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AN ALTERNATIVE MODEL FOR THE AETIOLOGY OF DEPRESSION

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A thesis submitted to the School of Health and Human Sciences
Southern Cross University, for the degree of Master of Science
(Psychology)

This thesis is dedicated to my wife, Cheryl McCombie, without whose support it would never have been brought to fruition.

I wish to acknowledge the irreplaceable and extremely valuable assistance that I received from my Supervisor, Dr S Provost. I also wish to acknowledge the invaluable assistance that I received from Dr L Brooks, the wizard of statistics.

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FOREWORD

This thesis is in two chapters. Chapter 1 provides a broad overview of some of the cognitive and other theories which provide insight into the development of depression. Depression, in this thesis, is seen as a complex disorder with a multifaceted aetiology the factors of which interact in subtle ways.

Chapter 2 is an exploratory study which provides some evidence regarding a specific factor which may be involved, at a basal level, in the development of schemas and attributional styles. This section is written in the form of a journal article which could be submitted for publication.

Depression has been chosen as an area of study because of its relevance to the present time, in terms of the large amount of government, public and media attention being paid to the development of depression and its effect on the community. There have been substantial developments in the treatment of depression over the last two decades. These developments mean that depression is being seen as having the potential to be more effectively managed, in response to the development of more effective medications for depression, tricyclic antidepressants, specific serotonin reuptake inhibitors, tetracyclic antidepressants and specific noradrenaline reuptake inhibitors, and more especially, the development of effective psychological treatments for depression (Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999: Michael & Cowley, 2002). However, although there has been a great deal of research into depression, its aetiology and its dynamics and into the development of more effective treatments for it, treatments for depression are still only moderately successful, whether presented individually or in combination (Manicavasager & Andric, 2004).

The goal of this research is to try to elucidate, from a novel perspective, factors that may be involved in the development of depression. Without a stronger theoretical accounting for the development of depression, it may be more difficult to move past the present moderate outcomes from treatment to the development of more effective therapies. The literature review provides an examination and evaluation of the present dominant cognitive, or information processing, theories of depressogenesis. Following this, the effectiveness of the cognitive therapies that they have produced has been addressed. The information arising from this review of the literature highlighted that fact that although early negative life experiences and present stress have been identified as being precursors to the development of depression, the dynamics of this relationship are not clear.

To try to elucidate the factors that may be involved in this relationship the review then looks at what the postulated negative early life experiences may be and what effect these may have on those exposed to them. This work identifies a set of findings which indicated that not all individuals exposed to such negative life experience immediately, or subsequently, developed depression. The question then arises: what are the factors that operate to produce depression in those who develop it in response to negative life events and/or stress? The search for these factors initially produced an evaluation of personality vulnerability factors. However, the evidence for such factors still appears to be post hoc and, again, no explanation of the aetiology of these personality vulnerability factors was offered by Beck (1987) or other researchers in this field.

Further research suggests that some of these early negative life experiences could also be characterised as traumas – child abuse and neglect. However, the literature on trauma does not support the incidence or chronicity observed in children

and adults who have developed depression in response to these negative life events. Other hypotheses were then evaluated to see what effect parental bonding and attachment and the parent child relationship have on the later development of depressive symptomatology.

The literature also suggested that the explanation of negative events developed by the individual to enable them to account for the negative life event (Abramson, Seligman, & Teasdale, 1978) seemed to be a fruitful area of research as it raised the possibility of individual differences in the response to life events. It is reasonable then to try to evaluate what impact genetics and biochemistry, and their interaction, have on individuals' self-explanations of the negative events that occur in their lives.

What followed from this is the examination of factors involved in such individual's self-explanations of these negative life events. This examination led to the evaluation of the input into the process of fluid intelligence, working memory, rule governed behaviour, mental modelling, information processing, and problem-solving theory, to see what light these various bodies of literature could throw on the ways individuals developed their self-explanations and the impact of these self-explanations on their behaviour. Unfortunately, these theoretical approaches, again, seemed to be post hoc.

Further research led the author to explore the construct of cognitive exhaustion (Sedek & Kofta, 1993). This construct seemed to offer a rationale for the differential response individuals had to negative life events. Cognitive exhaustion seemed to be able to offer a plausible explanation for the development of helplessness and hopelessness in response to the exposure to negative life events. Unfortunately, the construct of cognitive exhaustion was predicated upon the fact that individuals became exhausted in response to their need to hold the problem and the data which

was needed to solve the problem, the negative life event, in their working memories. Kofta and Sedek (1999) argued that the energy requirements of such processing became unmanageable and that individuals then become exhausted and, subsequently, helpless and hopeless.

The construct of cognitive exhaustion seems to offer a model for the development of a negative problem-solving orientation and the aetiology of the mental models, the schemas and negative attributional styles, postulated to underlie the development and experience of depression. However, the cognitive exhaustion model relies on the hypothesis that those individuals who become exhausted have less effective working memories and that these less effective working memories do not allow the individual to be able to effectively process the life event such that they feel successful and, therefore hopeful rather than hopeless. In response to this process, it is hypothesised, the individual continues to try to process the problem and becomes exhausted by the effort to do so. In response to this information, research was undertaken in the area of cognitive theory to see if the defective working memory hypothesis and its relationship to less effective problem-solving was supported. The findings arising from this research did not support this formulation (Eysenck & Keane, 2000; Hambrick & Engle, 2003). However, the work of Hambrick and Engle (2003) did provide an explanation for exhaustion based on cognitive theory, through the concepts of negative set, and functional fixedness, and the inability of some individuals to suppress the interference these errors cause when problem-solving.

In summary, the first chapter of this thesis sought to elucidate the possible factors involved in the development of depression. These factors are presented in the figure below.

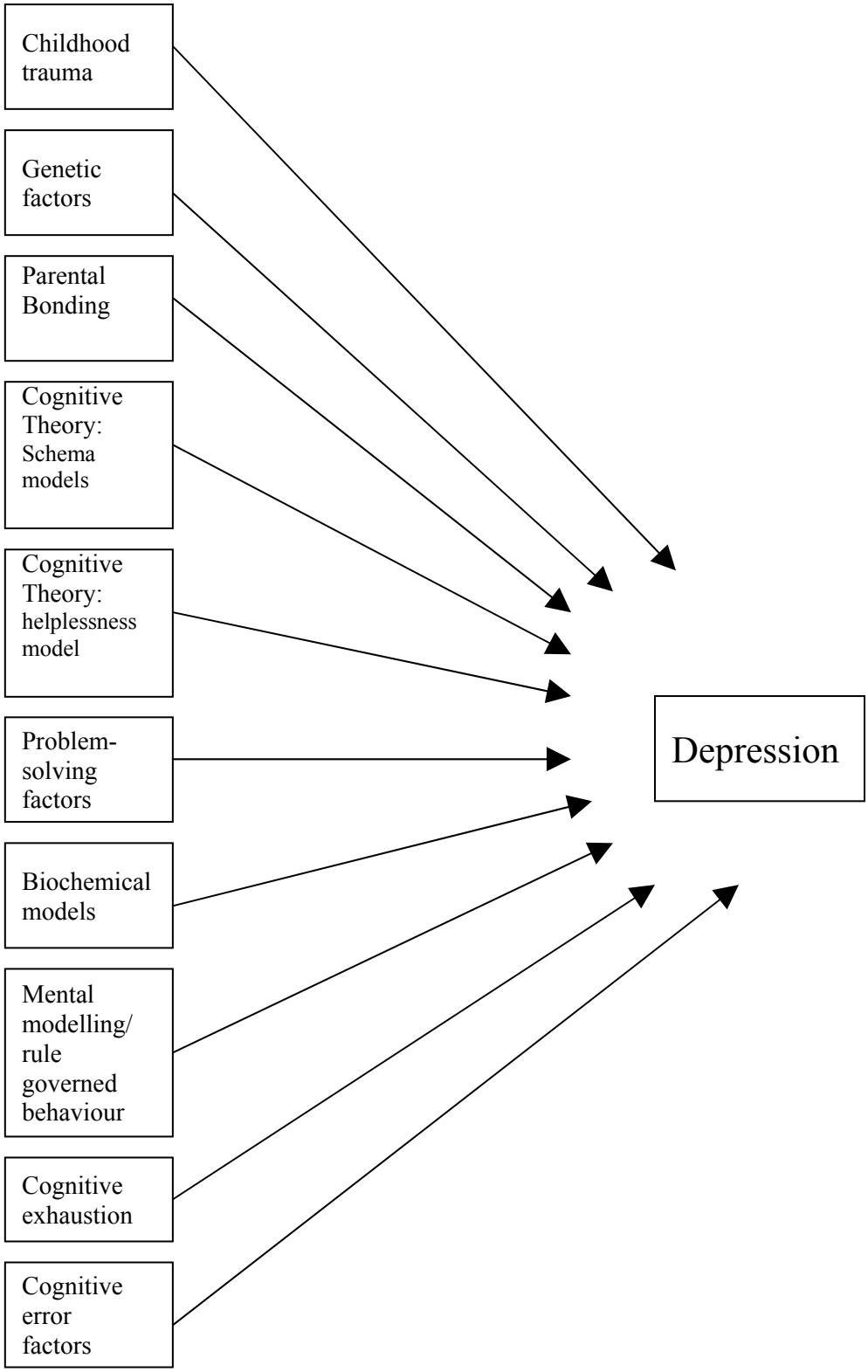


Figure 1.

Identified contributory factors to the development of depression.

The literature suggested that the last concept, cognitive error factors (the effect of functional fixedness and negative set and the inability to suppress interference during problem-solving), was a significant factor in depressogenesis and that an evaluation of the effect of these factors, in the context of all of the other possible factors in depressogenesis, was a area of study which had some merit.

Chapter 2 of this thesis is an exploratory study that attempts to establish the effect of the cognitive error factors, seen as being implicated in the development of depression, as a factor in the development of cognitive exhaustion and, hence, depression. The study uses a three group design which allows for the elucidation of the factors common to those individuals who presently suffer from depression or who have suffered from depression, but have since recovered, and the differences between these groups and those who have never been depressed. More specifically, this study is designed to try to establish if those participants who presently suffered from depression and those participants who have recovered from depression share a difficulty with the suppression of interference, when carrying out social problem-solving, when compared with those who have never been depressed. The results of the study are consistent with the existence of this relationship.

The study also attempts to offer other insights into the relationships between depression status and problem-solving orientation and the experience of dysfunctional attitudes and automatic thoughts. Finally, the study suggests that, consistent with the work of Eysenck and Keane (2000) and Hambrick and Engle (2003), less effective problem-solving in the social domain does not seem to be associated with working memory or fluid intelligence deficits.

CHAPTER 1: REVIEW OF THE LITERATURE

AN ALTERNATIVE MODEL FOR THE AETIOLOGY OF DEPRESSION

INTRODUCTION

Depression has been recognised as a major health problem for many years. This view was reinforced in the World Health Organization's World Health Report (2002), which indicated that mental and behavioural disorders account for 12% of the global burden of disease. The Global Burden of Disease (GBD) 2000 study, which produced the information used in the World Health Report (2002), indicated that unipolar depressive disorders are an enormous burden on societies, accounting for 4.4% of the Disability-Adjusted Life Years lost to ill health annually. One Disability-Adjusted Life Year can be conceptualised as one lost year of healthy life and is used as a way of quantifying the burden of disease. Depression is the leading cause of Years Lost to Disability and accounts for 11.9% of Years Lost to Disability. These figures indicate that unipolar depressive disorders are the fourth leading cause of burden among all diseases.

The World Health Report indicates that 5.8% of men and 9.5% of women will experience depression in any given year. Depression is a pervasive condition and the World Health Organisation estimates that approximately 121 million people in the world suffer from depression at any one time. The Report states that 15 – 20% of those who suffer from depression will carry out successful suicide attempts. It reveals

that depression has come to affect an increasing number of people across diverse cultures and that it is often characterised by the re-development of the disorder after successful initial treatment. It indicates that sufferers have a 35% chance of re-developing depression in the first two years after a depressive episode and a 60 % chance of re-developing depression within twelve years of the initial episode. Finally, the Report indicates that by the year 2020, depression will become the second leading cause of Disability Adjusted Life Years lost as it will increase in prevalence and produce 5.7% of the total Disability Adjusted Life Years for both sexes.

In the light of these findings, a great deal of research within both the medical/psychiatric and the psychological sciences has been devoted to the understanding of depression and to the development of effective treatment strategies to manage it. In response to this research new light is being directed towards the factors involved in the aetiology of depression which is now offering a potentially more complete alternative view of depressogenesis, involving biochemical, environmental and psychological factors.

COGNITIVE MODELS OF DEPRESSOGENESIS

Beck's Model

Cognitive, or information processing, models of depressogenesis were initially formulated by Beck (Beck, 1967, 1976, 1983, 1987, 1991; Beck & Clark, 1988; Kovacs & Beck, 1978). Beck posited that the effect on the individual of the interaction between the exposure to stressful life events which confront the individual's personal vulnerability and the individual's internal self-referent mental model of the world, or schema, is the underlying mechanism that leads to the development of depression.

This cognitive model suggests that the schema is a product of the effect upon the individual's self-referent thinking of previous exposure to stressful events and the person's success, or otherwise, in managing these events. A lack of perceived success in managing life events then leads to the development of dysfunctional cognitions. However, there is some doubt that stress of itself could be the only cause of the development of emotional problems – especially depression. A number of studies implicate reactions of the hypothalamic-pituitary-adrenal axis in the mediation of the individual's response to stress/negative life events or emotional challenge (Emslie, Weinberg, Kennard, & Kowatch, 1994; Holsboer, Lauer, Schreiber, & Krieg, 1995; Petty, Kramer, & Wu, 1997). These studies suggest that exposure to stressful events produces an increase in cortisol which then produces a reduction in serotonin and the development of depression. Petty et al. (1997) also indicate that deficits of serotonin may be a response to the impact of "inescapable stress" rather than a response to maladaptive coping and that serotonin deficits may be implicated in "learned helplessness" (Seligman & Maier, 1967; Maier & Seligman, 1976), a concept which has also been strongly implicated in the development of depression.

By studying the children from abusive families, who were exposed to very negative life events, Cerezo and Frias (1994) were able to link the exposure to situational stress to the later development of dysfunctional cognitive processing and the subsequent experience of emotional problems. This view was supported by the work of Dixon, Heppner, Burnett, and Lips (1993) and Gross and Keller (1992) who also established the relationship between exposure to stressful events, the development of cognitive processing biases and the later experience of depression. Dixon et al. (1993) also make the point that stress in the absence of a negative cognitive processing bias is still related to depressive symptoms. These data support

Beck's premise that stress, and the perception of worthlessness that arises from the exposure to stress, is a precursor to the development of depression.

