BDI-II Cognitive	1.00 (1.15)	-2.13 (2.03)	-3.39	.007**	-5.19	-1.06
HADS Anxiety	-1.00 (4.63)	-4.63 (2.20)	-4.99	.001**	-8.22	-3.03
HADS Depression	0.00 (1.83)	2.75 (4.63)	-2.24	.05*	-5.60	0.10

** Difference is significant at the 0.01 level (2-tailed) * Difference is significant at the 0.05 level (2-tailed)

QoL Scales

A number of the SF-36 QoL subscale change scores reflected significant improvement after the 8-week MBCT intervention in the participant group as compared to the control group. Specifically, role physical ($t = 6.00$, $p < .01$), general health ($t = 3.46$, $p < .01$), vitality ($t = -5.19$, $p < .01$) and the overall PCS ($t = 4.26$, $p < .01$) had improved. While following a pattern of improvement, the participants' change scores on the other subscales and summative MCS ($t = 2.15$, $p = .06$) were not statistically different from controls. Scores between the groups on the SSQoL subscales reflected significant improvement in the participant group on all but the language, mobility, mood, self-care and vision indicators.

The SSQoL total change score was significantly improved in the participant group ($t = 5.75$, $p < .001$).

Table 26
Independent Samples Test for Comparison of Controls vs Participants on QoL Indices

Index	Change Score (t2-t1) Controls (Mean (SD))	Change Score (t2-t1) Participants (Mean (SD))	t-value	p-value	95% Confidence Interval	
					Lower	Upper
SF-36 physical	-2.10 (3.44)	5.26 (8.64)	2.1	.06	-0.46	15.19
SF-36 role physical	-4.29 (3.67)	14.39 (7.10)	6.0	.001**	11.73	25.62
SF-36 bodily pain	1.27 (2.54)	4.81 (9.91)	0.95	.37	-4.95	12.02
SF-36 general health	-5.36 (4.07)	6.80 (8.10)	3.46	.01**	4.32	19.99
SF-36 vitality	-7.02 (2.99)	10.93 (8.83)	5.19	.001**	10.17	25.73
SF-36 soc function	0.00 (4.45)	5.45 (8.75)	1.43	.18	-3.05	13.95
SF-36 role emotional	-1.94 (3.89)	4.86 (12.42)	1.42	.19	-4.03	17.63
SF-36 mental health	-2.82 (9.48)	10.21 (5.20)	2.56	.06	-1.18	27.24
SF-36MCS	-2.89 (7.10)	7.55 (9.33)	2.15	.06	-0.76	21.64
SF-36PCS	-2.54 (2.92)	7.59 (5.31)	4.26	.002**	4.82	15.45
SSQoL energy	-1.00 (.82)	3.00 (4.50)	2.43	.04*	0.28	7.8
SSQoL family role	-2.00 (1.83)	5.75 (3.45)	5.08	.001**	4.35	11.15
SSQoL language	-0.75 (1.50)	0.88 (2.10)	1.54	.16	-0.79	4.04
SSQoL mobility	0.00 (1.63)	2.75 (4.89)	1.44	.18	-1.55	7.05
SSQoL mood	-2.75 (1.26)	3.50 (9.87)	1.76	.12	-2.03	14.53
SSQoL personality	-0.75 (2.20)	3.00 (4.50)	2.35	.04*	0.27	10.73
SSQoL self care	-0.75 (2.22)	4.75 (5.82)	1.95	.08	-0.40	5.40
SSQoL social	0.50 (1.73)	3.00 (2.67)	2.83	.02*	1.77	14.98
SSQoL thinking	-1.50 (3.00)	6.88 (7.22)	2.58	.03*	0.57	8.43
SSQoL upper extremity function	-1.00 (2.00)	4.00 (5.10)	2.43	.04*	0.39	9.61
SSQoL vision	0.00 (0.00)	0.75 (1.39)	1.53	.17	-0.41	1.91
SSQoL Work	-1.00 (1.41)	3.13 (0.47)	3.67	.01**	1.6	6.65
SSQoL Total	-11.00 (4.97)	42.13 (25.18)	5.75	<.001**	31.82	74.43

** Difference is significant at the 0.01 level (2-tailed)
* Difference is significant at the 0.05 level (2-tailed)

Phase II.

Qualitative

Following completion of the program and the second administration of questionnaires, participants were asked to rate how important they felt the MBCT program was for them (with "10" being "very important" and "1" being "not at all important". The responses at time-2 from the 23 participants ranged from 6 to 10 out of 10, with an average rating of 8.2. At time-3 the same question was asked of the participants. The average rating of importance of the program three months later was 7.5 out of 10. Verbatim responses on reflections on their experience, at time two, in the program are provided in Appendix C.

In general, there were a few themes that were found in the open-ended feedback questions to the clients. These included: a sense of "normalcy" in terms of how each has been affected by stroke; learned patience, acceptance and tolerance; decreased irritability and frustration; increased awareness of emotional and physiological sensations; improved cognition (attention and memory); and general improved well being. Many felt that the MBCT program and format provided them with the opportunity to meet others with stroke and to openly discuss some of the sensitive issues they have dealt with as a result of the stroke. The social support provided clients with a sense of trust, safety and a sense of "not being alone". Education about stroke and the often accompanying emotional changes also helped participants understand the "normal" experiences that people with stroke have. By the participant's report, the mindfulness breathing practice helped instill as sense of achievement and confidence in trying and mastering something new. Participants practiced awareness, patience and acceptance on a weekly basis in the formal sessions as well as informally in their daily lives. Improved emotional awareness and control was a consistent

report among the participants (i.e., decreased frustration, anger, and lability). A number of participants described being better able to read and pay attention without being distracted. In fact, two participants started reading novels for the first time since their stroke and were able to remember the characters and plots. The majority of participants described "just feeling better".

During the 3-month follow-up interview and administration of questionnaires, the participants were asked a number of questions related to any significant changes over the preceding three months as well as to the degree and form of mindfulness practice (see Appendix D). None of the participants had any changes to their medications over the three month period. In relation to significant events or changes in health, 15 participants (65%) had not had any changes. One participant experienced a positive event (birth in family) while six (approximately 26%) had experienced some decline in health and another participant had a spouse who sustained a stroke.

At follow-up, six participants (26%) reported maintaining some form of contact (i.e., over the phone, meeting for coffee) with other participants in the group. In terms of maintenance of mindfulness based practice along with awareness of cognitive processes involved in mood, all but three (13%) of the participants interviewed at follow-up persisted with some form of practice. The majority of participants engaged in mindful awareness at least twice a week. The use of the 'breathing space' technique was used, on average once a week, however a number of participants reported finding the breathing space helpful on a daily basis. Half of the participants made use of the guided meditation tapes, while the other half simply practiced methods learned from class. The majority of participants who used the tapes for guided meditation reported practicing once a week (22%), while 17% used the tapes

twice a week or more, and 9% used the tapes once a month.

Quantitative

Statistically, the effectiveness of the MBCT program was evaluated using MANOVA followed by a post-hoc protected t-test (or Fischer's LSD) with a Bonferroni correction. Table 27 presents the results of the overall analysis of effectiveness. (Mean and standard deviation scores for each measure are summarized in the tables with post hoc tests in the subsequent section.) Because the test of sphericity was not adequate, the conservative Greenhouse-Geisser correction was used. In general, almost all participant indices showed significant positive change following the program. The two indices that did not change were the BAI autonomic subscale ($F = 3.65$, $p = .07$) and the SSQoL language subscale ($F = 3.01$, $p = .09$). Only a few of the caregiver measures showed change. These included the emotional subscale of the DBRI ($F = 7.95$, $p = .01$) and the Lawton total $F = 5.8$, p .03 and instrumental ($F = 4.50$, $p = .05$) scores.

Table 27
Effectiveness of MBCT as a Function of Univariate Analysis

Index	Mean Square	F	df	p	Eta^2
BAI Total	432.81	20.42	1.17	.001	.50
BAI Neurophysiological	25.50	13.45	1.97	.001	.40
BAI Subjective	66.77	15.89	1.22	.001	.44
BAI Panic	9.65	5.71	1.27	.02	.22
BAI Autonomic	9.78	3.65	1.09	.07	.15
BDI-II Total	718.40	32.07	1.32	.001	.62
BDI-II Somatic	377.70	41.15	1.28	.001	.67
BDI-II Cognitive	57.16	13.41	1.27	.001	.40
HADS Anxiety	154.89	35.99	1.34	.001	.64
HADS Depression	87.87	14.66	1.38	.001	.42
SSQoL Total	17752.11	60.75	1.15	.001	.75
SSQoL Mobility	288.30	9.96	1.10	.004	.33
SSQoL Energy	140.37	15.74	1.12	.001	.44
SSQoL Upper extremity	76.71	8.76	1.05	.01	.31
SSQoL Work productivity	47.44	14.22	1.13	.001	.42
SSQoL Mood	170.13	6.94	1.21	.01	.26
SSQoL Self Care	40.73	26.42	1.10	.001	.57
SSQoL Social Roles	452.55	21.80	1.10	.001	.52
SSQoL Family Role	169.76	19.18	1.12	.001	.49
SSQoL Vision	12.80	5.75	1.30	.02	.22
SSQoL Language	12.69	3.01	1.10	.09	.13
SSQoL Thinking	142.48	24.12	1.10	.001	.55
SSQoL Personality	342.44	26.42	1.10	.001	.57
SF-36 Physical Function	2098.01	13.66	1.26	.001	.51
SF-36 Role Physical	10283.84	73.91	1.71	.001	.85
SF-36 Bodily Pain	1069.56	3.51	1.26	.001	.85
SF-36 General Health	818.06	5.34	1.62	.014	.21
SF-36 Vitality	3436.38	21.54	1.34	.001	.52
SF-36 Social Functioning	2778.55	5.35	1.56	.01	.21
SF-36 Role Emotional	3309.90	11.31	1.42	.001	.36
SF-36 Mental Health	2286.25	10.90	1.63	.001	.35
SF-36 PCS	4.15	19.95	1.32	.001	.50
SF-36 MCS	7.39	9.38	1.43	.002	.32
ZBI Role Burden	27.10	2.85	1.27	.11	.21
ZBI Personal Burden	1.08	.64	1.28	.48	.16
DBRI Psychotic	.24	.76	1.62	.46	.07
DBRI Difficult	9.25	1.57	1.16	.24	.13
DBRI Emotional	50.90	7.95	1.15	.01	.42
DBRI Repetitive	3.56	4.00	1.00	.07	.27
Lawton Total	28.12	5.80	1.16	.03	.35
Lawton Basic	2.72	4.12	1.0	.07	.27
Lawton Instrumental	14.04	4.50	1.19	.05	.29
HPLP Total	50.55	1.66	1.10	.23	.14

In order to determine the source of significance in the variance analysis, post hoc analysis between times 1, 2 and 3 was completed. Tables 28 through 77 depict the comparisons between time 1 and 2, time 2 and 3, and time 1 and 3 for each of the indices used. Critical t-values were used to accept the null hypothesis (i.e., that is no difference between assessment times) or reject the null hypothesis (i.e., that is a difference between assessment times). It was hypothesized that, should the program be effective, both in the short term and over time, one would see the pattern of rejecting the null hypothesis between times 1 and 2 and times 1 and 3, but not between 2 and 3 (i.e., gains were maintained over the 3-month period).

Affective Scales

All BDI-II scales fit the pattern of prediction, in that scores from times 2 and 3 were significantly lower than time 1 (fewer depressive symptoms endorsed; $t_{obt} > 2.58$) and there was no significant difference between time 2 and follow-up ($t_{obt} < 2.58$), indicating that gains were maintained (Tables 28 – 30). The BAI total score, neurophysiological scale, and subjective scale all fit the hypothesized pattern with significant difference between times 1 and 2 and times 1 and 3 ($t_{obt} > 2.58$), but not between times 2 and 3 ($t_{obt} < 2.58$). See Tables 31-35. The BAI panic and autonomic scales (Tables 34 and 35) showed no significant change on any of the comparisons (times 1, 2 or 3), with all obtained t-values being greater than the critical t-value of 2.58 and 2.61, respectively. The HADS anxiety and depression scale scores also fit the pattern of improvement from time 1 ($t_{obt} > 2.54$) with no change/decline at time 3 ($t_{obt} < 2.54$; see Tables 36 and 37).