However, the work of Kendler, Thornton, and Gardner (2000) with female twin pairs indicates that while stress is an initial precursor to, and essential factor in, the development of depression, this relationship does not always obtain. Their research suggests that this one-to-one relationship between the exposure to stressful events and the subsequent development of depression only holds until the individual has experienced nine exposures to stressful events. Kendler et al. (2000) were able to support a strong correlation between the experience of stressful events and the subsequent development of depression, using odds ratio statistics. However, their data suggested that subsequent stressful life events, while capable of producing depression, did not have the same triggering power as the initial exposures to stressful events after a watershed experience of nine such events. Their research indicates that, over time and with repeated exposure to stress, the relationship between stressful life events and depression slowly dissipates and that depression then occurs in the absence of a particular event or a particularly invasive event.

The negatively biased schema postulated to be typical of those who develop depression is focused upon perceptions of the individual's sense of inability and worthlessness. This sense of worthlessness may be more potent and pervasive than the recognition that there has been a lack of success in managing previous life stressors. Beck (1987, 1991) indicated that these schemas contained dysfunctional attitudes regarding the environment and the relations of the individual to the environment. However, Beck did not suggest that these dysfunctional attitudes were a sufficient cause for depression but that they were an integral or necessary part of the process involved in the development of depression. Beck's work indicates that the existence

of these dysfunctional attitudes precludes the adoption of more positive and adaptive schemas. He also proposed that these negative schemas maintain a cognitive shift or processing bias towards a depressing view of the circumstances of the individual's life and that these cognitive changes are accompanied by a negatively valanced memory. This negatively valanced memory tends to more effectively store and retrieve memories with a negative orientation. Evidence for this negative processing bias has been provided by the work of MacLeod, Mathews and Tata (1986) among others.

A number of authors (Georgieff, Dominey, Michel, Marie-cardine, & Dalery, 1998; Hedlund & Rude, 1995; Ingram & Ritter, 2000; McHugh & Wierzbicki, 1998; Miranda, Gross, Persons, & Hahn, 1998; Segal, Gemar, & Williams, 1999; Segal & Ingram, 1994) have carried out work on the concept of schemas. Typically, they assessed recovered depressed participants and assessed the existence of a negatively biased cognitive processing style in the absence of currently depressed mood. These assessments did not indicate that these recovered depressed individuals were different from individuals who had never been depressed on an assessment of dysfunctional attitudes or automatic thoughts. However, after a priming task in which the participants were challenged with material with a negative mood bias, the recovered depressed participants then demonstrated a negative cognitive processing bias consistent with depressed participants in the absence of such a depressed mood. Priming of mood is a collection of techniques which produce the activation of the self-referent schema. Priming is carried out by the process of exposing participants to, for example, lists of words with negative affectivity with or without the participant's conscious recognition of the activation of the schema. Subsequent to the priming process, the participants are then challenged, that is, they are faced with a situation which requires conscious processing. Such challenge then demonstrates differential

performance in those who were engaged in the priming process, either compared with their non-primed state or when compared with non-primed participants. The evidence from priming and challenge studies suggests that the negative schema continues after recovery from depression, in some form, and that with challenge the schema is re-vivified, which may predispose the individual to the re-development of depression. These data are supportive of the concept of an ongoing negative cognitive processing bias in depression.

Beck and Clark (1988) indicated that once the individual is exposed to a significant stressor/negative life event, the individual can develop a negative schema and dysfunctional attitudes. The schema and the dysfunctional attitudes which attend the schema then dominate the individual's existence by producing defective information processing both with regard to their situation and later life events. With later life challenge the interaction between the schema and dysfunctional attitudes leads to the development of negative automatic thoughts about themselves. The negative automatic thoughts which articulate the content of the negative schemas and the situation produce symptoms of depression. Beck and his collaborators (Beck, Brown, Berchick, Stewart, & Steer, 1990; Beck, Weissman, Lester, & Trexler, 1974; Rishkind, Castellon, & Beck, 1989) also considered the concept of hopelessness as a factor in the development of depression and as a potential risk factor for subsequent suicide. Their view was that hopelessness and the attributional patterns consistent with this emotional state were predictive of depression and of suicide attempts during depressive episodes.

Beck's Personality Vulnerability Model

As indicated above, Beck (1987) suggested that there were personality and other variables – genetics, bonding and neurochemical – in the interaction between

stressful events, coping, and the development of depression. With regard to personality variables, he developed the concepts of autonomy and sociotropy to describe the personality styles which are implicated in the development of depression (Beck, 1991). Beck (1991) postulated that these identified personality types were a source of cognitive vulnerability to the development of depression. The former of these personality variables, autonomy, is centred on a pervasive need for control/self-control, achievement and independence combined with a strong pattern of self-criticism (Abramson, Alloy, & Hogan, 1997). Connor-Smith and Compas (2002) define the sociotropic personality style as one in which the individual has a pervasive need for affiliation, interpersonal interaction and support and an avoidance of rejection or abandonment.

Beck argues that people of both personality types are at risk of developing depression when stressful events, which are congruent with their particular vulnerability factors, overwhelm their ability to cope using their respective coping mechanisms. Support for the concept of the relationship between sociotropy and depression, was also provided by Connor-Smith and Compas (2002), whose data provided strong support for the link between sociotropy, distress and anxiety/depression. Riso et al. (Riso, du Toit, Blandino, Penna, Dacey, Duin, Pacoe, Grant, & Ulmer, 2003) have found strong evidence for the concept of *impaired autonomy*, the need for excessive reassurance seeking, as a major factor in chronic depression. They also define impaired autonomy as a need for affiliation, social contact, and support. The concept of impaired autonomy is obviously similar to Beck's construct of sociotropy.

The concept of impaired autonomy has also received support from the work of Joiner and Metalsky (2001), who found that individuals who have a strong need for

affiliation engage in reassurance seeking in times of stress. Their work indicated that such reassurance seeking, especially when combined with depressive affect, was a precursor for the later development of depression. Given the work of Cerezo and Frias (1994) and Gross and Keller (1992), it seems reasonable that a person who has experienced problematic early development experiences would seek affiliation, would have a strong need for reassurance and would engage in assurance seeking. This research indicates that the lack of affiliation and support can be a significant contributor to the development of depressive symptoms. Barnett and Gotlib (1990) and Harris (2001) have also produced strong evidence that social support can be a significant protective factor confronting the development of depression with life stress.

As indicated above, Beck and his colleagues have developed a theory of depressogenesis based on the cognitive or information processing model. This model provides information on some of the factors involved in the development of depression. However, other authors (Abramson, Alloy, & Hogan, 1997; Dyck & Stewart, 1991; Haaga, Dyck, & Ernst, 1991) question the Beck formulation. This negative evaluation is in spite of Beck's own movement away, in some sense, from this rigid view (Beck 1991). In spite of this evidence from Abramson et al. (1997), Haaga et al. (1991) did find support for a personality type with dependency features that was more prone to the development of depression. This dependency type personality also seems to be consistent with the sociotropy construct. However, the view of Abramson et al. (1997) and Haaga, Dyck and Ernst (1991) was that, in contrast to sociotropy, there was less support for a link between the autonomous personality and depression.

Abramson, Alloy, and Hogan (1997) suggest that irrespective of personality type or the absence of a specific cognitive vulnerability, individuals will develop depression when faced with a challenge of sufficient severity to overwhelm their coping resources. Abramson et al. also fail to support the contention that personality congruent challenge will produce personality related depressive symptoms – more rumination and tearfulness in sociotropic depression, for example as indicated by Dyck et al. (1991).

However, Beck's theory of depressogenesis has been extensively evaluated. It has been seen by some writers (Ingram, 1984) as being more descriptive than causative because of its lack of explanation of how the postulated relationships function to produce the outcome of depression and how these processes of schema and biased information processing relate to affect. Coyne and Gotlib (1983) argued that neither Beck's model nor the learned helplessness model, which they considered were both diathesis-stress models, were able to demonstrate that cognitive factors played a causal role in depression. This view was taken in response to the unreliability of participants in research to behave in the predicted directions on assessment given their depressed or non-depressed status. Coyne and Gotlib (1983) further questioned these cognitive models in response to the data which indicated that individuals can and do recover from depression without therapy. Haaga et al. (1991) also found little evidence in support of the diathesis-stress model. Their view was similar to that of Coyne and Gotlib (1983) in that they were unconvinced of the power of dysfunctional beliefs or, by implication, negative attributional styles, when individuals spontaneously recover from depression without treatment.

However, other writers (Alloy, Abramson, Whitehouse, Hogan, Tashman, Steinberg, Rose, & Donovan, 1999; Connor-Smith & Compas, 2002; Oei & Free,

1995) have found strong evidence for the interaction between self-referent processing of negative relevant material, interpersonal stress, sociotropy and symptoms of depression. The meta-analysis of the effects of cognitive treatments of depression, carried out by Oei and Free (1995) is also supportive of the cognitive model and of the effectiveness of cognitive model based therapy. This support was in response to the mood congruent change, to lower scores, on the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) and the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) of the remitted depressives compared with the waitlist controls. This finding is supported by the work of Williams, Mathews and MacLeod (1996), whose studies using the modified Stroop Test, demonstrated that there is a significant processing bias in those who have a negative schema and a propensity to suffer from depression, even after the remitting of the depression, and that this bias is re-vivified, after recovery, by priming with depression related material. These findings were replicated by Lawson and MacLeod (1999), who found that this relationship obtained especially if the negative material used in priming is self-referent.

Helplessness Model

A second and dominant theory of depressogenesis is known as the "learned helplessness" model. This theory was developed out of the work of Maier and Seligman (1967 and 1976), whose initial research demonstrated that dogs exposed to inescapable and unavoidable electric shock later failed to avoid shock when escape was possible. Their view was that aversive uncontrollability produced cognitive, motivational, and emotional deficits that they believed had significant parallels with depressive symptomatology in humans. However, when this paradigm was regarded by the proponents to be unable to deal with the problems of the generalisability and

chronicity of depressive symptoms and the associated loss of self-esteem in depression, the "learned helplessness" model was reformulated with a reliance upon an attributional paradigm. This reformulation of the learned helplessness model, developed by Abramson, Seligman, and Teasdale (1978) sees the experience of depression as a product of a view of life which makes the individual feel helpless in the face of life challenge. Abramson et al. (1978) posit that, when exposed to a negative life event, the individual assesses the situation and ascribes a possible cause for the event. This process is commonly called a causal attribution. This causal attribution is an attempt to explain negative life events. With further or chronic exposure to negative life events the causal attributions can become internalised and produce an attributional style of responding to life events in a way which is characterised by an internal, global and stable set of attributions about life and life events. In response to this attributional style, the individual tends to interpret negative life events as being a product of their own flawed, worthless or vulnerable selves. The negative attributional style also ascribes to these negative life events a sense that they are a stable factor and that they will persist over time. Finally, the negative attributional style changes the perception of life such that the individual perceives that these negative events will occur over many environments and areas of their lives. In response to this attributional style, the individual develops a sense that they are helpless and becomes depressed.

The reformulated helplessness model then accounts for the self-esteem loss in depression because it "informs" the individual that they have a reduced ability to change their situation. The recognition, by the individual, that they are unable to exert control over their existence then reduces the individual's sense of self-worth or value. The learned helplessness model also proposes that there are cognitive vulnerabilities

to the development of depression in response to an explanatory style that, like the schemas postulated by Beck, is internal, global, and stable, and which is self-referent and pessimistic. This model places the evaluation of life events and cognitive processes at the centre of depressogenesis. More recent research supports this formulation and suggests that once this pessimistic and self-referent explanatory style has been developed, it is self-maintaining (Burns & Seligman, 1991; Joiner & Wagner, 1995; McKean, 1994; Nolen-Hoeksma, Wolfson, Mumme, & Guskin, 1995; Peterson & Seligman, 1984; Swendsen, 1997). This self-maintenance is seen as a product of the self-defeating explanatory style and its internal, stable and global structure which then causes the individual to interpret external challenging events in a way which presents these events to the individual as being unmanageable. This process, which is repetitive and unchanging, maintains the explanatory style, the sense of helplessness/hopelessness, and the vulnerability to depression. The key here is that the attributional style is not, as indicated by Dixon, Heppner, Burnett, and Lips (1993), a sufficient cause for depression. Their view is that depression is a result of the interaction of factors, and that, the attributional style in interaction with challenging, and perceived unmanageable life events, leads to depression.

Subsequent to the development of the reformulated learned helplessness model, Abramson, Metalsky and Alloy (1989) developed the hopelessness model of depression. This model arose out of a re-evaluation of the reformulated helplessness model which was seen as not having the necessary power to explain the development of depressive symptoms. The model focuses on hopelessness as the proximal and sufficient cause of depression and in doing so reduces the reliance on negative self-attributions. This model is based on the formulation that hopelessness arises when highly desired outcomes do not occur or when negative outcomes are not able to be

avoided and that the individual's repertoire of skills is insufficient to affect the outcome of this challenge. The hopelessness model implies both an unavoidable negative event and an inability to influence the outcome. The hopelessness model also relies on the internal, stable and global attributional style of helplessness theory, of which this model is a sub set, and reinforces the diathesis-stress formulation of depression. However, the work of other researchers (Dixon et al., 1993; Metalsky, Joiner, Hardin, & Abramson, 1993) suggests that hopelessness moderates rather than mediates the interaction between stress and depressive symptoms. Dixon et al. report that in the absence of hopelessness, stress is unrelated to depression. Further, they indicate that under high levels of stress high hopelessness individuals report higher levels of depression than low hopelessness individuals.