Table 28
Post hoc Protected t-test with Bonferroni Correction for BDI-II Total Score

BDI-II Total	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	12.10 (7.14)	3.48 (3.63)	--	5.90	2.58	Reject
t_2 vs t_3	--	3.48 (3.63)	4.33 (3.67)	0.58	2.58	Fail to reject
t_1 vs t_3	12.10 (7.14)	--	4.33 (3.67)	5.32	2.58	Reject

Table 29
Post hoc protected t-test with Bonferroni correction for BDI-II Somatic Scale

BDI-II Somatic	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	8.43 (4.84)	2.24 (2.34)	--	6.62	2.58	Reject
t_2 vs t_3	--	2.24 (2.34)	2.90 (2.41)	0.71	2.58	Fail to reject
t_1 vs t_3	8.43 (4.84)	--	2.90 (2.41)	5.91	2.58	Reject

Table 30
Post hoc Protected t-test with Bonferroni Correction for BDI-II Cognitive Scale

BDI-II Cognitive	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	3.67 (2.82)	1.24 (1.48)	--	3.82	2.58	Reject
t_2 vs t_3	--	1.24 (1.48)	1.57 (1.46)	0.52	2.58	Fail to reject
t_1 vs t_3	3.67 (2.82)	--	1.57 (1.46)	3.30	2.58	Reject

Table 31
Post hoc protected t-test with Bonferroni correction for BAI Total Scale

BAI Total Score	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_0
t_1 vs t_2	9.67 (7.15)	4.38 (2.48)	--	3.72	2.58	Reject
t_2 vs t_3	--	4.38 (2.48)	3.75 (2.83)	0.44	2.58	Fail to reject
t_1 vs t_3	9.67 (7.15)	--	3.75 (2.83)	4.16	2.58	Reject

Table 32
Post hoc Protected t-test with Bonferroni Correction for BAI Neurophysiological Scale

BAI Neurophysiological	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_0
t_1 vs t_2	3.67 (2.92)	1.67 (1.59)	--	4.70	2.50	Reject
t_2 vs t_3	--	1.67 (1.59)	2.63 (1.91)	0.44	2.50	Fail to reject
t_1 vs t_3	3.67 (2.92)	--	2.63 (1.91)	4.17	2.50	Reject

Table 33
Post hoc Protected t-test with Bonferroni Correction for BAI Subjective Scale

BAI Subjective	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_0
t_1 vs t_2	3.12 (2.62)	0.71 (1.10)	--	3.81	2.58	Reject
t_2 vs t_3	--	0.71 (1.10)	0.86 (0.85)	0.24	2.58	Fail to reject
t_1 vs t_3	3.12 (2.62)	--	0.86 (0.85)	3.57	2.58	Reject

Table 34
Post hoc Protected t-test with Bonferroni Correction for BAI Panic Scale

BAI Panic	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	1.29 (1.76)	0.43 (0.98)	--	2.14	2.58	Fail to reject
t_2 vs t_3	--	0.43 (0.98)	0.29 (0.78)	0.35	2.58	Fail to reject
t_1 vs t_3	1.29 (1.76)	--	0.29 (0.78)	2.45	2.58	Fail to reject

Table 35
Post hoc Protected t-test with Bonferroni Correction for BAI Autonomic Scale

BAI Autonomic	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	1.29 (2.12)	0.67 (0.91)	--	1.23	2.61	Fail to reject
t_2 vs t_3	--	0.67 (0.91)	0.29 (0.56)	0.75	2.61	Fail to reject
t_1 vs t_3	1.29 (2.12)	--	0.29 (0.56)	1.98	2.61	Fail to reject

Table 36
Post hoc Protected t-test with Bonferroni Correction for HADS Anxiety Scale

HADS Anxiety	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	5.81 (3.39)	1.67 (1.91)	--	6.77	2.54	Reject
t_2 vs t_3	--	1.67 (1.91)	2.33 (2.01)	1.08	2.54	Fail to reject
t_1 vs t_3	5.81 (3.39)	--	2.33 (2.01)	5.56	2.54	Reject

Table 37
Post hoc Protected t-test with Bonferroni Correction for HADS Depression Scale

HADS Depression	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	5.62 (4.00)	2.52 (2.42)	--	4.10	2.54	Reject
t_2 vs t_3	--	2.52 (2.42)	2.86 (2.22)	0.45	2.54	Fail to reject
t_1 vs t_3	5.62 (4.00)	--	2.86 (2.22)	3.65	2.54	Reject

Coping Style/Attitude Scales

The MASS scales (Tables 38-40) were also included in the analysis to determine if attitude and coping style would also be amenable to change. While it is often argued that these constructs are typically fixed dispositional qualities, it was hypothesized that two of the scales, namely, anxious preoccupation and helplessness/hopelessness, would show a lower degree of intensity should mood and the ability to cope with frustrations and stressors improve. Fighting spirit and fatalism were not anticipated to change as these scales do not contain items that reflect mood.

Through analysis, it was found that the Fighting Spirit and Helplessness/Hopelessness scores improved after completion of the program and the gains were maintained at time 3 (t_{obt} < 2.61 and 2.58, respectively; see Tables 38 and 39). There were no differences in scores on the Anxious Preoccupation and the Fatalism scales with the obtained t-score greater than the critical t-value of 2.61 and 2.58, respectively (refer to Tables 40 and 41).

Table 38
Post hoc Protected t-test with Bonferroni Correction for MASS Fighting Spirit Scale

MASS Fighting Spirit	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	48.62 (6.49)	53.62 (4.80)	--	3.04	2.61	Reject
t_2 vs t_3	--	53.62 (4.80)	54.14 (5.31)	0.32	2.61	Fail to reject
t_1 vs t_3	48.62 (6.49)	--	54.14 (5.31)	3.36	2.61	Reject

Table 39
Post hoc Protected t-test with Bonferroni Correction for MASS Helplessness/Hopelessness Scale

MASS Help/Hopelessness	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	9.95 (4.36)	7.42 (1.89)	--	3.57	2.58	Reject
t_2 vs t_3	--	7.42 (1.89)	7.33 (2.33)	0.13	2.58	Fail to reject
t_1 vs t_3	9.95 (4.36)	--	7.33 (2.33)	3.70	2.58	Reject

Table 40
Post hoc Protected t-test with Bonferroni Correction for MASS Anxious Preoccupation Scale

MASS Anxious Preoccupation	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	26.43 (9.50)	22.67 (2.75)	--	1.45	2.61	Fail to reject
t_2 vs t_3	--	22.67 (2.75)	22.52 (2.52)	0.06	2.61	Fail to reject
t_1 vs t_3	26.43 (9.50)	--	22.52 (2.52)	1.50	2.61	Fail to reject

Table 41
Post hoc Protected t-test with Bonferroni Correction for MASS Fatalism Scale

MASS Fatalism	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	20.33 (4.10)	18.86 (4.10)	--	1.61	2.58	Fail to reject
t_2 vs t_3	--	18.86 (4.10)	19.38 (4.50)	0.57	2.58	Fail to reject
t_1 vs t_3	20.33 (4.10)	--	19.38 (4.50)	1.04	2.58	Fail to reject

Quality of Life

Within the SSQoL Scale it was expected that scores on the majority of scales would fit the pattern of improvement and be maintained over the 3-month period, provided that participants maintain some form of practice. Scales not predicted to change included language, mobility, self-care, upper extremity functioning and vision, providing that the participants had reached a plateau in their physical recovery from stroke.

Results of post hoc analysis for the SSQoL scales are found in Tables 42 to 54. Generally, the hypothesis was accurate, with a few exceptions. As expected, the total, energy, family roles, personality, social roles, thinking and work productivity scale scores were improved at time 2 (as compared to time 1 scores) and this was maintained at time 3 (i.e., with no significant difference between scores at time 2 and 3). Also as expected, language and vision scale scores did not reflect any change after completion of the program or over time ($t_{obt} < 2.61$).

In terms of the exceptions found, the mobility scale and upper extremity scale scores were observed to remain relatively close between time 1 and time 2, and not significantly different between time 2 and 3. When times 1 and 3 were compared, however, a significant difference pointing toward improvement was observed with both scales. Another exception to the predicted pattern involved the mood scale score. While there was a trend toward improvement following completion of the program as well as at follow-up, this was not significant ($t_{obt} < 2.61$). The final exception was opposite to the prediction in that the self-care scale was found to improve at time 2 and this was maintained at time 3 ($t_{obt} > 2.58$).

Table 42
Post hoc protected t-test with Bonferroni correction for SSQoL Total Scale

SSQoL Total	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	285.95 (37.05)	321.81 (38.31)	--	6.80	2.58	Reject
t_2 vs t_3	--	321.81 (38.31)	326.19 (38.84)	7.63	2.58	Fail to reject
t_1 vs t_3	285.95 (37.05)	--	326.19 (38.84)	1.04	2.58	Reject

Table 43
Post hoc protected t-test with Bonferroni correction for SSQoL Energy Scale

SSQoL Energy	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	12.24 (4.13)	15.24 (3.83)	--	3.26	2.58	Reject
t_2 vs t_3	--	15.24 (3.83)	15.86 (3.93)	0.67	2.58	Fail to reject
t_1 vs t_3	12.24 (4.13)	--	15.86 (3.93)	3.93	2.58	Reject

Table 44
Post hoc protected t-test with Bonferroni correction for SSQoL Family Roles Scale

SSQoL Family Roles	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	27.57 (8.75)	31.0 (7.74)	--	3.74	2.61	Reject
t_2 vs t_3	--	31.0 (7.74)	31.48 (7.35)	0.52	2.61	Fail to reject
t_1 vs t_3	27.57 (8.75)	--	31.48 (7.35)	4.26	2.61	Reject

Table 45
Post hoc protected t-test with Bonferroni correction for SSQoL Language Scale

SSQoL Language	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	31.67 (6.04)	32.52 (5.65)	--	1.34	2.61	Fail to reject
t_2 vs t_3	--	32.52 (5.65)	32.76 (5.48)	0.40	2.61	Fail to reject
t_1 vs t_3	31.67 (6.04)	--	32.76 (5.48)	1.72	2.61	Fail to reject

Table 46
Post hoc Protected t-test with Bonferroni Correction for SSQoL Mobility Scale

SSQoL Mobility	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	45.38 (12.10)	49.71 (10.28)	--	2.61	2.61	Fail to reject
t_2 vs t_3	--	49.71 (10.28)	50.48 (10.13)	0.46	2.61	Fail to reject
t_1 vs t_3	45.38 (12.10)	--	50.48 (10.13)	3.07	2.61	Reject

Table 47
Post hoc Protected t-test with Bonferroni Correction for SSQoL Mood Scale

SSQoL Mood	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	29.91 (6.95)	33.62 (5.60)	--	2.43	2.61	Fail to reject
t_2 vs t_3	--	33.62 (5.60)	33.57 (5.15)	0.03	2.61	Fail to reject
t_1 vs t_3	29.91 (6.95)	--	33.57 (5.15)	2.40	2.61	Fail to reject

Table 48
Post hoc Protected t-test with Bonferroni Correction for SSQoL Personality Scale

SSQoL Personality	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	11.48 (5.14)	16.38 (3.57)	--	4.41	2.61	Reject
t_2 vs t_3	--	16.38 (3.57)	16.81 (3.40)	0.39	2.61	Fail to reject
t_1 vs t_3	11.48 (5.14)	--	16.81 (3.40)	4.80	2.61	Reject