Other Cognitive Models

Although helplessness/hopelessness is a strong theory with a good deal of evidence to support its centrality in the development of a model to explain the process of depressogenesis, other cognitive models exist which are important in explaining some or all of the factors in the aetiology of depression. One of these is the theory of response styles developed by Nolen-Hoeksema (1991). This theory suggests that individuals who suffer from dysphoric mood can move into depression and unconsciously extend the duration of their depression by an over-focus on their internal negative emotional state. Nolen-Hoeksema indicates that such internal focusing is accompanied by self-isolation, a loss of problem-solving focus and ability, and the possible development of dangerous behaviour and alcohol abuse – the last as a way of stopping the negative self-referent thinking or ruminating. Her view is that such negative self-focused ruminating can produce negative self-attributions and an increase in the recall of negative memories which can contribute to the development

of depressed mood through the increase in negative affect produced by the rehearsal of such negative self-attributions. Just and Alloy (1997), Lyubomirsky, Tucker, Caldwell, and Berg (1999), Papageorgiou and Siegle (2003), Schmaling, Dimieljian, Katon, and Sullivan (2002), and Schwartz and Koenig (1996) support the contention that a ruminative style is consistent with the existence of negative self-attributions, and that this cognitive style has the potential to increase the chronicity of depression. Lyubomirsky and Nolen-Hoeksema (1995) also point out the negative effect that such a ruminative style has on problem-solving and the potential of this deficit to reinforce an avoidance of problem-solving. This problem-solving avoidance is seen as being a result of defective problem-solving produced by the energy and motivational deficits based in the ruminative style. These factors are seen as having the potential to develop learned helplessness. Interestingly, the research of Nolen-Hoeksema (1991) contributes somewhat towards an explanation of the higher prevalence of depression in women. Nolen-Hoeksema's view is that women are more likely to ruminate than men and that this self-focused rumination tends to make women more reactive to depressive mood priming, as described above, than men and, therefore, more likely to become depressed in the face of negative events.

The cognitive models of depression, in spite of their apparent success in describing some of the factors in the aetiology of depression and their efficacy in developing therapeutic interventions for those individuals suffering from depression, tend to have a narrow focus. Research with children, where the negative life events produce either the negative valanced schemas or attributional styles which are implicated in the later development of depression occur, suggests that there are a number of significant environmental factors which need to be addressed when one considers factors involved in the aetiology of depression. These environmental factors

are the defining events which underlie the development of the dysfunctional cognitions.

FAMILY INTERACTION MODELS

The cognitive models of depression appear to be quite powerful in their ability to delineate the factors which lead to the experience of depression. However, they do not explain the type, or the effect, of negative life events or environmental factors which could initially induce these schemas or negative attributional styles. It would be worthwhile investigating if these initial negative life events or environmental factors, in childhood, have an input into the development of depression later. Certainly there needs to be an evaluation of some of the available research on depression in children to establish if childhood has a significant impact on the later development of depression.

The work of Cerezo and Frias (1994), with children who were the victims of chronic abuse, indicates that such children endorsed strong feelings of a lack of control over their lives and responded to their situations with a negative attributional style, making sense of their world through an internal and stable self-characterisation of themselves as being "bad". Cerezo and Frias found that the children had high levels of depressive symptomatology associated with their maladjusted cognitions, affects, and behaviours. This research indicates that abuse has a profound effect on the attributional style of the child, which is more accessible with age. Gross and Keller (1992) and Nolen-Hoeksema, Girgus, and Seligman (1992) found that psychological abuse was a more powerful predictor of poor self-esteem, negative attributional style and depression than physical abuse. However, they also found that child victims of physical abuse and combined abuse showed similar problems with self-esteem, attributional style, and depression. This work indicates that early childhood trauma is

predictive for the development of learned helplessness, a negative attributional style and depression, both immediately and later in life.

Further, it is reasonable to expect that the relationships elucidated by Cerezo and Frias (1994) and Gross and Keller (1992) would lead to the development of depression in abused children. However, research indicates that other factors in childhood can also produce the negative self-referent schemas and attributional styles which are associated with depression in childhood and later adolescence and adulthood.

A good deal of research has been carried out into the impact on later emotional status of the bond or attachment between mothers/parents and their children. McKean (1994) and Nolen-Hoeksema (Nolen-Hoeksema et al., 1992; Nolen-Hoeksema et al., 1995) argue that helplessness is triggered by "uncontrollability", uncertainty and a response to the failure of appropriate and supportive parenting. The essence of this research is that either a lack of parental involvement and/or the existence of parental conflict reduce the child's self-esteem and sense of self-efficacy and produce a negative attributional bias in the children so exposed. This research also reveals that children of depressed mothers are at risk of receiving a lower level of parent interaction and less positive reinforcement. This pattern of parenting is associated with a lack of persistence and enthusiasm, a lower threshold of frustration and a less positive outlook. These studies suggest that defective parental bonding and the exposure to abuse and neglect are precursors to the development of helplessness and the subsequent development of a self-referent and pessimistic explanatory style.

Dujovne, Barnard, and Rapoff (1995) and Ingram and Ritter (2000) have also identified the impact of less effective family structure and defective parental bonding as precursors to the development of a vulnerability to depression. They suggest that

this vulnerability may be based in a number of factors especially the behaviour of care givers who are rejecting, punitive, harsh or critical, behaviours which seem to engender a pattern of self-criticism and a negative attributional style in children. Ingram and Ritter (2000) indicate that such behaviours produce vulnerability structures which form the core of negative attributions or schemas in the future and which are associated with cognitive vulnerability and depressive symptoms. Ingram and Ritter posit that such vulnerability may be a response to the effect upon the child's sense of self-worth of a mother who does not give that child a sense of value. Such a low self-value would prime the person, as an adult, to respond to life challenges with feelings of worthlessness, hopelessness and eventually depression.

Both Dujovne et al. (1995) and Ingram and Ritter (2000) further found that parent over-protectiveness is an additional factor in the failure of the child to develop independence and to develop a pattern of increased reassurance seeking at times of challenge. Dujovne et al. (1995) and Ingram and Ritter (2000) see both under-involved and over-involved parenting styles as failures of bonding and as significant precursors to the development of negatively biased cognitive processing of information and eventual depression with later emotional challenge.

Harris and Curtain (2002) and Riso et al. (2003) were able to establish that children develop early maladaptive schemas in response to ineffective interpersonal interactions with their parents, that these early maladaptive schemas are strongly attached to core issues like autonomy and intimacy and that, in response to the importance of these core issues in development, these early maladaptive schemas were more likely to be automatic and more capable of producing negative affectivity. The information arising from the work of Harris and Curtain (2002) is consistent with the view that children develop schemas in response to their interactions with care

givers and that this interaction pattern contributes to their working models of life – their subsequent schemas. Harris and Curtain (2002) indicate that that parenting responses characterised by either low or high protection produce an increase in the vulnerability to the development of these early maladaptive schemas/negative attributional styles and the subsequent vulnerability to depression. The meta-analysis of research in the area of the development of depression in children produced by Joiner and Wagner (1995), identified bonding and parenting style as significant precursors to the later development of dysfunctional schemas and attributional styles and depression. Joiner and Wagner (1995) also support the contention that attributional style is a significant predictor of the development of depression in children and subsequently in adults with this established cognitive vulnerability.

A number of researchers, e.g. (Beck, 1987; Joiner, & Metalsky, 2001; and Riso et al., 2003) make a case for a personality vulnerability factor as a precursor for the development of depression. Recent work (Klein, Lewinsohn, Rohde, Seeley, & Durbin, 2002) indicates that depressive symptomatology tends to aggregate within families. Their research found that there were significantly higher rates of depression in the relatives of individuals who have suffered recurrent episodes of depression. Early onset of depression was also associated with familial pattern of the experience of depression. This pattern of morbidity in families could be a response to the factors isolated by Dujovne et al. (1995), Hayden and Kelin (2001), Ingram and Ritter (2000), and Riso et al. (2003), of the negative effect on bonding of depressed caregivers. The research suggests that depressed care givers were less likely to engage with their children which, as suggested by McKean (1994) and Nolen-Hoeksema et al. (1992, 1995), produces uncontrollability and learned helplessness. Dujovne et al. (1995), Hayden and Kelin (2001), Ingram and Ritter (2000), and Riso et al. (2003)

also found evidence that this familial aggregation of depression was associated with the negative effect of defective parenting styles of over-protection versus under-protection of children by their parents in response to the parent's own pathology or enculturation and adverse life events during childhood. Certainly, this would accord with the view of Yapko (1999) who considered that there was insufficient evidence from twin studies to establish that there was a genetic involvement in depression, especially as no single gene had been identified as a precursor to the development of depression. Yapko's research indicated that there may be correlations with a number of genetic influences with a maximum probability of effect of 40 to 50 percent. Yapko strongly supported the interaction model proposed by the other authors. Kendler et al. (1995) suggest that genetic factors mediate the interaction between negative life events and the effect of parenting style and parental bonding and produce a sensitivity to depression in response to negative life events.

Interestingly, there is a good deal of evidence that once a negative attributional style/negative self-referent schema has been developed in childhood, this schema has a strong potential to carry through to adulthood. Lewinsohn, Rohde, Seeley, Klein, and Gotlib (2000) and Lewinsohn, Rohde, Klein, and Seeley (1999) found that depressed and formerly depressed adolescents were at an elevated risk of the recurrence of major depression in adulthood. Riso, Miyatake, and Thase (2002) support this view and indicate that the dominant precursors for chronic depression were childhood adversity, heightened stress reactivity and chronic environmental stress. Their view is that these factors are implicated in the later development of cognitive vulnerability to depression through the mechanisms of later defective interpersonal reactions, attachment problems and a change in the nervous system in response to stress.

Klein (1990) and McDermut, Zimmerman and Chelminski (2003) propose the existence of a depressive personality disorder, based on the aggregation of depressive features and symptoms within some families. However, McDermut et al. suggested that such a construct would need a good deal more biochemical and genetic research to provide strong support for its viability as a means of accounting for the development of depression.

BIOCHEMICAL MODELS

It is clear that there is strong evidence for the role of familial factors as precursors to the development of depression. However, it is essential that both environmental and others causes for depressive vulnerability be evaluated to see what contribution they can make to the development of a model of depressogenesis that is more complete.

Coincident with the research on genetic factors in the development of depression, research into the biochemistry of mental disorders is being undertaken to establish the dynamics of the interaction between situational stress and the development of cognitive vulnerability and depression. These investigations tend to follow either a hypothalamic-pituitary-adrenal (HPA) axis pathway or a gamma amino butyric acid (GABA) pathway to the development of depression.

Hypothalamic-Pituitary-Adrenal Axis Model

The mechanisms of the HPA axis are well understood. With exposure to stressful events, anatomical connections between the amygdala, hippocampus and hypothalamus facilitate the activation of the HPA axis. This activation, fear signalling, triggers the hypothalamus to secrete corticotrophin releasing factor (CRF) which then travels to the pituitary gland. The arrival of CRF at the pituitary causes the pituitary to secrete adrenocorticotropic hormone (ACTH). ACTH is transported to the

adrenals, through the circulatory system, which then synthesise corticosteroids, adrenaline and cortisol. Adrenaline promotes the alarm and activation response while cortisol mediates the response facilitating an adaptive response in which alarm responses are reduced. The increased cortisol then inhibits the further release of CRF and ACTH. Constant activation of this system, however, produces a number of significant effects including the reduction in volume of the hippocampus and a consequent reduction in the ability to develop new memories. Hypersecretion of cortisol is also associated with a dysfunction of serotonin receptor activity and depression (Pitchot, Herrera, & Ansseau, 2001; Porter, Gallagher, Watson, & Young, 2004; Varghese & Brown, 2001). Holsboer, Lauer, Schreiber, and Krieg (1995) evaluated the effectiveness of the HPA axis response in depressed participants and their family members. Their findings were consistent with the existence of a defective HPA feedback loop in their participants and with the formulation that this defective feedback loop increased the sensitivity, of those studied, to the experience of heightened emotional states in response to situational stress. Their research indicated that there was a genetic factor in the development of this defective feedback loop and postulated that there was a feedback anomaly in the HPA system of their participants and the participants' family members which lowered the threshold of responding. This lower threshold of responding is seen to produce increased responses/over-responses to environmental factors.

Dopamine Model

Petty, Kramer, Wu, and Davis (1997) found evidence that environmental stress produces an increase in the secretion of dopamine in the medial prefrontal cortex and that this increased dopamine secretion then produced an increase in serotonin secretion with chronic stress. However, chronic over-secretion of serotonin

eventually produces a depletion of serotonin intra-neuronally and to serotonin depletion in the medial prefrontal cortex and with depressive symptomatology consistent with the paradigm of learned helplessness.

Gamma Amino Butyric Acid Model

Research has also been focused on the importance of gamma amino butyric acid (GABA) in the aetiology of depression. GABA is a inhibitory neurotransmitter which is involved in reducing the individual's response to life events. A low level of GABA is seen as maintaining the individual at a more emotionally aroused and sensitive state. GABA is increased by the administration of serotonin agonists (Petty, 1995) which are low in the blood plasma of depressed individuals (Emslie, Weinberg, Kennard, & Kowatch, 1994). Petty and other researchers (Emslie et al. 1994; Weinberg, Kennard & Kowatch, 1994; Petty, 1995; Petty et al. 1997) indicate that low levels of GABA are a fairly stable trait-like marker for mood disorders and that this deficit in GABA may represent a genetic vulnerability to mood disorders. This GABA based cognitive vulnerability to depression could be consistent with the work of Kendler, Kessler, Walters, and Maclean (1995) which suggests that an over-sensitivity to life events could be a precursor to the development of helplessness and depression.

Petty (1995) suggests that stress-induced helplessness produces a decrease of GABA in the hippocampus and therefore a hyper-reactivity to challenge. Petty (1995) also suggests that the treatment of mood disorders might be associated with a rectification of the GABA deficit in those individuals. Unfortunately, most of these studies are based on work with adult populations and are therefore post hoc in their assumptions. However, given the large number of findings linking GABA deficiency with mood disorders and given the fact that children also experience mood disorders

at a rate similar to adults, it is reasonable to postulate a causative role for GABA, especially given its effect on stress tolerance. Obviously, more research is needed into the state of children and their neurotransmitter function in advance of exposure to stressors consistent with those seen as producing a cognitive vulnerability to depression, before the GABA hypothesis can be supported more fully.

Summary

In summary, the information presented above suggests that there are many theoretical approaches to understanding the development of depression in individuals. It seems most parsimonious to deal with these many competing theories, and the constructs that they have developed, as a multifactorial description of the factors underlying the development and experience of depression. This is more the case as no single theory has been able to account for the full range of emotional and cognitive behaviours associated with the experience of depression.

EFFICACY OF TREATMENTS FOR DEPRESSION

Whatever the postulated aetiology of depression, the research on treatment outcome, though extensive, is focused on comparisons of cognitive therapies, of all kinds, with interpersonal therapies and medication management. A significant research effort has been directed to establishing the effectiveness of cognitive therapies, because they have become the dominant therapeutic modality for the management of depression. This focus has produced a great many reviews (Antonuccio, Danton, & DeNelsky, 1995; Barrett, Williams, Oxman, Katon, Frank, Hegel, Sullivan, & Schulberg, 1999; Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999; Haaga, Dyck, & Ernst, 1991; Hollon, Shelton, & Davis, 1993; Jacobsen, Dobson, Truax, Addis, Koerner, Gollan, Gortner, & Prince, 1996; Jayson, Wood, Kroll, Fraser, & Harrington, 1998; Hamilton, & Dobson, 2002; Michael, & Crowley,

2002; Oei, & Free, 1995; Oei, & Shuttlewood, 1996; Reinecke, Ryan, & DuBois, 1998; Spangler, Simmons, Monroe, & Thase, 1997; Teasdale, Segal, & Williams, 1995; & Wishman, 1993).

These reviews indicate that effective research in this area is difficult because of methodological complexity of it, especially with regard to the management of confounding variables. In response to these methodological difficulties, some of these reviews give limited support to cognitive therapy as an effective therapy while others show strong support for the efficacy of cognitive therapy. What follows is the reporting of both meta-analyses of outcome studies on the effectiveness of depression and reports of outcomes from single studies. Interestingly the meta-analyses have exceedingly few shared data – one study.

In their meta-analysis of the effectiveness of 43 outcome studies of cognitive therapy, Oei and Free (1995) were able to establish that changes in cognitive style occurs with cognitive therapy, other psychosocial therapies and with tri-cyclic anti-depressant treatment. Their research indicates that there was a significant change in cognitive negativity and a reduction in scores on the Beck Depression Inventory with the experience of the cognitive and psychosocial therapies, whereas this did not occur with tricyclic medication. However, their findings were not replicated on the Hamilton Rating Scale for Depression, which has a far less cognitive orientation to its items. More interestingly, Oei and Free did not find evidence for any superior outcome for cognitive therapy over other psychosocial therapies. A follow-up study by Oei and Shuttlewood (1996) reinforced the efficacy of psychosocial therapies over wait-list control/no treatment and again indicated that there was no difference in efficacy between cognitive therapy and other psychosocial interventions. Oei and Shuttlewood (1996) found that the engagement of an individual with a structured

approach, a structured formulation of pathology, a focus on inner dialogue and the engagement in a therapeutic alliance, produces measurable outcomes. However, they were unable to demonstrate that the specific processes of cognitive therapy are more powerful than the effect of the non-specific factors, outlined above, in producing positive mood change.

Jacobson, Dobson, Truax, Addis, Koerner, Gollan, Gortner, and Prince (1996) compared cognitive therapy with behavioural activation – the re-engagement of the depressed individual in their lives – alone, and a combination of behavioural activation and a direct approach to modifying core schemata. This study indicated that cognitive therapy was no more effective than behavioural activation alone or behavioural activation and a direct modification of the core schemata and that behavioural activation was as efficacious as cognitive therapy. These results were unchanged at six month follow up. Jacobson et al. suggested that this lack of difference in efficacy between the treatments indicates that behavioural activation was more powerful in changing the way people think than treatments explicitly focused on changing thinking. They felt that these outcomes challenged both cognitive theory and therapy.

The meta-analysis of Haaga, Dyck and Ernst (1991) assessed the outcomes of 38 studies which evaluated the relevance of cognitive factors in the development and maintenance of depression. This analysis produced little support for the causal hypothesis of cognitive theory, given that studies of remitted depressed individuals do not support this formulation. Similarly, it found little support for the concepts of sociotropy and autonomy. Haaga et al. (1991) were also concerned about the lack of a definition of the 'stressor' and suggested that until this was defined, it would be difficult to support a stress-diathesis model. Finally, they were concerned that the

factors postulated to be involved in the development of depression were too narrow and did not really take into account environmental, familial and other factors.

Spangler, Simons, Monroe, and Thase (1997) also failed to find evidence for the stress-diathesis model – either the Beck or the helplessness model – and its ability to predict response to cognitive therapy. However, they did find strong evidence in support of the effectiveness of cognitive therapy. Unlike Hamilton and Dobson (2002), however, they were not able to demonstrate a relationship between pre-treatment factors and therapeutic response. Spangler, Simons, Monroe, and Thase (1997) demonstrated a link between post-treatment depression and the existence of an internal, stable, and global attributional style and that this may mean that individuals with this cognitive style may respond less well to all treatments.

Hamilton and Dobson (2002) suggest that the effectiveness of cognitive therapy is dependent on other factors apart from the therapy itself. They indicate that the severity of depression at the commencement of treatment, the younger the age of onset, the chronicity and the number of previous episodes of depression all militate against the effectiveness of cognitive therapy as a treatment. This work is supported by that of Jayson, Wood, Kroll, Fraser, and Harrington (1998) who also identified severity at the time of treatment and age as significant factors affecting the response to cognitive therapy. However, they also demonstrated that cognitive theory and the therapy it has developed, are consistent with the development of depression and with its effective management.

Michael and Crowley (2002) reported on their meta-analysis of treatment outcomes which surveyed 38 studies involving treatment outcomes for child and adolescent depression. Twenty-four of these studies evaluated psychosocial treatment for depression – cognitive behavioural group therapy (13 studies), non-directive

individual support (3 studies), social skills group (3 studies), cognitive-behavioural individual therapy (4 studies), and relaxation groups (2 studies), and 14 studies which evaluated pharmacological treatments – controlled trials with an active medication and a control group. This analysis revealed that psychosocial treatments for early onset depression leads to a substantial reduction in depressive symptoms, with an overall effect size 0.72. They were also able to demonstrate that these effects were durable over time, effect size 0.19, whereas the pharmacological treatment did not produce a substantial reduction in severity in the depressed children and adolescents. The study also indicated that pharmacological treatments were no better than placebo in treating depressed youth and that effect sizes for children over all treatment regimes were less than for adolescents.

These reviews and the work of Barrett, Williams, Oxman, Katon, Frank, Hegel, Sullivan and Schulberg (1999), Clarke, Rohde, Lewinsohn, Hops and Seeley, 1999; Hollon, Shelton, and Davis (1993), Teasdale, Segal, and Williams (1995), and Whisman (1993) strongly suggest that cognitive therapy in all of its forms has a therapeutic effect; that cognitive therapies do change the targets of cognitive therapy and produce the remission of depressive symptoms; that group cognitive therapies are better than no therapy; that anti-depressant therapy was not substantially superior to placebo in treating depressed youth; that pharmacological and psychosocial treatments are more effective for adolescents than children; and that cognitive therapies are at least as effective as tricyclic and specific serotonin re-uptake inhibitors in the management of depression. These analyses of treatment effect also indicate that anti-depressant medication, if employed, should be combined with cognitive therapy because of the higher risk of relapse, following treatment, with medication alone as the treatment modality (Antonuccio et al., 1995). These findings

have been made with disparate groups and with different levels of depressive symptomatology.

Other researchers (Fava, Rafanelli, Grandi, Conti, & Belluardo, 1998; Gillham, Reivich, Jaycox, & Seligman, 1995) also found that pre-treatment of adolescents and individuals suffering from recurrent depression with cognitive therapy, significantly reduced the experience of depression later. These findings and the results of the previous analyses suggest that cognitive therapy is effective as a treatment of depression.

This treatment outcome information suggests that cognitive treatments are targeting constructs which are pivotal to the experience of depression whether or not the constructs are *causally* connected with depression. The theoretical standpoint of the dominant therapies of depressogenesis relies on the development of either a dysfunctional attributional style or a negative schema which are presumed to be developed in response to adverse developmental experiences. The impact of these challenging negative developmental experiences is to produce a sense of learned helplessness or the development of a negatively biased schema and, subsequently, depression. The outcome studies, then, support the theoretical underpinnings of the cognitive theories of depression. However, studies on the efficacy of treatment are not capable of elucidating the mechanism involved in the cause of depression. What then is the relationship between negative developmental, and later, challenge and the development of schemas or a negative attributional style?

SCHEMAS, ATTRIBUTIONAL STYLES AND MENTAL MODELLING

As Abramson, Seligman and Teasdale (1978) indicate, it is the nature of human beings to question why negative events occur when they do and how to deal with them. Kelemen and Di Yanni (in press 2003) and other researchers (German &

Barrett, 2005) indicate that children have a broad tendency to think about natural phenomena and to apply intention-based accountings for their observations. This research indicates that for young children, things occur for reasons and that they need to know why things happen. The children's explanations of their world then colour their subsequent behaviours. The guesses or explanations that children, and subsequently adults, make about the causes of behaviour, events, and situations are characterised by cognitive theories of depression as schemas. These schemas can be positive if the accounting produces appropriate positive outcomes or negative, in which case they become the negative schemas and negative attributions/explanatory style which cognitive theorists associate with depression.

Working Memory

In the light of the studies carried out by Kelemen and Di Yanni (2003) and German, and Barrett (2005), it is clear that individuals, from infancy, are trying to solve the problems of life. However, problem-solving is a complex process which is seen to require a good working memory. Typically a good working memory is associated with, and is seen as a sign of, average fluid intelligence. Therefore, those individuals with good working memory and hence fluid intelligence should be able to solve their life's problems and should not be overcome by their situations. However, Hambrick and Engle (2003) suggest that working memory capacity is only important to problem-solving performance when controlled processing is demanded, because relevant information must be maintained and processed under conditions of distraction or interference and where this distracting and interfering information has to be inhibited. They indicate that working memory capacity does not always correlate positively with problem-solving performance but that working memory is pivotal to problem-solving success.

Hambrick and Engle (2003) indicate that working memory capacity and problem-solving are also affected by problem-solving errors, functional fixedness – the inability to use a familiar object, concept or process in a novel way; and negative set – the continued use of a complex solution when a simpler solution is possible. Functional fixedness is seen to occur because the individual is unable to suppress a detail of the object or concept such that novelty can occur, and negative set is a response to the inability to suppress previously tried solutions. The work in child cognition by Kelemen and Di Yanni (2003) and German and Barrett (2005) indicates that functional fixedness is a normal response to life, in that it allows humans to develop automatic responses to life, which reduce the expensive demands of conscious or effortful processing on the body. German and Barrett (2005) were able to demonstrate that a younger child, of five years of age, was more able to solve a problem than an older child, of seven years of age, who had more experience of life and therefore a more "fixed" way of dealing with situations. These authors see fixedness as a normal function of growth and development and the development of a more effective semantic memory in children as they develop, such that they can rely more on the less demanding automatic processing of information to deal with life, rather than the more energy wasteful conscious processing of an early stage of development. Pretz, Naples, and Sternberg (2003) have described this process from a different viewpoint, the study of adult problem-solving. Their findings indicate that because the individual does not enter the problem solution situation/problem-solving space as a blank slate, present solutions are affected by previous solutions in terms of the outcomes and/or the structural tools used to deal with the information processing and subsequent problem-solving. That is, all information processing is affected by functional fixedness in some respect. Negative set has a similar aetiology in the early

life of the child, again through life experience, and the desire to account for and deal with life events, and can cause similar impediments to problem-solving as functional fixedness.

In the problem-solving space, functional fixedness and negative set limit the ability of the problem solver to hold the problem in the working memory "space" and manipulate it to produce a solution. The working memory is important in that it allows access to information about previous attempts to solve the problem or to alternative information to solve the problem. However, as Hambrick and Engle (2003), Brewin and Beaton (2002), and Eysenck and Keane (2000) indicate, if the working memory is not able to suppress intrusive information or interference, so maintaining flexibility, fixedness and/or negative set occurs and the problem becomes unsolvable. Therefore, the key operating variable in problem-solving is the ability to maintain the required information in an activated state to allow processing while suppressing interference – an inflexible view of the problem or previously used and unhelpful solutions. Such a process is quite demanding in terms of bodily resources and is therefore used sparingly (German & Barrett, 2005).

Rule Governed Behaviour

The work of other researchers (Allen & Brooks, 1991; Catania, Shimoff, & Mathews, 1989; Hayes, Kohlenberg, & Melancon, 1989) is important with regard to this problem-solving enterprise and the need to reduce the amount of conscious processing carried out. Catania et al. (1989), suggest that behaviour is initially controlled by contingencies. That is, a problem arises and the individual responds to it. If the response is correct, then the reward process reinforces this response contingency which then becomes more likely to occur. Catania et al. also indicate that as the contingencies change, the behaviour changes to adapt to these changes in

the contingencies. However, once the contingency relationship is internalised as a rule structure, this new rule structure becomes insensitive to contingencies and operates in spite of them, fixedness and negative set have developed. This is also the case where rules are learned from another individual. In response to this process the motivation for the maintenance of the rule is likely to differ from the effect of the contingencies that produced it. Further use of the rule eventually produces behaviour that is automatic, that is, the verbal component that triggers it is no longer required and rule following occurs without this verbal awareness or prompting. The loss of the verbal behaviour, however, removes the opportunity to modify the rule in the face of changing external contingencies.

This process of rule development and the development of insensitivity to contingencies has an effect on problem-solving. As Pretz et al. (2003) indicate problem-solving occurs in an environment where previous solutions have been developed either by the individual involved or by others who have given the individual a rule structure. This rule structure then interacts with problem-solving as it affects the heuristic of the solution search strategy and can interfere with effective problem-solving in the future. Rule governed behaviour arises because of the effect of contingency and the inability of the individual to examine all the consequences, information and options during problem-solving, in response to the limitations of working memory. In response to this interaction and limitations the individual relies on heuristic search strategies attending to a limited number of alternatives that they recognise as being promising – from past experience. The choice of the heuristic is based on the knowledge of the problem space and is at the heart of effective problem-solving (Schwarz & Skurnik, 2003). Ineffective heuristics, affected by fixedness and negative set and hence limited working memory capacity adversely affect problem-

solving, which is then based on a limited model of the aspects of the problem to be solved. In response to this process problem-solving become less effective. These processes may underlie the family environment factors recognised to be important in the development of depression elucidated by Dujovne et al. (1995), Harris and Curtain (2000), Ingram and Ritter (2000), and Riso et al. (2003).