Table 49
Post hoc protected t-test with Bonferroni correction for SSQoL Self Care Scale

SSQoL Self Care	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	34.67 (4.31)	36.57 (3.76)	--	3.93	2.58	Reject
t_2 vs t_3	--	36.57 (3.76)	36.57 (3.92)	0.00	2.58	Fail to reject
t_1 vs t_3	34.67 (4.31)	--	36.57 (3.92)	3.93	2.58	Reject

Table 50
Post hoc protected t-test with Bonferroni correction for SSQoL Social Roles Scale

SSQoL Social Roles	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	19.76 (7.85)	25.29 (6.07)	--	3.93	2.58	Reject
t_2 vs t_3	--	25.29 (6.07)	26.10 (5.82)	0.58	2.58	Fail to reject
t_1 vs t_3	19.76 (7.85)	--	26.10 (5.82)	4.51	2.58	Reject

Table 51

Post hoc protected t-test with Bonferroni correction for SSQoL Thinking Scale

SSQoL Thinking	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	11.29 (3.12)	14.43 (2.25)	--	4.18	2.58	Reject
t_2 vs t_3	--	14.43 (2.25)	14.81 (2.11)	0.51	2.58	Fail to reject
t_1 vs t_3	11.29 (3.12)	--	14.81 (2.11)	4.69	2.58	Reject

Table 52

Post hoc Protected t-test with Bonferroni Correction for SSQoL Upper Extremity Scale

SSQoL Upper Extremity	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	36.33 (8.75)	38.57 (7.93)	--	2.45	2.61	Fail to reject
t_2 vs t_3	--	38.57 (7.93)	38.86 (7.95)	0.32	2.61	Fail to reject
t_1 vs t_3	36.33 (8.75)	--	38.86 (7.95)	2.77	2.61	Reject

Table 53

Post hoc protected t-test with Bonferroni correction for SSQoL Vision Scale

SSQoL Vision	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	16.76 (4.56)	17.71 (3.81)	--	2.10	2.58	Fail to reject
t_2 vs t_3	--	17.71 (3.81)	17.95 (3.23)	0.52	2.58	Fail to reject
t_1 vs t_3	16.76 (4.56)	--	17.95 (3.23)	2.57	2.58	Fail to reject

Table 54
Post hoc Protected t-test with Bonferroni Correction for SSQoL Work Productivity Scale

SSQoL Work Productivity	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	8.91 (3.46)	10.76 (3.25)	--	3.28	2.58	Reject
t_2 vs t_3	--	10.76 (3.25)	10.95 (3.19)	0.34	2.58	Fail to reject
t_1 vs t_3	8.91 (3.46)	--	10.95 (3.19)	3.62	2.58	Reject

With respect to the SF-36 component and scale scores it was anticipated that no changes would be observed in the Physical Component Scale, physical functioning, role physical, or bodily pain. The general health scale (which contributes to the overall PCS score) was anticipated to be positively influenced by mood state (which was predicted to improve) as items on this scale carry an affective component. The Mental Component Scale and the contributing vitality, role emotional and mental health scale scores were anticipated to improve following completion of the program and to be maintained over time (providing participants engaged in practicing of what was learned in the program). The social functioning scale was not predicted to improve dramatically as there is a physical component to the items contributing to the scale.

In terms of the physical components of the SF-36 the bodily pain (Table 55) scale scores fit with the prediction that no change would occur within the time 1, 2 and 3 comparisons with the obtained t-scores not reaching the critical values of 2.61 and 2.58, respectively. Unexpectedly, improvement was seen in the PCS (Table 56), the physical functioning (Table 57), and role physical scales (Table 58) at time 2 and these gains were maintained at the follow-up 3 months later. The general health scale score (Table 59) was

found to improve at time 2 ($t_{obt} > 2.54$), however this was not maintained at time 3 ($t_{obt} < 2.54$).

Table 55
Post hoc Protected t-test with Bonferroni Correction for SF-36 Bodily Pain

SF-36 Bodily Pain	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	71.19 (32.50)	78.90 (26.75)	--	1.36	2.58	Fail to reject
t_2 vs t_3	--	78.90 (26.75)	82.24 (23.77)	0.62	2.58	Fail to reject
t_1 vs t_3	71.19 (32.50)	--	82.24 (23.77)	2.05	2.58	Fail to reject

Table 56
Post hoc Protected t-test with Bonferroni Correction for SF-36 Physical Component Score

SF-36 PCS	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	39.16 (6.21)	46.78 (7.73)	--	8.32	2.58	Reject
t_2 vs t_3	--	46.78 (7.73)	45.73 (8.74)	1.13	2.58	Fail to Reject
t_1 vs t_3	39.16 (6.21)	--	45.73 (8.74)	7.01	2.58	Reject

Table 57
Post hoc Protected t-test with Bonferroni Correction for SF-36 Physical Functioning

SF-36 Physical	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	65.24 (18.81)	80.00 (19.87)	--	3.86	2.58	Reject
t_2 vs t_3	--	80.00 (19.87)	76.61 (22.10)	0.89	2.58	Fail to reject
t_1 vs t_3	65.24 (18.81)	--	76.61 (22.10)	2.97	2.58	Reject

Table 58
Post hoc Protected t-test with Bonferroni Correction for SF-36 Role Physical

SF-36 Role Physical	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_0
t_1 vs t_2	38.10 (21.09)	73.81 (19.02)	--	9.81	2.54	Reject
t_2 vs t_3	--	73.81 (19.02)	73.21 (18.76)	0.17	2.54	Fail to reject
t_1 vs t_3	38.10 (21.09)	--	73.21 (18.76)	9.65	2.54	Reject

Table 59
Post hoc Protected t-test with Bonferroni Correction for SF-36 General Health

SF-36 General Health	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_0
t_1 vs t_2	61.67 (21.79)	72.76 (15.91)	--	2.90	2.54	Reject
t_2 vs t_3	--	72.76 (15.91)	68.76 (18.28)	1.05	2.54	Fail to reject
t_1 vs t_3	61.67 (21.79)	--	68.76 (18.28)	1.86	2.54	Fail to reject

In terms of the mental components of the SF-36, the MCS (Table 60) vitality (Table 61), role emotional (Table 62), and mental health (Table 63) scale scores fit with the prediction that improvement (i.e., higher scores) would occur between the time 1 and 2 comparisons and this would be maintained at time 3 ($t_{obt} > 2.54$). With respect to the social functioning scale, improvement was seen in this domain at time 2 ($t_{obt} > 2.54$), however this was not maintained at assessment three months later (see Tables 64).

Table 60
Post hoc Protected t-test with Bonferroni Correction for SF-36 Mental Component Score

SF-36 MCS	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	48.55 (10.14)	56.10 (6.40)	--	3.30	2.54	Reject
t_2 vs t_3	--	56.10 (6.40)	53.96 (10.60)	0.29	2.54	Fail to reject
t_1 vs t_3	48.55 (10.14)	--	53.96 (10.60)	3.01	2.54	Reject

Table 61
Post hoc Protected t-test with Bonferroni Correction for SF-36 Vitality

SF-36 Vitality	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	48.81 (19.63)	66.67 (18.89)	--	4.58	2.54	Reject
t_2 vs t_3	--	66.67 (18.89)	67.26 (2.59)	0.15	2.54	Fail to reject
t_1 vs t_3	48.81 (19.63)	--	67.26 (2.59)	4.73	2.54	Reject

Table 62
Post hoc Protected t-test with Bonferroni Correction for SF-36 Role Emotional

SF-36 Role Emotional	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	71.03 (23.37)	87.30 (15.05)	--	3.08	2.54	Reject
t_2 vs t_3	--	87.30 (15.05)	90.87 (11.15)	0.68	2.54	Fail to reject
t_1 vs t_3	71.03 (23.37)	--	90.87 (11.15)	3.76	2.54	Reject

Table 63
Post hoc Protected t-test with Bonferroni Correction for SF-36 Mental Health

SF-36 Mental Health	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	66.91 (15.53)	84.76 (11.12)	--	3.99	2.54	Reject
t_2 vs t_3	--	84.76 (11.12)	80.95 (15.30)	0.85	2.54	Fail to reject
t_1 vs t_3	66.91 (15.53)	--	80.95 (15.30)	3.14	2.54	Reject

Table 64
Post hoc protected t-test with Bonferroni correction for SF-36 Social Functioning

SF-36 Social Functioning	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	68.45 (26.99)	88.10 (19.15)	--	2.79	2.54	Reject
t_2 vs t_3	--	88.10 (19.15)	82.73 (22.87)	0.76	2.54	Fail to reject
t_1 vs t_3	68.45 (26.99)	--	82.73 (22.87)	2.03	2.54	Fail to reject

Participant scores on the SF-36 were also compared to the Canadian Normative Data according to sex and age group (Hopman et al., 2000). As shown in Table 65 statistical comparisons for each gender and within the respective age range for the group mean (age 55 – 74) were completed for both the initial and post-assessments. Initially, the males had statistically lower scores (as compared to the normative data) in the areas of role physical, vitality and social functioning. The females had lower scores in the areas of physical functioning, role physical, vitality, and mental health. At time 2, there were no significant difference between group and normative data.

Table 65
Statistical Comparisons Between Genders and Respective SF-36 Canadian Norms

SF-36 Subscale by Gender	Time 1 z-score	Time 1 Percentile (%)	Standard Deviation – Clinical Significance	Time 2 z-score	Time 2 Percentile (%)	Standard Deviation Significance
Females						
Physical Functioning	-1.18	12	> 1SD	-.12	45	NS
Role physical	-1.10	13	> 1SD	-.07	47	NS
Bodily pain	-0.28	39	NS	.08	53	NS
General health	-0.24	40	NS	-.04	48	NS
Vitality	-1.0	16	>1SD	.26	61	NS
Social functioning	-0.57	26	NS	.27	61	NS
Role emotional	-0.23	42	NS	.25	59	NS
Mental health	-1.17	12	> 1SD	.66	75	NS
Males						
Physical Functioning	-0.66	25	NS	-.15	45	NS
Role physical	-1.16	13	> 1SD	-.34	37	NS
Bodily pain	-0.25	40	NS	.20	58	NS
General health	-0.86	19	NS	-.24	40	NS
Vitality	-1.17	12	> 1SD	-.38	35	NS
Social functioning	-1.25	10	> 1SD	-.28	39	NS
Role emotional	-0.42	34	NS	.06	53	NS
Mental health	-0.78	22	NS	.10	54	NS

NS = Not significant

Effectiveness: Caregivers

While the repeated measures analysis of the caregiver scales indicated overall significance of change on the DBRI emotional scale and the Lawton total and instrumental scales, post hoc analysis failed to indicate specific points of difference for this change. Post hoc analysis results for the caregiver indices are outlined in Tables 66 to 77.