Mental Modelling

The work of Cheng and Holyoak (1985), Johnson-Laird (1983, 1996), and Pennington and Hastie (1993) is also important to the understanding of the development of the schemas and explanatory styles, and possibly the personality types of sociotropy and autonomy, experienced by those individuals who are affected by them. These authors state that individuals manufacture mental models of the situations or challenges that they face in order to understand and manage them. They define mental models as 'structural' representations of a system which allow an understanding of that system, the processing of information related to that system and the development of effective decisions in response to this interactive process. In this sense structural means that the development of the model allows the visualisation of the system's parts and, following from this knowledge of the structure, an understanding of how the system functions. Johnson-Laird suggests that such models are used for both spatial and temporal information and information management.

Johnson-Laird (1983, 1996) posits that such models are more effective in managing complex tasks than formal rule based logical structures which require more lock step processing and working memory capacity. However, once a rule structure has become internalised and non verbal, it is effectively a mental model of the world. In this regard the work of Catania, Shimoff, and Mathews (1989), Hayes, Kohlenberg, and Melancon (1989) and Johnson-Laird (1983, 1996) is congruent, using different

descriptions for a set of very similar concepts. Like the rule structures of Catania and the other researchers in this area, the mental models postulated by Johnson-Laird (1983, 1996) are more effective in dealing with the multiplicity of variables that are often involved in life challenges because they allow for automatic processing of this material which is less effortful. Both systems are, in effect, ways of producing default responses to typical life events. Johnson-Laird suggests that this process of mental modelling of situations arises because of the limitations of working memory.

Johnson-Laird states that mental models also have the advantage of being able to resolve ambiguities through the use of factually based inferences, which in turn are the result of past experience. However, he suggests that the initial building of the model requires a large amount of processing which can be effortful and that, because of this, some limitation or suppression of information occurs. Pennington and Hastie (1993) support this contention and suggest that one of the limitations of the modelling process is that it works with interpretations of the evidence rather than with the raw evidence itself. They caution that, because of the processing demands of model development, erroneous conclusions can arise in response to the development of these limited interpretations and suppression of information. These erroneous conclusions come into existence because those who are developing the models are unable to, and/or fail to, consider all of the options and information. These insights are reinforced by the work of Traxler, Sanford, Aked, and Moxey (1997) who suggest that modellers produce the simplest model possible to allow the processing and interpretation of the information. The Traxler, Sanford, Aked, and Moxey (1997) view is supportive of the work of Brewin and Beaton (2002), Eysenck and Keane (2000), German and Barrett (2005) and Hambrick and Engle (2003), on functional

fixedness and negative set and the effect of these cognitive processes on problem-solving.

Other authors (Eysenck & Keane, 2000; Hambrick & Engle, 2003) suggest that failures of suppression of the fixedness or negative set interferences, affect this process of model development, information processing and problem-solving. This is because functional fixedness and/or negative set can bias rule and model development and the assumptions upon which models or rules are developed and information is gathered and analysed. They advise that early exposure to challenging or stressful situations and the failure of processing produced by the overload of these situations can result in the development of defective mental models of the world. This defective modelling would then produce the defective schemas, which are in essence mental models, used by those presently labelled sociotropic or autonomous and who have pessimistic and negative schemas or self-referent explanatory styles.

Barwise (1993, p. 337) states that once the individual has "found a model in which a highly believable conclusion holds they tend not to search for alternative models which refute the conclusion". He suggests that individuals attempt to solve a problem and then give up in response to the effort required to reach a conclusion, that is, their working memory capacity has been exhausted. If this process produces a defective conclusion, then the model arising from this conclusion will also be defective. The research of Johnson-Laird (1996) revealed that as the individual has to deal with more complex problems, they have to develop multiple models which have to be integrated with the problems to be solved. He indicated that this process increases the likelihood of an incorrect response by a factor of 50% and significantly increases processing time and load. As indicated above, increased processing load can lead to the development of defective models and further defective processing.

Mental models in this setting become the default setting for the way the individual interprets and deals with the world – the negative schemas and attributional/explanatory style.

The models work as a way of explaining/interpreting and dealing with the world and the incidents that the individual is exposed to. Once this process is in place, the individual then develops rules of behaviour arising from, and reinforcing of, these models to make responding more automatic so as to reduce cognitive and emotional load. Therefore rules and models are interactive in the process of interpreting and responding to the world and life challenges and are, in turn, modified by the engagement in this process of dealing with life. However, once these models are no longer attached to a verbal response set, they become increasingly impervious to modification in response to changing contingencies (Catania et al., 1989) . In response to this view, Hayes et al. (1989) suggest that effective therapy may simply be a response to the individual learning a new and more effective set of rules or models which allow the individual to interact with the emotional challenges of life more effectively. This is consistent with a large body of evidence which suggests that combined cognitive and behavioural therapies are more effective than non-cognitive or purely behavioural approaches (Barrett et al., 1999).

One can see that these mental models and rule systems become activated in the process of life where the individual is exposed to life challenges and has to respond to these challenges in some way. As indicated above, Johnson-Laird (1983, 1996) and others have postulated that individuals develop mental models and rule systems as ways of dealing with this exposure to life challenge in a more efficient and effective way. However, if the models of their environment that individuals develop in response to positive or negative life events are defective and are based on false

premises, defective rules or incomplete information, then these models actively prevent the effective management of life through the biasing and misinterpreting of information as it is received and by the production of ineffective solutions based on the interaction of the skewed information, fixedness and negative set, and modelling, and hence problem-solving, processes. This modelling process seems to underlie the development of the negatively valanced schemas and negative attributional styles that characterise those individuals who suffer from depression.

Information Processing

The work of other researchers (Epstein, Lipson, Holstein, & Huh, 1992; Mathews & McLeod, 1994; and Sloman, 1996) supports the work, outlined above, in the area of mental modelling and problem-solving. The view of these researchers is that individuals process information either automatically – relying on established rule systems or models, which produce a rapid system of information processing for responding to reality; or consciously – engaging in conscious or controlled processing of the data and the challenge to be met. Epstein et al. (1992) posit that individuals develop a personal theory of reality which is both cognitively and emotionally driven and which automatically assimilates reality and directs behaviour using either a rational system of conscious processing, which functions within the bounds of established rules of inference, and an experiential system, which is the receptacle of the personal theory of the individual and which automatically interprets, encodes, and organizes experience and directs behaviour. Epstein et al. characterises this automatic or experiential system as the modality that guides everyday coping behaviour. The work of Epstein et al. developed a way of conceptualising the individual's thinking and responding and the factors involved in this process. In effect, Epstein et al. described the development of schemas and their interaction with the world through his

work on automatic/experiential problem-solving. Their work then set the stage for the later study of problem-solving and its effect upon affectivity.

Sloman (1996) suggests that humans use either an intuitive processor or a conscious rule interpreter when dealing with problem-solving. He indicates that the intuitive processor resides in the same computational hardware system as the conscious rule interpreter, in a similar manner to the Epstein et al. (1992) conceptualisation of the experiential and rational systems. Sloman posits that the intuitive processor works at a sub-conceptual level. This sub-conceptual processing allows information to be encoded in a single presentation, facilitating both the conceptualisation of the concept and a representation of its 'structure', as well as providing analysis to enable faster processing/reasoning. Successful reasoning through this process then provides rules and inferences for the future which inform the intuitive processor and reinforce the rules/model. In response to this process the individual then produces the systems of beliefs that they adhere to. In a naturalistic setting, the child who is rejected repeatedly by the parent tends to develop a mental model or rule system regarding family interactions which inform them that there will be no support. This experience then informs the child that parents are not approachable and produces the behaviour of not approaching parents for support. This conceptualisation of the world could then generalise to all adults, such as teachers and other helpers, without real world rejection by other adults, and the development of avoidance and mistrust of adults, by the child.

Mathews and McLeod (1994) suggest that emotional processing requires the individual to access both automatic processing (Sloman's, 1996, intuitive processor) and strategic or intentional processing (Sloman's rule interpreter). The formulation of Mathews and McLeod (1994) is that emotions are a product of the interaction

between these two systems and that each system is used depending on the demand or novelty of the situation. This means that situations which are already represented by the model can be processed automatically while situations that are not already represented by the model are processed strategically or consciously using the rule structures already in existence. However, once this novel situation has been processed it can then be incorporated into the existing model to either modify it or reinforce it in preparation for automatic responding to similar situations in the future.

Epstein et al. (1992), Mathews and McLeod (1994), and Sloman (1996) provide a model that allows the conceptualising of the way individuals respond to life as a process wherein established ways of thinking are used to minimise the energy requirements of dealing with life. Their automatic processing models are congruent with the discussion of working memory function, rule governed behaviour and mental modelling presented above. The contribution of Epstein et al. (1992), Mathews and McLeod (1994), and Sloman (1996) has been to conceptualise mental modelling as a dynamic process, which allows new model congruent information to be quickly absorbed which then informs further processing. However, others researchers, for example Catania et al. (1989) suggest that once the automatic processing has been established this automatic system becomes less responsive to real world contingencies. The work of Epstein et al. (1992), Mathews and McLeod (1994), and Sloman (1996) is consistent with cognitive theory and adds a new dimension to the understanding of the development of schemas and attributional styles.

Epstein et al. (1992), Mathews and McLeod (1994), and Sloman (1996) also provide an understanding of factors which may be involved in effortful processing which is seen to be experienced by those who suffer from depression. The work of these researchers suggests that individuals who suffer from depression experience

difficulties with effortful processing especially of schema self-referent information or of information with a social processing load (Hartlage & Clements, 1996). This difficulty with processing has been well researched and has been seen as a response to the clouding effects of depression in response to a decreased dopamine availability (Petty, Kramer, Wu, & Davis, 1997; Roy-Byrne, Weingartner, Bierer, Thompson, & Post, 1986). Other research has demonstrated an interaction between depression severity and effortful processing (Hartlage, Alloy, Vazquez, & Dykman, 1993; Yost & Weary, 1996). The underlying dynamics of this observed effortful processing difficulty have been studied with the result that this processing difficulty is seen as a product of the interference in the process of processing of schema self-referent material. That is, the challenge brings to consciousness the underlying schema-related thoughts which interfere in the processing of the material, causing increased response times and less effective performance (Ellis, Ottaway, Varner, Becker, & Moore, 1997; Gannon, Skowronski, & Betz, 1994; Hartlage et al., 1993; Hertel, 1997; Watts, Dalgleish, Bourke, & Healy, 1990; Yost & Weary, 1996). The work of Ellis et al. (1997), and other researchers (Ingram, Fidaleo, Freiberg, Shenk, & Bernet, 1995; Moretti, Segal, McCann, Shaw, Miller, & Vella, 1996; Watts, Dalgleish, Bourke, & Healy, 1990) provides a good deal of support for the resource allocation model as an explanation for this effortful processing. This model postulates that the activation of intrusive and irrelevant thoughts related to the self-referent schema, distracts the individual from effective processing, which is consistent with the interference produced by functional fixedness and negative set (German & Barrett, 2005). However, other support was found for the impact on processing of expectations of uncontrollability in the social domain and its need for diligent processing to deal with it (Gannon et al., 1994; Weary, 1990; Yost & Weary, 1996).

The work on automatic versus conscious processing assists in the explanation of the phenomenon of effortful processing. Schema self-referent information may require conscious processing before it can be integrated into the automatic processing system through the conscious system. The process of integrating new information into the existing automatic system would require extra effort and would delay responses and produce the less effective information processing observed in experiments, e.g., Hartlage and Clements (1996).

Individuals who suffer from depression have also been extensively studied with regard to the effect of depression on their cognitive function. Studies demonstrate that depression is accompanied by cognitive effects including: EEG hemispheric anomalies within either the left or right frontal lobes, but more normally the right, becoming hypo-active during episodes of depression (Gotlib, Ranganath, & Rosenfeld, 1998; Henriques & Davidson, 1990); changes in cerebral blood flow (Passero, Nardini, & Battistini, 1995); frontal cortex and basal ganglia glucose uptake deficits on Positron Emission Tomography (Buchsbaum, De Lisi, Holcomb, Kessler, Johnson, King, Hazlett, Langston, & Post, 1986; Mayberg, 1994;); and frontal and parietal impairment on neuro-psychological assessment which demonstrated deficits in thinking, planning, attention, working memory, learning – both verbal and spatial, and reaction time (Austin, Ross, Murray, O'Carroll, Ebmeier, & Goodwin, 1992; Cavedini, Ferri, Scarone, & Bellodi, 1998; Elliott, Sahakian, McKay, Herrod, Robbins, & Paykel, 1996; Freedman, 1994; Golinkoff & Sweeney, 1989; Gotlib, Roberts, & Gilboa, 1996; Hertel, 1994; Lemelin & Baruch, 1998; O'Brien, Sahakian, & Checkley, 1993; Segal, 1996; Seligman, Kaslow, Alloy, Peterson, Tanenbaum, & Abramson, 1984; Senior & Douglas, 2001). These studies demonstrate that those individuals who are depressed experience greater cognitive deficits with controlled or

conscious processing than with more automatic processing – which remains unaffected by their condition; that they have a more effective memory for negative rather than positive material; and that they tend to negatively bias interpretation and judgement processes. These studies indicate that those individuals who are depressed suffer from the outlined cognitive deficits and secondary deficits related to their depression including: oversensitivity to negative feedback; a lack of motivation; fatigue; a slower rate of processing in controlled/conscious problem-solving; difficulty inhibiting task irrelevant thoughts; and poorer divided attention. In the light of these findings the negative information processing bias demonstrated by those suffering from depression may be a product of this cognitive dysfunction as much as the effect of schema related difficulties. However, the significant difference in effectiveness between the processing of non-schema related material and schema-related material suggests that this effortful processing is a product of the interference in processing produced by the self-generated self-referent thoughts produced by schema/attributional style relevant challenge.

It is highly likely that the biochemical, metabolic and vascular responses to the experience of depression reduce the cognitive resources available to process information of all kinds. This would especially be the case with material that is self-referent and which requires conscious processing. Such effort, it is suggested, would reduce the ability of the depressed individual to deal with conscious processing of life events and would increase the possibility of either avoiding the information or processing it automatically, if possible, and responding automatically to the event. Such automatic processing would then reinforce the established automatic/schema response to such challenge.

It seems reasonable to assume that the ability to deal with life events would be related to the ability to problem-solve the events that the individual is faced with. It is also clear that problem-solving is a flexible undertaking that can find both problem and emotion focused solutions, especially in times of high demand (D'Zurilla, 1990). However, it is also clear that problem-solving is adversely affected by cognitive errors which affect model formulation, information gathering, and information processing.

Problem-solving

A number of researchers have studied problem-solving, especially as problem-solving is a pivotal component of coping (D'Zurilla & Chang, 1995). D'Zurilla and Maydeu-Olivares (1995) following the work of Epstein et al. (1992) recognised that problem-solving was carried out in two ways – in an automatic or experiential system or in a non-automatic or conscious system. They characterised the experiential system as being intuitive and based on feelings, versus a more deliberate, slower, logical approach.

Nezu (1986a) established that problem-solving was a mediator between state and trait anxiety and life stress. The results of this study suggested that effective problem-solving was negatively correlated with the experience of life stress, or anxiety. Further, a second study (Nezu, 1986b) revealed that depressed individuals evaluate their problem-solving abilities as less effective and less systematic, and report that they feel that they have less control in problem situations. This research indicates that depressed individuals who believe that their problem-solving ability is less robust will experience both a lack of belief in their ability to cope and increased depressive symptoms, when faced with challenge. These findings were reinforced by the work of Heppner, Kampa, and Brunning (1987).

Heppner and Anderson (1985) consistent with the work of Nezu (1986a, 1986b) found that the way in which participants evaluated or rated their problem-solving ability – effective or ineffective – was consistent with their coping ability. Positive self-evaluators demonstrating more effective coping and lower levels of anxiety and depression than negative self-evaluators. Davey, Jubb, and Cameron (1996) and Haaga, Fine, Terrill, Stewart, and Beck (1995) found that the individual's confidence in their problem-solving ability was correlated with catastrophic worrying – lower confidence being associated with more catastrophic worrying. They suggested that problem-solving confidence was a better predictor of catastrophising than self-reports of anxiety. Consistent with this research, Elliott, Johnson, and Jackson (1997) found that college students who had a positive problem-solving orientation had lower levels of illness and fewer accidents while those with an avoidant or negative problem-solving orientation/style were more likely to suffer from apathy, alcohol and drug use, risk taking and depression. Elliott, Sherwin, Harkins, and Marmarosh (1995) and other workers (D'Zurilla & Chang, 1995; D'Zurilla, Chang, Nottingham, & Faccini, 1998; D'Zurilla & Sheedy, 1991; Sadowski, Moore, & Kelley, 1994) found similar relationships to those of the previous authors with regard to the negative effect on affectivity of an avoidant or negative problem-solving orientation/style.

Kant, D'Zurilla, and Maydeu-Olivares (1997) also make the link between social problem-solving deficits and depression, consistent with the work of Haaga, Fine, Terrill, Stewart, and Beck (1995). This research supports the contention that a negative problem orientation is most strongly associated with the defective cognitions and automatic processing schemas associated with depression. Finally, Chang and D'Zurilla (1996) found that problem orientation is a major component of problem-solving ability, that is, the less positive the view of problem-solving is the less

effective the problem-solving also is. Skinner, Chapman, and Baltes (1988) found that children (and adults) who have a higher level of negative affectivity have a lower level of belief in their ability to control negative rather than positive events and outcomes. Interestingly, problem-solving orientation is not related to mental ability (Burns & D'Zurilla, 1999). However, high scores on rational problem-solving are associated with more positive problem orientation, more consciousness and more planning, On the other hand, emotional problem-solving was associated with negative affectivity and less well developed problem-solving skills.

In summary, the research on the relationship between problem-solving orientation and emotional status indicates that depressive symptomatology is not significantly correlated with real world problem-solving or cognitive skills. However, the studies indicate that problem orientation, especially a positive problem orientation, is more important for psychological well being than problem-solving skills as such (Kant et al., 1997). However, Kant et al. (1997), consistent with other the other researchers in this area, also suggest that defective problem-solving skills may be an important factor in the development of negative affectivity and the development of positive or negative self-appraisal with regard to problem-solving. Those individuals who have a positive attitude or orientation to problem-solving and/or are confident in their problem-solving abilities and/or who feel a sense of personal control in their problem-solving are less likely to develop negative affectivity with exposure to social problem-solving tasks. More confident problem-solvers also tend to use more effective problem-solving strategies (Ritchey, Carscaddon, & Morgan, 1984). However, those individuals who have a negative attitude or orientation to problem-solving, who have a low level of confidence in their problem-solving abilities, and who tend to avoid social problem-solving suffer from significantly more negative

affectivity. This affective negativity is also associated with: depression and anxiety (Hoffman, Cole, Martin, Tram, & Seroczynski, 2000; Kant et al., 1997; Nezu 1986a, 1986b; Haaga et al., 1995); more dissatisfaction with life (Heppner & Anderson, 1985); chronic worry (Davey, Jubb, & Cameron, 1996); substance abuse and risk taking in older adolescents (Elliott, Johnson, & Jackson, 1997); and suicide potential (Chang, 1998; Sadowski & Kelly, 1993). As Heppner, Kampa, and Brunning (1987) indicate, a low perception of coping competence produces a low level of coping. Haaga et al. (1995) also demonstrated that a negative problem orientation is associated with high levels of dependency or affiliation – sociotropy or impaired autonomy.

There is some evidence that the problem-solving orientation or attitude is developed during childhood (Skinner, Chapman, & Baltes, 1988; Hoffman et al., 2000). These writers indicate that children develop their appraisals of their problem-solving ability in response to: the attitudes of significant others – teachers and parents – to their problem-solving attempts and success or lack of success, which they take on board and incorporate as their own; their own self-appraisals of their success or otherwise in problem-solving; and to the tendency to under-estimate their actual competence, which may be a response to the internalisation of the appraisals of the child and their skills by others. However, these negative self-appraisals, once established, are highly correlated with high scores on measures of depression and with depressive symptomatology. This work with children mirrors and elucidates the factors involved in the aetiology, and the effect, of a negative self-appraisal of problem-solving competence.

In an attempt to clarify the factors involved in this negative versus positive problem-solving orientation or style, Heppner and his colleagues developed the

Problem-solving Inventory (Heppner & Anderson, 1985; Heppner & Baumgardner, 1985; Heppner, 1988; Heppner, Kampa, & Brunning, 1987; Heppner, Walther & Good, 1995). This instrument, rather than looking at whether the problem solver is more experiential/automatic or rational/strategic seeks to establish whether the problem solver has appraised themselves as having confidence in their problem-solving ability, whether they tend to avoid problem-solving or whether they have a sense of personal control in the problem-solving space. Heppner's research and the work of other researchers (Davey et al., 1996; Haaga et al., 1995; Heppner & Anderson, 1985) suggests that low problem-solving confidence, a high avoidance style and a perceived lack of personal control is associated with increased rates of negative affectivity, anxiety and depression. The formulation offered by these researchers is that the individual's appraisal of their problem-solving mediates subsequent performance, in problem-solving, and also affects reactions to stressful events. Elliot et al., 1995, conceptualised Heppner's (1985) problem-solving confidence and personal control factors as being elements of the problem-solving orientation factors.

D'Zurilla and his colleagues (Chang, 1998; Chang, & D'Zurilla, 1996; D'Zurilla & Chang, 1995; D'Zurilla, Chang, Nottingham, & Faccini, 1998; D'Zurilla & Maydeu-Olivares, 1995; D'Zurilla, & Nezu, 1987; D'Zurilla & Sheedy, 1992; Nezu, 1986 & 1986) developed a five-factor solution for the relationship between social problem self-appraisal and the development of negative affectivity. This five-factor solution produced the concepts of: positive problem orientation, negative problem orientation, rational problem-solving, impulsivity/carelessness style, and avoidance style. Evaluations of this five-factor solution indicate that, as expected, positive problem orientation was associated with positive affectivity and negative

problem orientation was associated with negative affectivity. Furthermore, D'Zurilla and Chang (1995) were able to establish that a rational problem-solving style is independent of an automatic/experiential problem-solving style and is associated with a higher level of positive affectivity. However, their research indicates that the four other dimensions of problem-solving – positive and negative problem orientation, impulsivity/carelessness, and avoidance – were all highly correlated with experiential/automatic reasoning/problem-solving. D'Zurilla et al. intimated that a positive problem orientation was conducive to the use of a more rational approach to social problem-solving and to more effective coping. D'Zurilla, Chang, Nottingham, and Faccini (1998) also suggest that the negative problem orientation, impulsive/carelessness, and avoidance styles of problem orientation are consistent with helplessness, consistent with the work of Abramson et al. (1978).

Subsequently Burns and D'Zurilla (1999) developed a three-factor solution for the relationship between problem-solving appraisal and affectivity. This three factor solution produced the concepts of rational problem-solving, emotional problem-solving and automatic problem-solving. Burns and D'Zurilla (1999) saw rational problem-solving as a behaviour which was consistent with the Epstein et al. (1992) and the D'Zurilla and Chang (1995) construct of similar name, which is associated with positive affectivity. They conceptualised emotional processing as being consistent with the Epstein et al. concept of experiential processing and the D'Zurilla et al. concepts of negative problem orientation, impulsive/carelessness style and avoidance all of which are associated with negative affectivity. Finally they developed the concept of an automatic problem-solving style or orientation, which tended to cross over with elements of both rational and emotional problem-solving and which was associated with some elements of negative affectivity. Burns and D'Zurilla

suggest that those who have a less logic-based or a more "emotional" problem-solving style are more likely to develop emotional difficulties, especially depression, with challenge. This less logic-based problem-solving style is seen as being consistent with the processes of sociotropy, which is characterised by a more emotional response set and a higher need for affiliation. It is also consistent with the self-referent and pessimistic explanatory style elucidated by the helplessness theorists.

Until recently, the link between the development of a negative schema and/or helplessness and the development of depression was difficult to establish (Segal & Ingram, 1994) even given the work outlined above on the importance of the individual's attitude to social problem-solving as a precursor to the development of affectivity and negative affectivity in response to the individual's self-appraisal of ineffectiveness in problem-solving. It is possible that this negative self-appraisal is a response to the negative effect upon problem-solving produced by cognitive errors – functional fixedness and negative set (Hambrick & Engel, 2004) – on mental model development (Johnson-Laird, 1983, 1996). This research indicates that initial difficulty with problem-solving produces a negative orientation to problem-solving, the rejection of further structured rational problem-solving and the adoption of an automatic way of dealing with the environment, an avoidance of problem-solving and negative affectivity – helplessness and depression.

Cognitive Exhaustion

How does the perception, by the individual, that they have poor real world problem-solving develop? Sedek and his colleagues (Kofta & Sedek, 1999; Kofta, Weary, & Sedek, 1998; Sedek & Kofta, 1990; Sedek, Kofta, & Tyszka, 1993; von Hecker & Sedek, 1999) have postulated that a possible mechanism for the development of a negative problem-solving orientation and a depressive schema /

negative attributional style / hopelessness is cognitive exhaustion. Cognitive exhaustion is consistent with the views of Barwise (1993) and Johnson-Laird (1996) that mental models can become so complex that the problem-solver can run out of working memory capacity when dealing with complex problems, become exhausted and then fail to problem-solve effectively. The model espoused by Sedek and his colleagues is that problem-solving requires the understanding of the task and its meaning, the selection and remembering of the information related to the task, the management of ambiguities, and the development of effective mental models of the situation to produce effective decisions or behaviours. If the situation is controllable, then these activities produce solutions which increase the sense of controllability and self-efficacy and hence positive affectivity. In this situation, the problem-solver perceives that they have been successful and develops both problem-solving confidence and a positive problem orientation, which will reinforce the use of rational/conscious problem-solving and which act as protective factors in subsequent problem-solving undertakings.

If the complex process of problem-solving, outlined above, is ineffective in meeting the challenge, especially in response to the inability to develop an effective mental model of the problem, there is an initial increase in mental activity to overcome this situation and subsequently a decrease in such activity as the individual becomes mentally exhausted and recognises that they are unable to solve the problem (Kofta & Sedek, 1999; Kofta, Weary, & Sedek, 1998; Sedek & Kofta, 1990; Sedek, Kofta, & Tyszka, 1993; von Hecker & Sedek, 1999). The recognition of their inability to solve the problem then produces uncertainty and the perception of uncontrollability, which leads to a lack of problem-solving confidence, and a negative

problem orientation. If this lack of success continues then the individual is faced with constant cognitive challenge without reward – the overcoming of the challenge.

It is argued by Sedek and his colleagues that this lack of reward produces *cognitive exhaustion*. Such exhaustion – which is characterised by distraction, inhibition of thinking, an ineffective use of mental resources, and an inability to develop new hypotheses to deal with the problem, and which is a product of irreducible uncertainty (Kofta & Sedek, 1998) – changes the individual's belief in their ability to solve life situations/problems, reinforcing their negative self-appraisals of their problem-solving ability. In response to this loss of belief in their ability to solve problems, they cease to attempt to do so, becoming passive observers which further robs them of the ability to deal with non-routine (life) problems, in response to which they develop strong feelings of powerlessness and worthlessness. Kofta and Sedek (1998) suggest that the loss of the ability to deal with life problems is probably a response to the loss of effective filtering of data. Kofta and Sedek indicate that, with regard to this filtering process, as the cognitive load increases, the person cannot select relevant from non-relevant information nor select any plausible hypothesis. The formulation presented by Sedek and Kofta (1990) is supported by the work of Tallis, Eysenck, and Mathews (1991), who suggest that depressed individuals have elevated evidence requirements to assist them to make decisions, suggesting that the individual has a specific difficulty in prioritising information upon which to formulate hypotheses and solve problems.

Sedek and Kofta (1990) suggest that the lack of effective filtering then leads the individual to attend to all of the available data and alternative hypotheses which causes overload as, without the ability to select relevant information, the cognitive resources will be used in an inefficient and ineffective manner. The ineffective use of

cognitive resources results in the lack of sufficient resources to allow problem formulation and solution. This process of overload, ineffective cognitive processing and mental exhaustion exposes the individual to increased uncertainty and hence cognitive demobilisation and passivity. These factors are the obvious signs of helplessness and hopelessness which underlie the depression that follows. Kofta and Sedek (1998) also indicate that hopelessness/helplessness can be produced by the exposure to a single overwhelming event as well as through this constant exposure to uncertainty and the lack of reward for effortful processing. Traumatically induced helplessness – the response to the exposure to a totally unsolvable problem – they argue, could of itself, produce the cognitive and affective correlates of depression. This view is consistent with that postulated by Abramson et al. (1997) that depression could be caused by the engagement with an overwhelming stressor.