Table 66
Post hoc Protected t-test with Bonferroni Correction for Caregiver SF-36 Physical Component Score

SF-36 PCS - caregiver	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	47.38 (9.63)	48.41 (6.53)	--	-0.46	2.78	Fail to reject
t_2 vs t_3	--	48.41 (6.53)	48.96 (6.15)	0.59	2.78	Fail to reject
t_1 vs t_3	47.38 (9.63)	--	48.96 (6.15)	-1.04	2.78	Fail to reject

Table 67
Post hoc Protected t-test with Bonferroni Correction for Caregiver SF-36 Mental Component Score

SF-36 MCS - caregiver	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	52.68 (11.66)	53.90 (7.15)	--	.46	2.78	Fail to reject
t_2 vs t_3	--	53.90 (7.15)	55.78 (5.65)	0.69	2.78	Fail to reject
t_1 vs t_3	52.68 (11.66)	--	55.78 (5.65)	1.14	2.78	Fail to reject

Table 68
Post hoc Protected t-test with Bonferroni Correction for ZBI Role Burden

ZBI role burden	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	9.08 (4.89)	6.83 (4.67)	--	1.71	2.78	Fail to reject
t_2 vs t_3	--	6.83 (4.67)	7.25 (3.72)	0.32	2.78	Fail to reject
t_1 vs t_3	9.08 (4.89)	--	7.25 (3.72)	1.39	2.78	Fail to reject

Table 69
Post hoc Protected t-test with Bonferroni Correction for ZBI Personal Burden

ZBI personal burden	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	3.17 (2.91)	2.75 (1.86)	--	0.76	2.69	Fail to reject
t_2 vs t_3	--	2.75 (1.86)	2.75 (1.82)	0.00	2.69	Fail to reject
t_1 vs t_3	3.17 (2.91)	--	2.75 (1.82)	0.76	2.69	Fail to reject

Table 70
Post hoc Protected t-test with Bonferroni Correction DBRI Emotional Scale

DBRI emotional	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	6.67 (5.19)	4.00 (3.61)	--	2.48	2.78	Fail to reject
t_2 vs t_3	--	4.00 (3.61)	3.92 (3.45)	0.07	2.78	Fail to reject
t_1 vs t_3	6.67 (5.19)	--	3.92 (3.45)	2.56	2.78	Fail to reject

Table 71
Post hoc Protected t-test with Bonferroni Correction DBRI Repetitive Behaviour Scale

DBRI repetitive behaviour	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	2.83 (2.92)	2.17 (2.29)	--	1.64	2.78	Fail to reject
t_2 vs t_3	--	2.17 (2.29)	2.17 (2.29)	0.00	2.78	Fail to reject
t_1 vs t_3	2.83 (2.92)	--	2.17 (2.29)	1.64	2.78	Fail to reject

Table 72
Post hoc Protected t-test with Bonferroni Correction DBRI Psychiatric Scale

DBRI psychiatric	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	0.17 (0.39)	0.42 (0.99)	--	1.04	2.61	Fail to reject
t_2 vs t_3	--	0.42 (0.99)	0.25 (0.62)	0.71	2.61	Fail to reject
t_1 vs t_3	0.17 (0.39)	--	0.25 (0.62)	.332	2.61	Fail to reject

Table 73
Post hoc Protected t-test with Bonferroni Correction DBRI Difficult Behaviour Scale

DBRI difficult behaviour	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	3.5 (3.66)	2.75 (3.67)	--	0.72	2.78	Fail to reject
t_2 vs t_3	--	2.75 (3.67)	2.17 (2.66)	0.56	2.78	Fail to reject
t_1 vs t_3	3.5 (3.66)	--	2.17 (2.66)	1.28	2.78	Fail to reject

Table 74
Post hoc Protected t-test with Bonferroni Correction Lawton Total Score

Lawton total	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	49.08 (8.22)	50.92 (8.33)	--	1.96	2.78	Fail to reject
t_2 vs t_3	--	50.92 (8.33)	51.25 (8.24)	0.35	2.78	Fail to reject
t_1 vs t_3	49.08 (8.22)	--	51.25 (8.24)	2.31	2.78	Fail to reject

Table 75
Post hoc Protected t-test with Bonferroni Correction Lawton Basic Scale

SF-36 Lawton basic	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	25.25 (3.19)	25.83 (3.21)	--	1.67	2.78	Fail to reject
t_2 vs t_3	--	25.83 (3.21)	25.83 (3.21)	0.00	2.78	Fail to reject
t_1 vs t_3	25.25 (3.19)	--	25.83 (3.21)	1.67	2.78	Fail to reject

Table 76
Post hoc Protected t-test with Bonferroni Correction Lawton Instrumental Scale

Lawton instrumental	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	23.83 (5.51)	25.08 (5.58)	--	1.65	2.78	Fail to reject
t_2 vs t_3	--	25.08 (5.58)	25.42 (5.57)	0.45	2.78	Fail to reject
t_1 vs t_3	23.83 (5.51)	--	25.42 (5.57)	2.10	2.78	Fail to reject

Table 77
Post hoc Protected t-test with Bonferroni Correction HPLP Total Scale

HPLP Total	Mean t_1 (SD)	Mean t_2 (SD)	Mean t_3 (SD)	t_{obt}	t_{crit}	H_o
t_1 vs t_2	110.36 (18.76)	113.09 (20.21)	--	1.15	2.87	Fail to reject
t_2 vs t_3	--	113.09 (20.21)	112.91 (19.99)	0.08	2.87	Fail to reject
t_1 vs t_3	110.36 (18.76)	--	112.91 (19.99)	1.08	2.87	Fail to reject

Discussion

The purpose of the present section was to evaluate the effectiveness of the MBCT program with a group of individuals who have had a stroke. Segal and colleagues (2002) described initial trials for MBCT in the treatment and prevention of depression in a clinical non-stroke population as very effective, with a relapse rate of 37% as compared to the 66% relapse rate for individuals receiving treatment as usual. Until now, there has been no published implementation or evaluation of MCBT with individuals who have sustained a stroke.

The sample of participants in the present study is representative of the general stroke population in the region in terms of age and gender. Specifically, the sample was comprised of 26% females, only 1% more than that reported by Sarti and colleagues (2000). Also, the average age at time of stroke was comparable with the mean age in the epidemiological studies mentioned at the beginning of this paper.

Phase I involved a preliminary control arm that served to provide a benchmark for putative change when both Fall and Winter participant group data were combined. In this analysis, the participants showed improvement in symptoms related to anxiety and depression on all measures, although findings on the BAI were not as strong. It is felt that the range in variability in the participants' responses contributed to this, but that positive improvement indicators would be evident with increased sample (power). Quality of life indices reflected improvement in both physical and psychological components of the SF-36 and the SSQoL. It was interesting to find that the Mental Component Summary (MCS) change score was not significantly greater in the participants as compared to the controls. Closer evaluation of item content revealed that subscales comprising the MCS that had not

significantly improved (i.e., social functioning, role emotional, and mental health) contained items that were vague, but when items of similar content were articulated in "stroke specific" language on the SSQoL, positive change occurred (i.e., Personality: irritability, impatience; Social Roles: social activities, hobbies, recreation, intercourse). From this it is proposed that items specific and relevant to individuals with stroke tend to be given more thought and endorsement. The SF-36 mental component items did not reflect the range specific symptoms of anxiety or emotional loss. Of note, the SSQoL Mood subscale change score did not reach significance. The 8 items on this subscale are hard features of depression and given the relatively healthy baseline level of the participants, there was a floor effect. It is clear that the BDI-II is a more sensitive and specific measure, which was able reflect change. Altogether, the findings show that change occurred in the participant group but not the control group and this change took place over the 8 week MBCT intervention period. Again, the power of this assertion is limited by the small sample sizes, however this created a sufficient base on which to implement the Winter program and amalgamate the data of both participant groups.

As outlined in the results section for Phase II, significant positive overall changes were seen on all but two of the participant indices. One exception was on the BAI autonomic subscale. One can see that the mean score at time 1 was very low and non clinical (i.e., 1.29 out of a possible 12) leaving little room for change. The other exception was the SSQoL language subscale. Again, the sample had relatively little difficulty with speech and communication (i.e., average score at time 1 was 31.67 out of a possible 35). Also, one would not expect the intervention to have a direct effect on language production or

intelligibility, but improvement in the participant's response to difficulty when communicating and sense of self should be seen.

Through post hoc analysis the pattern of scores that reflect a significant difference between time 1 and 2, and time 1 and 3, but not 2 and 3 translates into the statement that a significant positive change occurred over the period of time that the program ran and this change was maintained (but did not continue to improve) at the 3-month follow up. This pattern is the ideal one to find when the intention is to show change that resulted from the intervention. It is important to highlight the importance of the maintenance of improvement for the majority of participants at the time of follow-up.

The anticipated pattern was observed for all affective subscales on the BDI-II and the HADS and for the BAI total, neurophysiological and subjective subscales. No significant change was observed between periods on the BAI panic or autonomic scales. Again, the argument can be made that very few symptoms of panic or autonomic anxiety were present initially, thus leaving little variance for change. In addition to determining whether or not the measures were responsive and sensitive to change, further analysis set out to identify instruments that were superior in terms of responsiveness. In general, there was no significant difference between the BAI and HADS anxiety subscale or between the BDI-II and the HADS depression subscale. In previous research by Aben and colleagues (2002), the sensitivity and specificity has not been found to be substantially different for HADS as compared to BDI-II in identifying symptoms in stroke patients. The BDI-II came out on top with respect to responsiveness when compared to aspects of the SSQoL that related to mood and when compared to the SF-36 MCS. This lends further support to the assertion that

depression is one of the most important determinants of low QoL after stroke (Kauhanen et al., 2000).

Post hoc analysis of the MASS subscales revealed improvement that was maintained in the fighting spirit and the helplessness/hopelessness scales, but not the anxious preoccupation or the fatalism scales. This finding was interesting as it speaks to the malleability of attitudes, likely secondary to improvement in mood. It is cognitively incongruent to have thoughts of helplessness or hopelessness with positive changes occurring. Further, with the positive inner changes, hope and optimism are instilled and feed the development of a fighting spirit. Lewis and colleagues (2001) found that reduced survival is predicted by negative attitudes toward stroke and illness, but not by depression or anxiety. The present study took this argument two steps further and evaluated how change in depression and anxiety through intervention can improve both negative attitudes and overall QoL.

Researchers have demonstrated that anxiety and depression have a major influence on individual's self-evaluated quality of life (Fruhwald, Loffler, Eher, Saletu, & Baumhackl, 2001; Kauhanen et al., 2000). Along with the positive changes on mood-specific questionnaires, improvement on overall QoL on both the SSQoL and SF-36 was also seen. No significant difference was found between the SSQoL total and the SF-36 MCS, however the SSQoL total was found to be more responsive than the SF-36 PCS, suggesting that overall, the specific QoL instrument was better than the generic one. As Wiebe and colleagues have suggested (2003), this finding supports the notion that, overall, specific QoL instruments are more responsive than generic tools.

The general pattern of maintained improvement after the MBCT intervention was seen on most SSQoL subscales. Anticipated exceptions to this included no change to the vision and language subscales. Interestingly, no change was found at any time on the SSQoL mood scale. Because the measures specifically designed to assess mood (e.g., BDI-II, HADS) did demonstrate change, it is felt that the 8-item mood scale may not be comprehensive enough. This was alluded to earlier in Section III. Notably, the personality subscale of the SSQoL, which has items that reflect irritability and impatience, did follow the anticipated improvement pattern. Two other unexpected change patterns occurred. Specifically, the SSQoL mobility and upper extremity functioning scales demonstrated no change between time 1 and 2, or between time 2 and 3, however significant change was found at time 3 as compared to time 1. A number of explanations could be made for this finding, however the most reasonable would appear to be that the physical improvements occurred subsequent to improvement in mood and this may or may not be an independent process.

The participant's SF-36 scores were compared to Canadian normative data according to gender and age. At time 1, the females were significantly lower than their cohorts on the scales of physical functioning, role physical, vitality and mental health. The males were significantly lower on role physical, vitality, and social functioning. At time 2, there were no observed differences between the participant scores and the normative data, indicating that the participants were now experiencing an overall QoL similar to their peers. Evidently, change occurred. The expected improvement pattern was observed on all SF-36 mental aspects of health, with the slight exception on the social functioning scale where improvement was made at time 2, but this was not maintained at time 3. Because the aim of

the MBCT program was not to effect change in physical health, it is not surprising that only small to moderate effect sizes were observed on the physically oriented indices. As expected, no overall change occurred the bodily pain scale or the general health perceptions scale of the SF-36. Interestingly, scores on the overall physical component score (PCS), physical functioning scale, and role physical scale improved and this was maintained at the 3-month follow up. With respect to the physical changes, some participants made qualitative comments that point toward the possibility that with improved mood and improved fighting spirit attitude, more efforts were made to try more physical activities. It is postulated that the participants learned, through the program, to acknowledge and accept what is there and make changes to set attainable goals. These areas of intrinsic motivation and personality factors require further investigation.

On the overall evaluation of effectiveness with the caregivers, only the DBRI emotional subscale and the Lawton total and instrumental scores showed significant positive change. The remaining caregiver indexes at time 1 generally reflected a low level of burden and a high level of independence on the part of the participants, suggesting that there was little room for improvement in these areas. In addition to this relative 'ceiling', there were only fifteen caregivers who participated in the assessment periods resulting in a low statistical power. Because any changes that might have occurred would have been small (as level of functioning was already high) a relatively higher number of caregivers would have been needed to attain sufficient power.

It is meaningful that the caregivers observed change in the emotional behaviours of their spouses in that this provides collateral information and support to the participant's responses of improved emotional well-being. The improved Lawton scores may point

toward improved physical abilities (as noted in the participant's scores) that occurred secondary to or in conjunction with the improved emotional changes exhibited by the participants. Unfortunately, these three areas of improvement did not appear to translate into improvement in caregiver burden. Again, the point should be made that the degree of burden reported by the caregivers at time 1 was not great, suggesting little room for positive change. In the post hoc analysis in which a very conservative approach was used, these changes were not detected between assessment periods.

Altogether, it is clear that during the period of implementation of the MBCT program, positive changes emerged across a range of assessment measures, and the majority of these improvements were maintained at follow-up in the participant groups. The initial control arm analysis between the Fall participants and the dropout controls provided support for the role of the MBCT as an impetus for this change. A word of caution is warranted in the interpretation of this, however, as there was no control sample by which to compare both participant groups combined. Nonetheless, the overwhelmingly positive qualitative data lend support for the MBCT treatment effect. As mentioned at the beginning of this section, it was important to differentiate effectiveness from the possibility of natural progression. Controlled repeated trials could only serve to qualify this.

Of course, there are limitations to the sample used in the present study. First and foremost is the absence of a wait-list control group. As previously mentioned, the minimal response from community-based volunteers in the recruiting period precluded the initial plan to use a wait-list control cross over design. Instead, two individual groups completed separate sessions. Non-completing recruited participants who agreed to interview at time 2 served as a control group by which to compare the Fall participant group. The size of the

initial comparison groups are small and this can lend statistical validity to be questioned with the associated low power. Nonetheless, the findings with the Fall participants were consistent with the Winter group and effect sizes were strong. Other limitations relate to threats to internal validity.

In the present study, Phase I involved comparison of a small demographically comparable group with the initial treatment group. Phase II involved evaluating change over time in the completing participants. In both phases there exist threats to internal validity of the findings. Shadish, Cook, and Campbell (2002) argue that quasi-experimental designs (i.e., non-random assignment to groups) can address the concerns of threats to internal validity. One method is to identify and evaluate the plausible threats. Another is to use control by design through multiple control groups, multiple baselines and/or statistical control. There are a number of classic threats to internal validity (for complete review, see Shadish et al., 2002; Vellutino & Schatschneider, 2003). Those that had the potential to be present in the present study include history, maturation, instrumentation, subject selection, statistical regression to the mean, and experimenter bias.

In the present experiment, history (the occurrence of an outside event that could have affected the results; Vellutino & Schatschneider, 2003) was controlled for on a number of levels. First, participants were directly asked about the positive and negative life events that occurred over the testing periods. As mentioned earlier in the paper, there were no overt life events for any of the participants. Second, the time between pre- and post-test and follow up was kept at short as possible and consistent across participants. Third, attendance was taken and each participant completed more than 80% of the sessions, indicating that acquisition

potential was consistent. Fourth, the atmosphere and setting of the individual meeting sessions as well as the group participation sessions were kept constant.

The threat of maturation is a threat to internal validity produced by biological and psychological changes in the individual as a function of the passage of time (Vellutino & Schatschneider, 2003). The intervention was held consistently at the same time of day for both groups (to eliminate variability in arousal, hunger, and fatigue). The function of age could not be controlled in terms of range; however, each individual was tested over the same time frame and therefore "aged" the same amount. Results from Phase I suggest that maturation is not the cause of the improvement noted but it cannot be ruled out, especially for results pertaining to the follow-up period.

Instrumentation threats to internal validity were controlled for on various levels. First all measures were, as psychometrically identified in Section III, reliably sound. Second, inter-rater reliability was addressed with all measures, which were objective in nature, being administered by the same trained rater on all test occasions. Third, all data were scored according to procedure and were not vulnerable to condition. Fourth, all data was recorded on a durable record should re-scoring (or data entry checks) needed to be made.

The subject selection threat to internal validity involves changes due to the differential selection of participants (Vellutino & Schatschneider, 2003). In the case of the present study, all participants were volunteers, which may suggest that these individuals were more proactive in health behaviours, were more independent, and were more likely to be attending to the media press releases or recruitment posters. The only control that could account for partial management of this threat existed in the Phase I control arm, where individuals who were demographically comparable and who were all volunteers were

compared (i.e., dropout controls versus completing participants). However, it remains possible that important individual differences (e.g., motivation to improve) may explain some of the differences observed. A more rigorous design, possibly including an "intent-to-treat" approach is required to fully deal with this issue.

Statistical regression involves any change that can be attributed to the tendency of extremely high or low scores regressing toward the mean (Vellutino & Schatschneider, 2003). In the present study, groups were not identified or selected based on initial test scores, however over repeated trials this may be an issue. In contrasting the control arm with the first group in Phase I, it is evident that the participants did not regress toward the mean (they improved), while the controls remained the same or declined. Again, the small sample size of the control group may have influenced this finding.

The final threat of experimenter and subject bias warrants mention. While it was not possible to have had a naïve research assistant to conduct the testing sessions, it is felt that because standardized protocol (both during intervention and in individual sessions) and objective self-report measures were implemented these biases may have had a limited effect on internal validity. Clearly, a "double-blind" approach would be preferable. However, given the intervention it would not be possible to keep the participants blind to their treatment condition and it may be difficult to prevent disclosure by the participants of their treatment condition to blind raters. These issues are more easily dealt with in a clinical trial involving medications than a trial of a complex intervention.

As mentioned earlier another method to address concerns regarding threats to internal validity is to use control by design through multiple control groups, multiple baselines and/or statistical control (Shadish et al., 2002). Due to participant recruitment response rates the use

of multiple control groups was not feasible. Instead, the data from the dropout control group served as a basis for comparison in the initial investigations of the effectiveness of MBCT. Although sample size was small (directly affecting power), effect sizes were great and allowed for increased confidence in the positive effects of MBCT. Nonetheless, larger and more rigorous studies are required to provide a definite answer.

SECTION V: PREDICTORS OF SUCCESS

The fourth and final purpose of the present study was created with the postulation that different attitudes and demographic characteristics might contribute to the general effectiveness of MBCT as outlined in the previous section. Because each individual responds to serious illness in different ways, the Mental Adjustment to Stroke Scale (MASS) was developed to categorize the attitudes of stroke patients into fighting spirit, helplessness/hopelessness, anxious preoccupation and fatalism (Lewis et al., 2001). While Lewis and colleagues (2001) were able to demonstrate that specific negative attitudes contribute to decreased survival after stroke, it has not yet been addressed with the MASS as to whether changes in attitude could occur and whether this could predict survival.

Method

Using bivariate correlational analysis the MASS subscale change scores were correlated with the change scores on all index measures used, the demographic features obtained on the initial interview, and the attendance records. Results were then tabulated according to domain for ease of interpretation.

Results

The correlation coefficients between the MASS and mood indicator change scores for the twenty-three completers are shown in Table 78. Correlation coefficients between the

MASS and quality of life measures are shown in Table 79. With respect to measures that addressed mood (e.g., BAI, BDI-II, HADS), only the helplessness/hopelessness MASS scale was found to have significant correlations with the mood measures. Specifically, significant correlations were observed with the BAI total ($r = .46$, $p < .05$), BDI-II total ($r = .69$, $p < .001$), BDI-II somatic ($r = .62$, $p < .001$), BDI-II cognitive ($r = .64$, $p < .001$), and HADS Depression ($r = .48$, $p < .05$). The relationship for all instances reflects the pattern of a decrease in negative attitude (helplessness/hopelessness) along with decreased endorsement of items reflecting anxiety and depressive content.

Table 78
Predictor Correlations: Attitude and mood change scores

	MASS Fighting Spirit	MASS Help/ Hopelessness	MASS Anxious preoccupation	MASS Fatalism
BAI total	.16 (.48)	.46* (.03)	-.17 (.44)	-.17 (.43)
BAI neurophys.	-.08 (.72)	.28 (.20)	-.13 (.55)	-.05 (.82)
BAI panic	.07 (.75)	.39 (.07)	-.06 (.79)	-.22 (.31)
BAI subjective	.14 (.52)	.41 (.06)	.15 (.50)	-.11 (.62)
BAI autonomic	.32 (.13)	.20 (.36)	-.13 (.54)	-.14 (.53)
BDI –II Total	.17 (.43)	.69** (.001)	-.18 (.41)	-.20 (.36)
BDI-II somatic	.08 (.72)	.62** (.001)	-.16 (.46)	-.09 (.68)
BDI-II cognitive	.27 (.22)	.64** (.001)	-.16 (.46)	-.32 (.14)
HADS anxiety	.13 (.56)	.09 (.69)	-.24 (.27)	.26 (.23)
HADS Depression	-.09 (.70)	.48* (.02)	-.17 (.45)	.14 (.52)

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Within the QoL measures there were only four significant correlations. Helplessness/hopelessness was significantly correlated with the SF-36 social function (r = -.41, p = .05), role emotional (r =-.63, p < .001), mental health (r = -.55, p < .05) and MCS (r =-.62, p < .05; see Table 77). Again, there were no significant correlations with fighting spirit, anxious preoccupation, or fatalism subscales.

When demographic variables were analyzed for their relationship to the outcome variables only two participant variables showed a significant relationship, namely age at time of stroke and diagnosis of depression at initial assessment. Age at time of stroke was positively correlated with the SSQoL mood change score (r =.47, p < .05) suggesting that as age at time of stroke increases, the less likelihood that mood would be adversely affected (note that a high mood score on SSQoL reflects less symptomatology). A diagnosis of depression was intuitively negatively correlated with the BDI-II total score (r =-.58, p < .01), somatic score (r =-.47, p < .05), and cognitive score (r =-.61, p < .01), as well as the MASS helplessness/hopelessness scale (r =-.54, p < .01). The SSQoL work productivity (r =-.46, p < .05) and SF-36 physical health (r =-.43, p < .05) scores were also negatively correlated with the preexisting diagnosis of depression, suggesting that an initial presence of depression can be reflected by less work production and poorer physical health. All participants had 80 – 100% attendance records; therefore this indicator would not elucidate the question of predictor variables.