Sedek et al. hypothesised that ineffective mental modelling, the ineffective development of a cognitive representation of the problem situation, in response to overload, and the loss of the effective filtering process which underlies it, produces an (unconscious) loss of faith by the individual in their ability to develop effective mental models, effective construction of cognitive representations of situations, and hence effective problem solutions. It is likely that this process results in less logic-based approaches to life modelling/problem-solving, because of the loss of faith in rational or conscious problem-solving. The reliance on a less logic and more emotionally-based problem-solving style would lead, as suggested by Heppner and Anderson (1985), Epstein et al. (1992), and D'Zurilla et al. (1995), to: a less effective/positive orientation to problem-solving; less effective problem-solving because of a lack of the use of effective modelling and information management; a failure to solve the problem; the confrontation with uncontrollability and uncertainty;

and the cognitive exhaustion elucidated by Kofta and Sedek (1998). This exhaustion seems to parallel the passivity and helpless response produced in their dogs by Maier and Seligman (1967, 1976), which laid the foundation for helplessness theory and the later reformulated helplessness and then hopelessness theories.

Alternatively, the elucidated cognitive exhaustion and defective problem-solving style may in fact be a response to initial failures in problem-solving, with exposure to challenge or stress which is consistent with the work of Johnson-Laird (1996). These failures may result in the perception that challenge is unmanageable and/or uncontrollable. It is possible that the recognition that effort is useless and that life is unmanageable or uncontrollable, produced by these failures, underlies the development of hopelessness and the negatively biased schema/explanatory style.

CONCLUSIONS

This survey of the literature has evaluated a number of possible explanations for the development of depression and indicates that there is strong evidence for the cognitive theories of depressogenesis. The evidence from the treatment outcome literature supports the contention that the cognitive constructs thought to underlie depression do exist and that when these constructs are addressed with cognitive therapy, the power of these constructs to maintain depression does diminish which produces the reduction of depressive symptomatology. However, there are still gaps in the explanation of the dynamics of depressogenesis with regard to the interaction of schemas or negative attributional styles and the subsequent development of depression. Another concern with the cognitive theories of depressogenesis is that the information or data is post hoc and does not really explain how or why, apart from assumptions of early environmental challenge, these schemas or negative attributional styles develop. At the same time, the cognitive treatments for depression still seem to

be the most efficacious, in spite of the problems over the aetiology of depression from a cognitive point of view.

This survey has also looked briefly at other explanations of depressogenesis. Perhaps the most promising is the work with children which indicates that the early exposure to trauma or abuse, to emotional neglect in response to the parent's own depression or other emotional disorder, to ineffective bonding, to negative appraisals by the child and their parents/carers of the child's ability to solve life or personal problems, or to over or under-protectiveness by the parent(s) of the child are all very clear precursors to the development of depression in children and for their later experience of depression. These factors appear to leave the child with self-perceptions of worthlessness, inability, and powerlessness. These factors are probably the negative environmental events seen to produce the negative schemas and attributions which in combination with stressful life events result in child, and subsequently adult, depression. However, the mere exposure to stress or trauma does not necessarily produce immediate or long term emotional problems and so it seems that this promising set of factors may still not account for depression following exposure to them.

There is good evidence for some genetic trait process underlying depressogenesis, especially given the evidence of familial aggregation and family vulnerability (Klein, 1990; McDermut et al., 2003). This information seems to support Beck's construct of sociotropy (Beck, 1987), which is also supported in the literature, as a trait precursor to depression. However, evidence from the genetic literature is not strong in supporting such a formulation (Yapko, 1999). The evidence seems to support a combination model with interaction between some genetic heritability and the influence of past and present environmental factors. However, how these genetic

factors operate to produce depression is not clearly explained. It may be that this genetic factor is responsible for a change in biochemistry producing a low level of GABA and with it an over-sensitivity to life events and a decrease in serotonin, especially as not all individuals exposed to stressful events develop depression subsequently. Alternatively this genetic effect may involve the HPA axis in a way in which interferes with the self-regulating inhibitory process to produce a deficit of serotonin. Finally, this genetic defect may be related to dopamine secretion/over-secretion, again producing neuronal deficits of serotonin and hence depression. The problem with these hypotheses is that there are few data regarding childhood biochemistry with which to establish if the present findings of GABA deficit or disturbed HPA feedback loops are responses to environmental challenge or precursors to the over-reaction to environmental challenge and the development of biased information processing in response to this over-reactivity.

The evidence for the efficacy of cognitive therapy for depression offers support for the view that the mediating variable between the exposure to life stress and the development of depression may be a cognitive vulnerability and/or defective or biased information processing (Alloy et al., 1999; Connor-Smith & Compas, 2002; Dixon et al., 1993; Oei & Free, 1995). The work of Epstein (1990), Johnson-Laird (1996) and Hayes et al. (1986), explains how schemas and the cognitive vulnerability to depression are developed in response to environmental factors. Epstein (1990) suggests that individuals develop a self theory which explains the world to them in response to life events and that this explanation then becomes the automatic processor which interprets subsequent events. This process is similar to the internal rule systems posited by Hayes et al. (1989) and with the mental models of the world that Johnson-Laird (1996) postulates. All three researchers and their colleagues suggest that

humans develop short hand ways of dealing with the complexities of life and that subsequent life events are interpreted through these systems. They have, in other words described the development of schemas and attributional styles as the development of rule based systems/mental models.

Sedek and his colleagues (Kofta & Sedek, 1999; Kofta, Weary, & Sedek, 1998; Sedek & Kofta, 1990; Sedek, Kofta, & Tyszka, 1993; von Hecker & Sedek, 1999) have developed a rationale to explain why these rule systems, mental models and schemas are developed. These researchers suggest that constant exposure to challenge (stressful life events) without reward (the positive resolution of the challenge) produces cognitive exhaustion, a state equivalent to helplessness. Sedek and his colleagues suggest that prolonged exhaustion produces mental models of a world in which the individual constantly feels unable and where intense cognitive effort does not lead to reducible uncertainty. Kofta & Sedek (1999) suggest that in this situation of irreducible uncertainty, the individual tends to abandon rational thought and rational problem-solving and to adopt an ineffective experiential/emotional style – which is associated with depression, and impaired autonomy (Haaga et al., 1995; Heppner et al., 1987). It is very possible that this process produces the changes in biochemistry associated with depression through the action of the HPA axis, or other biochemical systems.

Kofta and Sedek (1999) support the work of Johnson-Laird (1996) and Hayes et al. (1989) who have described schema formation/development in terms of the development of models or rule structures which simplify or facilitate the management of life challenge. Sedek's work is also consistent with the work on problem-solving styles developed by Epstein et al. (1992), Heppner et al. (1985), and D'Zurilla et al. and others. D'Zurilla et al. (1998) suggest that cognitive exhaustion is probably the

mechanism which underlies the loss of problem-solving confidence and the development of a negative problem orientation, an avoidance style, or a careless/impulsive style of social information processing, all of which interfere with problem-solving and are again consistent with cognitive exhaustion, helplessness, and the development of dysfunctional schemas and negative attributions. With reference to the work of Cerezo and Frias (1994), McKean (1994), Dujovne et al. (1995) and Ingram and Ritter (2000), the child's confrontation with abuse, trauma, neglect, rejection, abandonment, defective bonding or over or under-protection would represent situations where the child is faced with social problems (negative early life experiences) which they are unable to solve in spite of a full cognitive effort to do so. These emotional challenges place the child in a situation where irreducible uncertainty obtains in spite of a great deal of cognitive effort. In response to the inability to solve these social problems, the child then confronts cognitive exhaustion and develops models or rule systems of social incompetence and helplessness. Further confrontations with helplessness, in response to a negative problem-solving orientation, subsequently reinforce this exhaustion and the sequelae to the development of exhaustion, helplessness and hopelessness, and depression.

Sedek, Kofta, and Tyszka (1993) posited that exhaustion arose because the individual was unable to filter the input in a way which allowed processing and effective model development and problem solution. They suggested that this lack of filtering was caused by a lack of working memory which is consistent with the view of Johnson-Laird (1996). Yet, the information arising from the literature (Austin, Ross, Murray, O'Carroll, Ebmeier, & Goodwin, 1992; Cavedini, Ferri, Scarone, & Bellodi, 1998;) on the cognitive effects of depression suggests that although depressives can still solve non self-referent problems as well as non-depressed

individuals, in spite of their cognitive dysfunction, their ability to solve self-referent problems is poorer. If this is the case then working memory capacity per se may not be the underlying factor in the development of exhaustion.

Hambrick and Engle (2003) and Eysenck and Keane (2000) report that working memory capacity is only a problem when controlled/strategic or conscious processing is demanded. However, Hambrick and Engle also indicate that working memory capacity does not correlate with problem-solving success. They suggest that working memory function is limited by the need to deal with two problem-solving errors – functional fixedness and negative set. Hambrick and Engle state that these two problem-solving errors affect problem-solving because their existence takes up working memory space and prevents the formulation of effective problem-solving models and the development of solutions. The Hambrick and Engle formulation is that the ability to suppress these problem-solving errors is the key to effective problem-solving. The work of Pretz et al. (2003) suggests that all problem-solving is informed by previously established solutions. This means that the solutions previously used will interfere in the problem-solving of novel problems and that, to be successful, the problem solver must be able to suppress these previous solutions, when appropriate. However, the work of Kelemen and her colleagues (2000, 2003) indicates that children develop functional fixedness from infancy that this is a normal response to life – a normal function of semantic memory, allowing the development of life rules with which to reduce the cognitive load of conscious processing and allowing more effective and efficient life management. The literature suggests that the inability to suppress previous defective concepts or previously used and ineffective solutions (functional fixedness and negative set factors), may be the underlying factor in cognitive exhaustion which is the precursor to helplessness schema/attributional

style development an eventually depression. It is also likely that this inability to suppress already incorporated information is implicated in the ruminative style, elucidated by response style theorists, Nolen-Hoeksema (1991).

SUMMARY

This paper has provided an overview of a large body of research related to the development of effective models which can be used to understand the aetiology of depression. The review of the literature has elucidated the fact that there is a need for more effective treatments for depression, in response to the steady worldwide increase in depression and the misery and financial costs that this increasing health burden is producing.

This review has surveyed a number of areas of research which were seen as being pivotal in the understanding of depressogenesis and depression management. The overview looked at some of the cognitive models of depressogenesis, as well as other models of depressogenesis – child trauma and abuse; child and family interaction patterns; biochemical; working memory; information processing; rule governed behaviour; mental modelling; problem-solving; and cognitive exhaustion. All of these models have a great deal to offer in the understanding of the development of depression.

However, the underlying mechanisms which could account for the development of schema/attributional style, do not seem to have been isolated. All of the explanations for the development of schema/attributional style, encapsulated in the various approaches listed above, accept that schemas/negative attributions develop in response to life challenge but do not provide a mechanism for the development of them.

Of these approaches, cognitive exhaustion, a possible response to ineffective problem-solving, appears to be the most likely formulation which could explain of the problems of schema development. This concept can be seen as being the necessary underlying mechanism which has the capacity to produce defective problem-solving, the loss of problem-solving confidence and an avoidance of problem-solving, the development of ineffective rule structures or models of the world and the reliance on these ineffective rule systems or models – schemas/attributions – to solve or interpret life problems. The underlying process of cognitive exhaustion is postulated, by Kofta and Sedek (1999) to be a product of an inability to effectively filter information to allow effective problem modelling and solution. However, the work on working memory (Hambrick and Engle, 2003) does not support the filtering hypothesis. This work, however, allows for another accounting for the development of cognitive exhaustion, the cognitive errors of functional fixedness and negative set. These factors, because they significantly interfere with effective processing, have the potential to produce irreducible uncertainty, with the result that the individual is overwhelmed by unmanageable information overload, such that they become exhausted by the effort of trying to manage the information and processing demands of problem-solving, and are unable to produce a solution.

This survey of the literature postulates a revised view of the development of negatively valanced schemas, hopelessness and depression based on cognitive exhaustion. The information arising from this survey suggests that the inability to suppress information, gained from previous experiences of success or otherwise in problem-solving (fixedness and negative set factors), while undertaking problem-solving in a novel context is the factor which produces cognitive exhaustion. Cognitive exhaustion then becomes the agency which confounds the complex process

of social problem-solving, and leads to the development of ineffective mental models/schemas/attributions and depression with exposure to stressful life events.

Without a great deal of further work, it will be difficult to establish whether this lack of the ability to suppress interference in problem-solving is a product of extremely early cognitive exhaustion – in response to bonding, abuse or other child development or family interaction factors; or a response to ineffective genetic programming of the individual's biochemistry such that they do have an ineffective HPA feedback loop or such that they have an insufficient supply of inhibitory neurotransmitters, either of which would produce hyper-arousal/sensitivity and the failure of suppression. This problem would seem to present itself as an area worthy of future research.

In the study which follows this review of the literature, the assessment of the existence of an implied inability to suppress information in adults who are suffering from depression or who have suffered from depression and have now remitted was seen to be a worthwhile first step in trying to tease out the relationship between working memory, exhaustion and negative affectivity. The following study was designed to see if it were possible to demonstrate that those individuals who suffer from depression and those individuals who have recovered from depression continue to exhibit slow processing – indicating a difficulty with the suppression of pre-established ways of thinking – on tasks of social processing, when compared with matched controls who have not suffered from depression. If such a relationship could be demonstrated, this would suggest that the difficulty with suppression may be a factor in the development of cognitive exhaustion and hence helplessness/hopelessness and depression.

PART 2 – EXPERIMENTAL STUDY

FAILURE OF SUPPRESSION AS A FACTOR IN COGNITIVE EXHAUSTION AND DEPRESSOGENESIS

ABSTRACT

The cognitive theory of depressogenesis (Beck, 1967, 1976) suggests that particular forms of schematic processing develop in response to early life challenge and that depression is a result of the interaction between these early maladaptive schemas (or negative attributional styles) and subsequent life challenge. Recent research has indicated that cognitive exhaustion (Kofta & Sedek, 1999; Sedek & Kofta, 1990) may be a contributing factor in the development of helplessness in response to the effect of continued cognitive effort without the reduction of uncertainty. Other research (Hambrick & Engle, 2003) suggests that irreducible uncertainty may be a response to a failure of cognitive suppression in problem-solving. This study aims to establish if those participants who are presently depressed and those who have recovered from depression have a longer response time on a social problem-solving task, suggesting a difficulty with cognitive suppression, than those participants who have never been depressed. Three groups of participants – presently depressed, recovered depressed, and never depressed – were assessed using measures of depression, problem-solving style and a social problem-solving task. The results suggest that, in contrast to never-depressed participants, depressed and recovered depressed participants had longer response times on the social problem-solving task, providing support for the hypothesis that depression status is related to problem-solving efficiency, which may be a response to a failure of cognitive suppression.