Table 79
Predictor Correlations: Attitude and quality of life change scores

	MASS Fighting Spirit	MASS Help/ Hopelessness	MASS anxious preoccupation	MASS Fatalism
SF-36 physical	.13 (.57)	-.23 (.30)	-.18 (.42)	-.16 (.46)
SF-36 role phys	.12 (.58)	-.13 (.55)	.12 (.60)	-.24 (.26)
SF-36 bodily pain	-.09 (.70)	.34 (.11)	-.16 (.47)	-.25 (.25)
SF-36 gen health	-.01 (.96)	.02 (.94)	-.12 (.57)	.01 (.95)
SF-36 vitality	.06 (.79)	.03 (.89)	.20 (.35)	-.10 (.64)
SF-36 soc function	.07 (.75)	-.41* (.05)	-.19 (.39)	-.22 (.31)
SF-36 role emot'l	-.16 (.48)	-.63** (.001)	.20 (.35)	.27 (.21)
SF-36 ment health	.06 (.78)	-.55** (.007)	.02 (.91)	.19 (.40)
SF-36 MCS	.03 (.91)	-.62** (.002)	.09 (.69)	.08 (.72)
SF-36 PCS	.13 (.57)	-.04 (.86)	.19 (.40)	-.18 (.41)
SSQoL energy	.03 (.88)	.15 (.48)	.11 (.61)	-.07 (.74)
SSQoL family role	-.21 (.33)	-.13 (.56)	.31 (.15)	-.31 (.15)
SSQoL language	-.04 (.85)	.12 (.58)	.05 (.84)	-.06 (.78)
SSQoL mobility	.21 (.34)	-.06 (.78)	-.10 (.65)	.12 (.60)
SSQoL mood	-.03 (.91)	.35 (.11)	.11 (.62)	.14 (.53)
SSQoL personality	-.02 (.94)	.25 (.25)	.13 (.55)	-.12 (.59)
SSQoL self care	.11 (.62)	-.39 (.06)	.07 (.77)	-.11 (.63)
SSQoL social	.30 (.17)	-.08 (.71)	-.38 (.07)	.13 (.57)
SSQoL thinking	-.09 (.69)	.04 (.86)	.35 (.10)	-.29 (.19)
SSQoL upper ext	.05 (.83)	-.35 (.10)	.39 (.07)	-.17 (.43)
SSQoL vision	-.01 (.98)	.34 (.11)	-.15 (.45)	.14 (.52)
SSQoL work	.13 (.56)	-.12 (.59)	-.17 (.44)	-.12 (.58)
SSQoL total	.15 (.50)	-.26 (.23)	-.15 (.48)	-.01 (.97)

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

Discussion

Overall, it appears that low mood, attitude and mental components of QoL are all closely interrelated. While there were not many significant correlations, those that did exist pointed towards the role of depressive symptoms. Specifically, depressive symptomatology initially after stroke had significant correlations with younger age at time of stroke. Present depressive symptoms as reflected by the BDI-II, BAI total, and HADS depression subscale were identified to be related to the attitudes of helplessness and hopelessness. Further, QoL SF-36 subscales, namely social function, role emotional, mental health, and the aggregated mental component score, were also significantly related to helplessness/hopelessness scores.

Lewis and colleagues (2001) found significant correlations with both the anxious preoccupation and helplessness/hopelessness and HADS anxiety and depression scales. In the present analysis, HADS change scores were used and significant changes in the fighting spirit and helplessness/hopelessness attitude scales were observed. The HADS depression subscale change scores were significantly correlated with helplessness/hopelessness change scores. This suggests that while negative attitudes can predict decreased survival they are not necessarily fixed and do respond to intervention. In fact, this finding is similar to a recent review by Ingram and colleagues who, based on a review of 40 studies, found that dysfunctional attitudes were elevated in patients during an episode of depression but within normal limits when not depressed (Ingram, Miranda & Segal, 1998). Overall, the relatively small and homogeneous nature of the sample used limits comparisons on demographic predictor variables. It would be interesting to evaluate some of the hypotheses that have been raised that point toward the age at time of

stroke (Williams et al., 1999), marital status (Kauhanen et al., 2000) and gender (Ouimet et al., 2001) and QoL outcome.

SECTION VI: GENERAL DISCUSSION

The present study set out with four primary aims: to adapt and implement MBCT to a group of people with stroke; to evaluate the psychometric properties of the measures used; to evaluate the effectiveness of the MBCT program; and to determine what, if any, variables contributed toward success in the MBCT program. All of these aims were achieved and the general findings have been discussed in their respective sections.

Overall, it was determined that the MBCT was amenable to modifications to suit most of the needs of people who have functionally recovered from a stroke of mild to moderate severity. The participants were eager in helping to test the adaptations of the original MBCT program and make suggestions for ongoing modifications. For the program facilitators, it was important to be practiced in mindfulness meditation, welcoming for suggestions, flexible for change, and to be available for individual meeting times when the participants had personal issues to discuss.

Psychometric analysis lent statistical support for the reliability and validity of the measures used. Overall, internal consistency was reflected by moderate to strong alpha values, with the exception of the BAI panic subscale, the SSQoL thinking and self care subscales, and the MASS anxious preoccupations scale, which were low. Convergent and divergent validity was demonstrated with all measures used. Convergent validity was found within the respective mood-related measures (e.g., specific to depression or anxiety) as well as within the related subscales of the QoL measures. Divergent validity

was demonstrated between the emotional/mental and physical subscales. With respect to responsiveness, generally moderate to large effect sizes were found, with the exception of indices related to physical functioning (which were not anticipated to change) and caregiver burden. The mood related measures were equivalent when effect size differences were compared. The BDI-II was found to have greater responsiveness when compared to the QoL emotional/mental indices. Despite the initial hypothesis, no significant difference on degree of responsiveness was found when the generic and stroke-specific QoL indicators were compared.

The effectiveness for the MBCT program was positive based on the initial control group analysis, qualitative responses, and the measures of mood, attitude, and quality of life. Significant improvement was reported on the BDI-II, the HADS, and the BAI total, neurophysiological and subjective subscales. This improvement was identified at time 2 (at the end of the program) and at time 3 (three months later). Overall improvement on the QoL measures was also seen in both the emotional and physical domains. The majority of the emotional/mental subscales had improved scores at time 2 and the improvements were maintained at time 3. Attitude changes were also reported with the MASS fighting spirit and helplessness/hopelessness scales both at time 2 and time 3. This change was not anticipated when this measure was initially selected for use (it was selected primarily to serve as a reflection of predictor variables for change), however it was a pleasant surprise. Earlier in this paper, reference was made to research by Lewis and colleagues (2001) who found that reduced survival is predicted by negative attitudes toward stroke and illness, but not by depression or anxiety. With the observed improvement in negative attitudes in the present sample, we have also found improved

scores on measures reflective of symptoms associated with anxiety and depression. Caregiver results were not as dramatic as those of the participants. This was felt, however, to be due to the generally independent level at which the participants were functioning prior to the program.

With respect to predictors of success, the MASS helplessness/hopelessness scale was strongly correlated with the BDI-II, the BAI total, and the MCS of the SF-36, where a more positive attitude reflected decreased symptomatology. Of the demographic characteristics, increased age at time of stroke was related to a better SSQoL mood score. Many interpretations can be made of this; however, one suggestion is that with increased age, people have usually fulfilled many social, financial and vocational goals. Those having a stroke at a younger age are faced with many goals not yet achieved and the social pressures that coincide with this.

SECTION VII: CLINICAL IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The original development of the MBCT program was motivated by the authors' desire to develop a maintenance program for depression that embraced a holistic shift that involved the whole mind and body state (Segal et al., 2002). Initial trials were found to be successful with participants who had full physical functioning. The MBSR program (on which MBCT was based) has reported numerous successful trials in improving quality of life for individuals with physical conditions (Castillo-Richmond et al., 2000; Kabat-Zinn et al., 1998; Massion et al., 1995). It is not surprising then, that MBCT was also effective with individuals with both emotional and physical conditions. The time-

limited clinical nature of MBCT and the benefits demonstrated in this study add a new population of individuals that may benefit from MBCT. In fact, even Aaron Beck reviewed the MBCT program to have "promising implications for cognitive therapy of depression" (Segal et al., 2002). Based on this study one might add that MBCT has promising implications for individuals dealing with depression, anxiety, and the healing needed to adapt to life changing circumstances (e.g., physical health decline).

Because the MBCT program is time limited, it is well-suited to be implemented in an outpatient rehabilitative setting. For stroke patients, for example, after a short time in acute care, some are discharged home and others are referred to an inpatient rehabilitative setting for intensive therapies, often targeted toward regaining functional abilities. After this, however, clients are sent home. Providing the MBCT program at this point in the recovery phase would be desirable, not only to teach the principles and practice of MBCT, but also to provide the patients with a routine, purpose, and the opportunity to meet other's with stroke.

Directions for future applications of the MBCT program are countless. MBCT within the areas of rehabilitation and health psychology has the potential to help individuals through difficult transitions in emotional and physical roles. Target groups could include, but are not limited to, individuals with multiple sclerosis, early stages of Huntington's Disease, Parkinson's Disease, various forms of myopathy, spinal cord injury, and mild brain injury. While the MBCT program was not definitively seen to improve caregiver burden future trials could include participants who pose a greater burden. A limitation with this may be a corollary lower level of cognitive status, which could limit higher level gains. Provision of the MBCT program to the caregivers

themselves could provide them with invaluable techniques directed toward developing and maintaining a sense of self and acknowledging and accepting what can not be changed. A program directed to caregivers has the added benefit of not requiring that the care giving recipient be functioning at a given level of cognitive status. This opens the doors for research for caregivers of people with dementia, Alzheimer Disease, psychiatric illnesses, among others.

Regardless of the type of population future research is directed toward, efforts should be made to continue to evaluate mood and health related quality of life outcome based on measures sensitive and specific to the target group. Further research into the refinement in responsiveness of the specific versus the generic measures should be done. This may necessitate reevaluation of item content and number, for example on the SSQoL. Weighted mental and physical subscales would also assist in the comparison of the specific measure with more generic ones.

Additional studies are necessary to further evaluate the effectiveness of MBCT. Randomized controlled clinical trials can be expensive in terms of finances, time, and energy but will be required to accurately assess the value of MBCT in individuals who have had a stroke. Nonetheless, empirical data from smaller studies will continue to be invaluable in furthering the rationale for the funding of these larger scale studies.

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APPENDIX A: COVER LETTER AND CONSENT FORMS

Dear Participant,

We are interested in investigating the effectiveness of the Mindfulness Meditation program with individuals who have survived a stroke. This 9-session program focuses on the emotional and psychological needs that may arise following stroke. The aim of this program is to teach you skills that can help you deal with unpleasant thoughts, feelings or experiences that you might face as a result of your stroke. This program has been shown to be effective with a wide range of clinical groups, but as of yet, has not been offered to those who have had a stroke.

By indicating that you are interested in participating in this study, you will be asked to meet individually with the investigators to discuss the specific format of the program (e.g., what to expect and what will be required of you) and then to sign the consent form. After this, you will be asked to tell us a little about yourself and to fill out some questionnaires (this will take about an hour). Providing that you meet all the criteria to participate, you will then be able to begin the 9-week program, with weekly meetings (for 1½ hours) with a group of individuals who have also had a stroke. During these sessions, you will learn skills that have been shown to help with tension, stress, anxiety, and depression. You will be encouraged to practice the skills you learn at home and during you daily life. It is our hope that this program will also help with general life satisfaction. The sessions will be modified to accommodate any extra needs that you may have to ensure that the experience is comfortable and enjoyable.

At the end of the group sessions another set of questionnaires will be brought to you to be filled out. This will take 30-45 minutes. Because we are interested to see if this program has any long-term benefits, we also ask that we be able to contact you in 3 months to assess how you are feeling and coping in general. All individual meetings and completion of questionnaires can take place in your home, if this is most convenient for you.

Your participation is voluntary, and you may terminate your participation at any time.

The information you provide will be treated in a confidential manner. Any answers you provide on the questionnaires are accepted. There will be no disclosure of the data to anyone other than the researchers conducting the study. Your name will not be used in any scientific presentation or publication. The data will be stored in a secure filing cabinet for a minimum of seven years.

For information or questions, please call the Principle Investigator, Amy Moustgaard, at (807) 344-4475. You may also contact Dr. Michel Bédard, Advising Investigator at (807) 343-8630.

Thank you for agreeing to be contacted!

Amy Moustgaard, M.A.
Ph.D. Candidate
Psychology Department
Lakehead University

"Pre-consent Form"

I have read the covering letter detailing some of the information about the Mindfulness Meditation Program being offered as part of a research study conducted by Amy Moustgaard, M.A.

By signing this form, I agree to have Amy Moustgaard contact me by telephone. My signature not mean that I agree to consent to participate in the program; it only indicates that I would like to hear more about what is being offered, free of charge.

Please indicate your name, phone number, and the best time of day to reach you:

Name: _____ Ph.:(___)_____

Best time of day to call:_____

_____ _____

Signature Date

_____ _____

Witness Date

* This program is approved by Lakehead University Ethics Committee

"Consent – Participant"

My signature below shows that I agree to participate as part of the 9-week Mindfulness Meditation program, for individuals who have had a stroke. The details of this study, conducted by the Primary Investigator, Amy Moustgaard, have been explained to me, both in the covering letter and in person, and I have had an opportunity to ask questions related to it. My signature also indicates that I understand the following:

1. I will be required to attend weekly 1½-hour group sessions for 9 sessions.
2. I will be asked to practice skills learned in class at home throughout the week.
3. I will be asked to complete questionnaires at the beginning, end and three months following completion of the program.
4. I can refuse to answer any questions that make me uncomfortable.
5. I can withdraw from the study at any time.
6. The information collected will be confidential and used only for the stated research data collection.
7. When the study is completed, I will be able to receive a summary of the findings, upon request.

_____ _____

Signature of Participant Date

_____ _____

Signature of Witness Date

Mailing address: _____

_____

_____

Please indicate if you would like to receive a summary of results upon completion of the study:

☐ Yes ☐ No

"Consent – Caregiver"

I _____ am a caregiver of a person who has sustained a stroke. I have read and understood the covering letter of the study involving the Mindfulness Meditation, by Principle Investigator, Amy Moustgaard, and I agree to participate. I am aware that I will be given a set of questionnaires to complete at the beginning, end, and six months after the completion of the program. I understand that it will take approximately 30 minutes to complete the questionnaires. I realize that some of the questions are of a personal nature and may choose to not answer questions that make me uncomfortable. I am aware that I may withdraw at any time form the study and that a report of the results may be requested at the completion of the study.

_____ _____

Signature of participant Date

_____ _____

Witness Date

APPENDIX B: MBCT PROGRAM PACKAGE FOR FACILITATORS.

Session 1

Theme

Welcome session. Embarking on the start of a new beginning.

Agenda

- Introductions – from facilitators as well as participants
- Notes about privacy and confidentiality
- Inception of this program – some background information
- Description of the program, definitions, history that unites Eastern mindfulness meditation and Western psychological epistemologies
- Participants to discuss nature and onset of stroke, problems experienced in past and now, aim or goals through participation.

Session 2

Theme

Mindfulness starts when we recognize the tendency to be on automatic pilot and make a commitment to learning how best to step out of it to become aware of each moment. Practice in purposely moving attention around the body shows both how simple and difficult this can be.

Agenda

- Orientation (20 min)
  - Introductions of facilitators and outline of session format
  - Icebreaker – Photo gallery of stress
- Raisin Exercise (15 min)
  - The exercise
  - feedback and discussion
- Automatic Pilot (5 min) – handout 6.2
- Body Scan Practice (20 min) – box 6.3
  - short breath focus
  - feedback and discussion
- Homework (15 min)
  - discuss purpose and importance
  - recommend mindfulness of a routine activity
  - introduce tapes and assign Body Scan Tape for 4/7 days

Facilitator notes

From time to time, we all experience the effects of absent-mindedness. We may read a whole page of a book and find that we have taken in nothing; or finish a meal without noticing the taste of the food. In such cases, we may or may not have been aware of where our attention had gone.

When asked to describe these kinds of events, many people use the term "automatic pilot" as a way of saying that they are just behaving mechanically, without really being aware of what is going on. In automatic pilot mode, it is as if the body is doing one thing, while the mind is doing something else. Most often, we do not intend to be preoccupied with this or that—it simply happens. The mind is therefore passive much of the time, allowing itself to be "caught" by thoughts, memories, plans, or feelings.

This day to day mindlessness can seem harmless, but can be damaging because we may be letting the good things pass us by, or we could be letting the bad things happen without taking skillful action on them.

Begin Raisin Exercise

Questions following exercise

Does anyone want to say anything about their experiences while eating?
Would you be able to say what kind of thoughts went through your mind?
Where did the thoughts take you?.. That's interesting. So the task is to actually focus your awareness on the raisin, but the mind isn't having any of that!
Can anyone comment on the taste? Texture?
How was this different from how you normally eat raisins? Were you more aware of what you were eating? As a fact or as a sensation? Rather than automatic pilot mode, there was a stronger awareness
Any other comments? Can you say a little more about that?

Automatic Pilot

So really, this is a very simple exercise that is just meant to illustrate how, first of all, much of the time we are actually not getting out moment's worth, if you like. You know, all that taste, all that smell, all the visual patterns of the texture, you know they just disappear in one handful. We are not really there for it. And it also shows what happens when we bring awareness to experiences in a different way. This, for the most of us, is slightly different from the way we normally eat raisins. It is interesting that it provides a sort of background against which we can then begin to notice any sense of irritation, urgency, wanting to get on, "what on earth are we doing this for?" So it's all good noticing.

This is a taste of what we will be doing in this program. We will practice bringing our awareness to our everyday activities so that we know what is going on and can actually change the nature of the experience. If you are fully aware of your thoughts, feelings, sensations in the body, in the sense that you may have glimpsed in this raisin experiment, you can actually change the experience giving yourself more choices and more freedom.

The basic take-home message from that little exercise is that we're not aware of what's going on a lot of the time. If we can bring awareness we become aware of aspects of life that otherwise may just slide by, both the good and the bad. We can't actually

control what comes into the mind, but we can control what we do next. This program is all about being able to move to a place of awareness from which we can choose what the next step is, rather than run off the old habits of the mind.

Homework

Homework is a routine aspect of this program as the main approach is to learn by doing. Homework shouldn't be viewed as "something you have to do", rather it should be approached as seeking out awareness and an experience. This should be relaxing, if not enjoyable. Homework is central to MBCT and is not an optional extra.

There may be difficulties with homework. Let me say two things. First, you will see in the handouts a report of someone who said, 'I couldn't do this. It went up and down, but eventually something seemed to happen,' so just hang in there. Second, classes who have completed this program unanimously offer the advice that, 'whatever happens, stick with it.' That may not seem relevant to you now, but it may be at some point. Remember, you do not have to enjoy it, you just have to do it.

Session 3

Theme

Further focus on the body begins to show more clearly the normal chatter of the mind, and how it tends to control our reactions to everyday events.

Agenda

- Body Scan Practice (20 min)
  - review practice
- Homework review (25)
  - reiterate purpose
  - feedback and discussion
- Thoughts and Feelings (10)
  - thoughts and feelings exercise
  - discuss connection between thoughts and feelings
  - awareness of pleasant events; pleasant events calendar
- 10 min. sitting meditation (15)
  - introduction
  - practice
  - feedback and discussion
- Homework (10)
  - Body Scan Tape for 4/7 days
  - 10 min. of mindfulness of the breath 3/7 days
  - Pleasant Events Calendar 7/7 days

Facilitator Notes

Thoughts and Feelings Exercise

Interpretation of events plays a large role in determining moods. Understanding the extent of this can be very helpful for many people in overcoming barriers in practice and in daily life.

Have everyone settle into a comfortable position and ask them to close their eyes and to imagine the following scenario:

> "You are walking down the street, and on the other side of the street you see somebody you know. You smile and wave. The person just doesn't seem to notice and walks by."

Now, notice what is going through your mind. To yourself, consider the thoughts are you having about what just happened on the street. What are you thinking about that person? How did it make you feel when they did not wave back? What are your feelings about that person? Now consider any physical sensations you might have after such an experience. Is anything tight? Uncomfortable? Unusual?

Open your eyes. *Using black board or white board, go from participant to participant and have them identify a thought, feeling and sensation.*

Note how the same situation elicits many different thoughts and interpretations, hence, many different feelings. This can be used as a basis for discussion of how emotional reactions are often the product of our interpretations of events.

Connection between Thoughts and Feelings

Our emotions are the consequences of a situation plus an interpretation. We often find ourselves in a situation (A) and end up with a feeling (C). Normally, these are the things of which we are most aware. Often, we are not aware of a thought (B) that links them. It is as if there is this stream of thoughts present all the time.

Awareness of Pleasant Events

Becoming more fully aware of the way a situation is classified by the mind as "pleasant" or "unpleasant" and the extent to which our thoughts and moods colour such interpretation may take some practice.

We would like each of you to practice an exercise this week. Specifically, we would like for you to be aware of at least one pleasant event that occurs each day (and preferably while it is happening). In your handouts for today there is a calendar with space for you to write down the events, as closely as possible in time to when it occurs, along with the thoughts, feelings, and body sensations that accompany the event. When writing the thoughts, write them as if they were spoken out loud (e.g., in words that actually came to mind) using quotation marks, if that helps. Try to describe the feelings and sensations in as much detail as you can.

Session 4

Theme

With a greater awareness of how the mind can often be busy and scattered, learning to take awareness intentionally to the breath offers the possibility of being more focused and gathered.

Agenda

- 10 minute sitting meditation (20)
  - awareness of breath and body
  - what to do with intense physical sensations
  - review practice

- Homework review (15)
  - of body scan, mindfulness of the breath and routine activity, pleasant events, elicit personal examples

- Mindful stretching (25)
  - introduce
  - practice
  - review/feedback

- 3 minute Breathing Space (10) – box 8.3
  - introduce and practice

- Homework (10)
  - Sitting Meditation Tape with stretches on days 1, 3, and 5
  - Yoga on side 2 of Body Scan Tape - optional
  - Pleasant Events Calendar 7/7 days

Session 5

Theme

With a greater awareness of how the mind can often be busy and scattered, learning to take awareness intentionally to the breath offers the possibility of being more focused and gathered. Incorporating this with the body.

Agenda

- 10 min. Sitting Meditation (25)
  - review practice
- Homework review (10)
  - meditation, stretching
  - Pleasant events, review sheets
- Yoga – introductory session
- Unpleasant Events (10)
  - introduce
  - importance of monitoring in homework
- Homework (3)
  - Body Scan Tape for 4/7 days
  - 10 min. of mindfulness of the breath 3/7 days
  - Unpleasant Events Calendar 7/7 days
  - use of 3 minute breathing space and recording in journal
- End of Class Review (8)
  - review MBCT model
  - ABC of thoughts, emotions and sensation

Facilitator Notes

Unpleasant Events

Last week we discussed that becoming more fully aware of the way a situation is classified by the mind as "pleasant" or "unpleasant" and the extent to which our thoughts and moods colour such interpretation may take some practice. We had you fill out the Pleasant Events Calendar for two weeks. This practice seemed to help people appreciate a positive moment for what it is and may have helped people

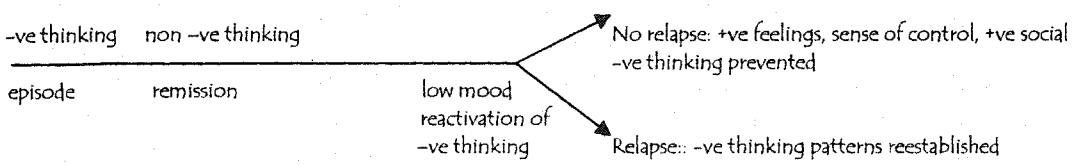
become more aware of the thoughts, feelings and body sensations that accompany such pleasant experiences.

We would like each of you to practice a similar exercise this week. This time, we would like for you to be aware of the thoughts, feelings and sensations associated with unpleasantness, no matter how fleeting or momentary the event in question may be. In your handouts for today there is a calendar with space for you to write down the events, as closely as possible in time to when it occurs, along with the thoughts, feelings, and body sensations that accompany the event. When writing the thoughts, write them as if they were spoken out loud (i.e., in words that actually came to mind) using quotation marks, if that helps. Try to describe the feelings and sensations in as much detail as you can.

Examples of an unpleasant event might be:

They did not have my car ready when I arrived to pick it up.
Thoughts: This is really unprofessional of this dealership
Feelings: Annoyed, frustrated
Sensations: increased heart rate, tightness in chest, tension in shoulders and neck

End of class review - review MBCT model: ABC of thoughts, emotions, and sensations; being aware of the moment, simple pleasures; how our mind automatically categorizes events as positive, negative or neutral.



Session 6

Theme

The mind is most scattered when it tries to cling to some things and avoid/escape other things. Mindfulness offers a way of staying present by giving another place from which to view things: to help take a wider perspective and related differently to experience.

Agenda

- 30 min. Sitting Meditation (35) – Box 9.2
  - awareness of breath, body, sounds, then thoughts
  - review/discuss
- Homework review (15)
  - meditation, stretching, Yoga
  - Unpleasant events
- Yoga Part two
- Defining Poststroke Depression (15)
  - background, prevalence
  - symptoms
  - prognosis
- Wild Geese Poem (5)
  - read and discuss
- Watch 1st half of Healing from Within video (50')
- Homework (5)
  - Sitting Meditation Tape (Series 1, Tape 2) 5/7 days
  - 10 min. of mindfulness of the breath 3/7 days

Session 7

Theme

Relating differently involves bringing to experience a sense of "allowing" it to be, just as it is, without judging it or trying to make it different. Such an attitude of acceptance is a major part of taking care of oneself and seeing more clearly, if anything, needs to be changed.

Agenda

- 35 min. Sitting Meditation (40)
  - awareness of breath, body, sounds, thoughts
  - noting how we relate to our experiences through the reactions we have to whatever thoughts, feelings or bodily sensations arise
  - review/discuss

- Homework review (5)
  - meditation

- Read Rumi's poem, "The Guest House" (5)

- Accepting/Allowing and Letting Be (10)
  - why it is important, how we can use it
  - working through the body

- Homework
  - Sitting Meditation Tape (Series 1, Tape 2) 3/7 days
  - Sitting Meditation with no tape (in silence) 3/7 days
  - mindful awareness when noticing unpleasant sensations

Session 8

Theme

Negative moods, and the thoughts that accompany them, restrict our ability to relate differently to experience. It is liberating to realize that our thoughts are merely thoughts, even the ones that say they are not.

Agenda

- A quote
- 35 min. Sitting Meditation (40)
  - awareness of breath, body, sounds, thoughts
  - review/discuss
- Homework review (10)
  - meditation with and without tape
- Moods, Thoughts and Alternative Viewpoints exercise (20)
  - practice and review
- Meditation: "Sending loving kindness" – know thyself heal thyself
- Homework
  - Sitting Meditation Tape (Series 1, Tape 2) 3/7 days
  - Sitting Meditation with no tape (in silence) 3/7 days
  - mindfulness of negative thoughts and feelings

Facilitator Notes

A quote before the start

"When we lose ourselves in thought, thought sweeps up our mind and carries it away and in a very short time we can be carried far indeed. We hop a train of association not knowing that we have hopped on, and certainly not knowing the destination. Somewhere down the line we may wake up and realize that we have been thinking, that we have been taken for a ride. And when we step down from the train, it may be in a very different state of mind from where we jumped aboard" (Goldstein pp 59-60).

In the sitting meditation at the start of the session

"Taking a few moments now to become aware of the thoughts that are arising in your mind, imagine yourself sitting in a cinema. You are watching an empty screen, just waiting for thoughts to come. When they come, can you see what exactly they are and what happens to them? Some of them will vanish as you become aware of them."

"... If there is a place in the body that is experiencing intense sensations, bring your awareness to that region. Surrounding the physical sensations with a sense of friendly interest....on each outbreath, saying,' It's OK. Whatever it is, it's OK.' Soften and open to the sensations you are experiencing. Particularly if there's any sense of resistance, bringing gently awareness to it, on each outbreath, opening and softening as best as you can, rather than tensing or bracing...when it feels comfortable, returning the focus to the breath or to the body as a whole."

"...If there is a feeling that is making you uncomfortable or preoccupied, find that emotion. What does it feel like? Where is it located? What are the negative thoughts surrounding that emotion? While stepping back from this feeling, notice how the cycle of thoughts and feelings are creating a waterfall, but you are able to stand behind them. You are aware and realize that it's OK to feel like this.

"...If there is a thought in your mind that is experiencing intense energy then bringing your awareness to that thought.... Notice what the thought is saying.... Notice that the thought is simply a thought... It is not fact. ...Notice how the thought is making you feel...Be aware of that thought and feeling....

Moods, thoughts, and alternative view points

Exercise: Hand out scenario paper (version1 and 2 on either side)

Version 1: "you are feeling down because you've just had a quarrel with a colleague at work. Shortly afterward, you see another colleague in the General Office and he or she rushes off quickly, saying he or she couldn't stop. What would you think?"

Version 2: "you are feeling happy because you've just been praised for good work. Shortly afterward, you see another colleague in the General Office and he or she rushes off quickly, saying he or she couldn't stop. What would you think?"

In discussion: we've got exactly the same objective situation, but the frame of mind we bring to it creates a radically different interpretation, a different set of feelings. This makes the very obvious point that just because we think something doesn't make it so.

Thoughts carry credibility. We believe them. But we have the capacity to make all these different interpretations of the same situation, so that if these are going to be determined by the same situation, so that if these are going to be determined by the frame of mind that we bring to it, and we are in a negative frame of mind, we are in danger of getting trapped in the interpretations that frame of mind produces, and our mood gets worse, and then down we go. Thoughts are not facts, even the ones that tell you they are.

So the first stage is to be aware of this difference between thoughts and facts. Part of the point of meditation is to perceive this distinction; we note our thoughts as passing events in the field of awareness; we note their content and their "emotional charge", and then we bring our attention back to the breath. As best we can, we do not get caught in the thought stream. We just say, "Oh, there's another thought", then, we go gently but firmly back to the breath.

Session 9

Theme

Maintaining a balance in life is helped by regular mindfulness practice. Good intentions can be strengthened by linking such intentions to a positive reason for taking care of oneself.

Agenda

- Body Scan (20)
  - awareness of breath, body, sounds, thoughts
  - review/discuss

- Homework review (10)
  - negative thoughts and feelings log; discuss/feedback – handout 11.5

- Looking Back - Review whole course (15)
  - what has been learned – pairs and then group input

- Looking forward (15)
  - check and discuss plans of intention for future practice (brainstorm re: how to keep up the momentum)
  - what will be applied from the program to daily life
  - note positive reasons for maintaining some form of practice; activity lists
  - community resources for follow-up

- Review session 8 handouts (3)

- End class (10)
  - distribute token memory stone
  - concluding meditation

Appendix C

Qualitative (verbatim) reflections on the Program experience

ID	Rating of Program (/10)	What was liked, learned, of benefit	What could be changed
2	10	- Breathing helped with hip pain (decreased Tylenol use) - Gave the opportunity to learn a different way of thinking - Helped to accept who I was - Like video tapes, inspiring - Like straightforwardness of facilitator and her shared experience	Nothing
4	10	- enjoyed recording good moments and seeing how these related to how you think and feel - liked the guided meditation, looked forward to going to group - it was a safe and pleasant experience	- didn't like Kabat-Zinn's voice, too slow, needed music on tape
9	9	- the supportive nature of group - being with others with stroke	- getting on the floor was too challenging
11	8	- I recommended it to a friend. I liked the supportive nature of the group especially b/c everyone has had a stroke - I have found that my mood is more balanced now and I am less easily frustrated - My heart rate has gone down by 10 points; I am able to do activities that require multitasking; I am able to follow two plots in different books on the go - I am more aware of my body and how my thoughts relate to how I feel, physically and emotionally	Nothing
12	8	- I am a bit less negative now, I see that I have a habit of being negative - I like the supportive nature of the group	- because I find it hard to socialize, it was difficult at first to get out to the group, but now it's okay…I am even meeting with some participants for coffee each week
13	10	- I learned a lot of things especially how to breathe when I am anxious - Supportive with friends in group; liked listening to others	- I can't sit in a chair for too long
15	8	- enjoyed the group and found it helpful in teaching me to take time to focus on self, thoughts, sensations, tensions - I am beyond thinking of self now; I am thinking of future and plans down the road	

ID	Rating of Program (/10)	What was liked, learned, of benefit	What could be changed
16	10	- really liked the tape; it helped me to relax; to clear my mind (after some work at the beginning) - the more I think about it the more I can relax - I liked the facilitators and the group format - I took the opportunity to reevaluated my self and look at my accomplishments	
3	7.5	- I discovered that I was not alone, it was comforting - I felt "normal", which was a big relief - I am able to use the breathing to quickly manage my irritability (which I find I am able to detect better) - I find it has helped my memory, but I don't know why. Maybe it is because I am more relaxed	I didn't like the voice of the man on the tapes.
17	8	- I liked listening to other people and learning from them - I felt like I had something in common with others - I like to do the breathing on my own without the tape	Nothing.
18	6	- I am more able to relax	Nothing
20	7	- it helped my focus my attention when I had to learn new things at work - I can deal with momentary periods of stress better because I am more aware of it coming on and I can use the breathing - I felt I wasn't alone and that gave me strength	Later in the day would be better.
19	9	- I notice a big change! I've enjoyed it very much and learned how to relax and to "stop and smell the roses" - I am trying not to hurry to do things now; the longer the better.	Nothing

ID	Rating of Program (/10)	What was liked, learned, of benefit	What could be changed
21	9	- I have more self confidence and I am less nervous driving my car - I am sleeping better and not waking up throughout the night - I can read now and be able to pay attention - I have more patience to do my sewing - I have applied the breathing techniques to medical and dental visits when I start to get nervous.	I would like more sessions.
22	8	- the social aspect and sharing amongst the group	Nothing
23	8	- I liked the social aspect - It helped me in a big what to relax and to use the breathing - Before I was up and down with my mood; now I can sense when things are changing and can slow myself down before my mood changes for the worse - The yoga stretching really helped with my muscle spasms	Nothing
24	8	- I got a lot out of it. It helped me identify triggers of stress (like physical tension) and nip it in the bud. - I am more able to relax	Nothing
25	6	- I liked the social aspect	I would have liked to continue on with the program.
26	8	- I looked at my situation differently - I learned to control my emotions much better and find that I can sit back and relax - The breathing has helped with my COPD [congestive obstructive pulmonary disease]	More sessions.
27	7	- I liked the social part - It helped with acceptance of changes from stroke	I didn't like the stretching part

ID	Rating of Program (/10)	What was liked, learned, of benefit	What could be changed
28	7	- I liked the social aspect - It helped to put my abilities into perspective - I became able to talk about things and feel comfortable - I am less impatient and don't "fly off the handle" as much	I found the yoga and balancing difficult
29	9	- I liked networking with others who have had a stroke - I felt as though I was not alone - It helped me manage my stress (I've been using the breathing space at work)	I'd like to do more yoga
30	8	- I liked the social aspect and meeting others with stroke; I realized that I wasn't the only one. - I can use the breathing to help relax both on my own and with the tapes.	Nothing.

Appendix D

Three-month follow-up questionnaire

1. Since the completion of the MBCT program, have you kept in touch with any of the group members?

Yes, _____ times a month No

2. Since the completion of the program, have you started any new medications?

Yes, Specify _____ No

3. Have there been any significant (good or bad) events for you in the past 3 months?

Yes, specify _____ No

4. How frequently do you practice mindful awareness (i.e., being present to everyday activities)?

At least 5 times a day once a day 3x a week 1x a week never

5. How frequently do you use a 3-minute breathing space?

At least 2x a day 1x a day 3x/wk 2x/wk 1x/wk never

6. How frequently did you complete some form of guided meditation?

Specify form _____ Frequency _____

7. After three months of completion of the MBCT Program, how would you rate the importance of the program for you (10 = extremely important and 1 = not at all important)?

1 2 3 4 5 6 7 8 9 10