INTRODUCTION

The World Health Organisation's World Health Report (2002) reported that mental and behavioural disorders account for 12% of the global burden of disease, and that unipolar depressive disorders are an enormous burden on societies. The World Health report (2002) indicates that 5.8% of men and 9.5% of women will experience depression in any given year and that 15 – 20% of those who suffer from depression will carry out successful suicide attempts.

Life stress and the inability to cope with stress are seen as important factors in the development of emotional distress and, especially, depression. Cognitive or information processing models of depressogenesis were initially formulated by Beck (Beck 1967, 1976, 1983, 1987, 1991; Beck & Kovacs, 1978). Beck posited that the interaction between the exposure to stressful events which confront the individual's personality vulnerability and the individual's schema, is the underlying mechanism that produces depression.

Other cognitive theorists, such as Seligman and Maier (1967) who developed the original helplessness model of depression, and Abramson, Seligman, and Teasdale (1978), who generated the re-formulated model of helplessness have seen the experience of depression as a product of a view of life which makes the individual feel helpless in the face of life challenge. In response to this perception of helplessness and associated hopelessness, the individual becomes depressed. The Abramson et al. (1978) formulation is that there are cognitive vulnerabilities to the development of depression in response to an explanatory style that, like the schemas postulated by Beck (1976), is internal, global, and stable, and which is self-referent and pessimistic. More recent research (Burns & Seligman, 1991; McKean, 1994; Nolen-Hoeksema, Wolfson, Mumme, & Guskin, 1995; Swendsen, 1997) supports this

formulation and suggests that once this pessimistic and self-referent explanatory style has been developed, it is self-maintaining. This self-maintenance is seen as a product of the self-defeating explanatory style and its internal, stable and global structure which then causes the individual to interpret external events in a way which presents these events to the person as unmanageable. This process is repetitive and unchanging, which maintains the explanatory style, the sense of helplessness/hopelessness, and the vulnerability to depression.

Other research (Cerezo & Frias, 1994; Dujovne, Barnard, & Rapoff, 1995; Gross & Keller, 1992; Ingram & Ritter, 2000; McKean (1994); Nolen-Hoeksema, Girgus, & Seligman, 1992; Nolen-Hoeksema, Wolfson, Mumme, and Guskin (1995) argues that helplessness is triggered in children by uncontrollability and uncertainty, in response to: the failure of appropriate and supportive parenting; the modelling of depressive behaviours by the person's mother/parents; the effect upon the child's sense of self worth of a mother who does not give that child a sense of value; childhood abuse and neglect; parental conflict; ineffective bonding or attachment between mothers/parents and their children; a lack of parental involvement; behaviour of care givers who are rejecting, punitive, harsh or critical; or a parental style which is characterised by over-support or a lack of support.

The work of Barwise (1993) and Johnson-Laird (1983, 1996) is important to the understanding of the development of the schemas and explanatory styles. Johnson-Laird (1983, 1996) states that individuals manufacture mental models of the situations or challenges that they face in order to understand and manage them. He defines mental models as structural representations of the presenting system which allows an understanding of that system. Mental models, Johnson-Laird (1996) suggests, are more effective in dealing with the multiplicity of variables that are often involved in

life challenges because they allow for automatic processing of this material which is less effortful. Johnson-Laird (1996) suggests that that this process of mental modelling of situations arises because of the limitations of working memory. However, he indicates that the building of the model requires a large amount of processing which can be effortful. Because of the processing demands of model development, erroneous conclusions can arise, because those who are developing the models are unable to, and fail to, consider all of the options and information. In this way, early exposure to challenging or stressful situations and the failure of processing produced by the overload of these situations can produce defective mental models of the world. This defective modelling would then produce the defective schemas, which are in essence mental models, used by those who are presently labelled sociotropic or autonomous, and who have pessimistic and self-referent explanatory styles.

The work of Heppner (Heppner & Anderson, 1985; Heppner & Baumgardner, 1985; Heppner 1988), Epstein (1990, 1994) and D'Zurilla et al. (Burns & D'Zurilla, 1999; D'Zurilla & Chang, 1995; D'Zurilla & Sheedy, 1991) indicates that those who have a less logic-based or a more "emotional" problem-solving style are more likely to develop emotional difficulties, especially depression, with exposure to life challenges. These writers suggest that this less logic based problem-solving style is a response to the perception by the individual that they are not good at problem-solving (Kant, D'Zurilla, & Maydeu-Olivares, 1997). These and other researchers (Heppner, Kampa, & Brunning, 1987; Nezu, 1986) have established that those who have a low belief in their problem-solving ability, irrespective of their actual problem-solving ability, were more likely to suffer from negative affectivity and a sense of a lack of control in their lives and to use a less logic-based problem-solving style.

Until recently, the link between the development of a negative schema and/or helplessness, and the development of depression was difficult to establish (Segal & Ingram, 1994). However, Sedek et al. (Kofta & Sedek, 1999; Sedek & Kofta, 1990; Sedek, Kofta, & Tyszka, 1993; von Hecker & Sedek, 1999), have established that one possible mechanism for the development of the depressive schema or hopelessness and a negative attributional style is cognitive exhaustion. They define cognitive exhaustion as the outcome of increased cognitive activity without an end product, the solving of the problem, which causes the problem solver to decrease the activity and to avoid further problem-solving, in response to a perception, of uncontrollability and irreducible uncertainty. Cognitive exhaustion was seen by Sedek et al. to be demonstrated by the inability of their participants to solve the challenge and to then cease to respond or to respond more slowly, which was seen as the demonstration of signs of hopelessness/helplessness. The development of the concept of cognitive exhaustion is consistent with the work of Barwise (1993) and Johnson-Laird (1996). The view espoused by Sedek et al. (1990, 1993, & 1999) is that problem-solving requires the development of effective mental models of the situation to produce effective decisions or behaviours. If the situation is controllable, these activities produce solutions which increase the sense of controllability and self-efficacy.

If, however, the problem solver recognises that they are unable to solve the problem this produces uncertainty and the perception of uncontrollability, which is consistent with the work of the problem-solving researchers (Nezu, 1986; Heppner et al., 1987). If this lack of success continues, then the individual is faced with constant cognitive challenge without reward, the overcoming of the challenge, and develops a lack of confidence in their ability to solve problems and subsequently an avoidance of problem-solving.

The lack of reward changes the individual's belief in their ability to solve life situations/problems, and their motivation to do so, in response to which they cease to attempt to problem solve and become passive observers, which further robs them of the ability to deal with non-routine (life) problems. This complex process is seen as being a response to the inability to effectively filter data / information (Kofta & Sedek, 1993), which, if it occurred, would ensure that effective modelling and problem-solving would take place, in which case exhaustion and helplessness would be less likely to occur. Kofta and Sedek indicate that the lack of effective filtering means that the individual attends to all of the available data without the ability to select and sort the relevant information. In response to this the cognitive resources will be used in an inefficient and ineffective manner, which results in the lack of sufficient resources to allow problem formulation and solution.

The inability to develop a solution exposes the individual to increased uncertainty and subsequently cognitive exhaustion, demobilisation and passivity, the obvious signs of helplessness and hopelessness which underlie the depression that follows. Kofta and Sedek (1998) also indicate that hopelessness/helplessness can be produced by the exposure to a single overwhelming event. Traumatically induced helplessness – the total inability to solve an overwhelming problem – they argue, could of itself produce the cognitive and affective correlates of depression. This view is consistent with that postulated by Abramson et al. (Abramson, Alloy, & Hogan, 1997).

Kofta, Weary, and Sedek (1998) hypothesised that ineffective mental modelling, and hence the inability to solve the problem and reduce uncertainty, produces a loss of faith in the ability to develop effective mental models and to solve problems, consistent with the work of D'Zurilla et al. (1999). This loss of faith

subsequently produces less logic-based approaches to life modelling/problem-solving, which then leads to the reliance on a more emotionally-based problem-solving style and, as suggested by Heppner et al. (1985b) and D'Zurilla et al. (1999), to less effective problem-solving – because of a lack of the use of effective modelling and information management – and the failure to solve the problem. This failure would then result in the confrontation with uncontrollability and uncertainty, and the development of cognitive exhaustion and helplessness as described by Sedek. The cognitive exhaustion and defective problem-solving style may in fact develop in response to initial (in childhood) failures in problem-solving, with exposure to challenge or stress.

Johnson-Laird (1996) posited that failures in model development and problem-solving are a product of a poor working memory. Hambrick and Engle (2003), however, suggest that working memory capacity is not the pivotal factor in problem-solving unless conscious processing is required. They indicate that, contrary to the view of Johnson-Laird, working memory capacity does not always correlate with problem-solving performance. Rather, their work and the work of German and Barrett (2005) indicates that working memory, and hence problem-solving, is adversely affected by two problem-solving errors – functional fixedness (the inability to use a familiar object or concept in a novel way) and negative set (the continued use of a complex solution when a simpler one is available). These two errors adversely affect performance when the problem solver is unable to suppress previous information, solutions or models to allow an effective response to the problem. This work adds to the work of Sedek et al.(1998) in that it offers an explanation for the development of cognitive exhaustion, in that the working memory-based filtering

failure that Sedek et al. posited may in fact be a response to these cognitive errors rather than to a working memory deficit.

The present study attempts to elucidate the mechanisms behind the development of cognitive exhaustion by trying to establish if the errors of functional fixedness and negative set are implicated in the production of irreducible uncertainty, cognitive exhaustion and, eventually, a negative schema and hopelessness and, possibly, a negative problem-solving orientation. This attempt to elucidate the mechanism which lies behind poor model formulation and the development of cognitive exhaustion, arises out of the recognition that not all people who are exposed to life challenge or negative developmental experiences develop depression. If this was not the case, all people so exposed would become depressed, not just the 15.3% of the world population who do.

To establish the factors operating in this complex interaction between personality type, information processing bias, problem-solving style, cognitive exhaustion, problem-solving ability, and depressogenesis, a three group (or triadic) design was used. This three group design was developed to compare those who had never been depressed with those who had recovered from depression and those who were presently depressed (Blackburn, Jones, & Lewin, 1986; Dobson & Shaw, 1986; Gotlib, Mount, Cordy, & Whiffen, 1988; Hamilton & Abramson, 1983; Hollon, Kendall, & Lumry, 1986; Lewisohn & Rosenbaum, 1987). The three group design was chosen because of its ability to elucidate the factors that differentiate the performance of the three groups under study. In this case, the three group design was chosen because of its potential to establish commonalities of response, which may suggest long-term processing similarities, between the currently and previously depressed groups and their differences from the never depressed group.

The three group design also allows comparisons to be made between the groups to elucidate if there are differences between them with regard to problem-solving ability/model development and any differences or similarities between the depressed and recovered depressed groups on the measures used. Traditionally (Hedlund & Rude, 1995; Segal & Ingram, 1994), this design has been used to measure the extent to which recovered depressed individuals have resolved or retained their cognitive biases and negative schemas following resolution of their depressed state. Hedlund and Rude (1995) and Segal and Ingram (1994) used the triadic design and a mood priming exercise to establish if asymptomatic recovered depressed participants produced changes in their Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978) and their Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980) scores, consistent with those that were demonstrated in the presently depressed groups, following this mood priming. This study found support for the finding that individuals who had been depressed maintained an asymptomatic vulnerability to depression. This research also established the three group design as an effective way of comparing these groups in a way which elucidated complex differences which may only have otherwise been able to be elucidated through more difficult longitudinal research.

To attempt to establish the mechanism behind the development of cognitive exhaustion, the present study focused on trying to delineate the factors which contributed to this exhaustion. To do this, participants were assessed with a number of measures, firstly, of information processing bias, as such information processing bias is seen as pivotal in the development of helplessness and the negative schema, with its negative attributional bias and negatively valanced memory. This assessment was carried out using the Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978)

and the Automatic Thoughts Questionnaire (ATQ; Hollon & Kendall, 1980). The DAS taps the underlying dysfunctional attitudes and cognitions that are associated with depression. The ATQ is a way of measuring the underlying thoughts which were produced by, and which maintain, the negative processing biases demonstrated by those who are depressed. Both of these measures are state measures (Segal & Ingram, 1994) and demonstrate that those who are depressed have significantly biased processing of information.

Secondly, the participants were assessed in terms of their problem-solving style. A number of theorists (Burns & D'Zurilla 1999; D'Zurilla & Chang, 1995; D'Zurilla & Sheedy, 1991; Epstein, 1994; Heppner & Anderson, 1985; Heppner & Baumgardner, 1985; Nezu, 1985, 1986a, 1987; Nezu & D'Zurilla, 1989) have been able to establish that the way individuals evaluate their ability to solve social problems is related to the adjustment of the person. They have shown that individuals who lack belief in their ability to solve problems, whether they are good problem solvers or not, and who see problem-solving as a negative endeavour have a poorer adjustment to life. These researchers have also been able to demonstrate that a poor attitude to problem-solving is highly associated with depression and anxiety. The research of Burns and D'Zurilla (1999) indicates that problem-solving orientation is not related to mental ability. However, a negative problem-solving orientation is associated with less effective problem-solving (Chang & D'Zurilla, 1996).

To clarify the factors involved in the production of this postulated cognitive exhaustion, it was decided to establish if one of the underlying factors in the development of cognitive exhaustion was a product of the inability to develop effective mental models. This inability could be demonstrated by a longer response time to complete a problem-solving task, especially if this task required a significant

input into model development and the suppression of competing information. As indicated above, the lack of the ability to form effective mental models may prevent the individual from developing effective problem-solving strategies, which should produce a problem-solving style which was less rational, an "emotional" style, while effective problem-solving ability should produce a problem-solving style of "rational" problem-solving. The less effective problem-solving style should then correlate with higher levels of emotional difficulties, as predicted by Heppner and Anderson (1985), Epstein (1990) and D'Zurilla et al. (1998), and higher scores on measures of depression.

To attempt to evaluate these relationships, a social problem-solving task was developed which challenged the participants to solve moral dilemma type problems. The participants were with challenged with "moral dilemmas", such that the challenges were not of the true/false type but required the participants to engage in a process of deciding the relative merits of the behaviours of a set of agents in situations. To this extent, the challenge tasks are seen to parallel life experiences, in that they challenged the participants to decide between a number of similarly valanced alternatives, both positive and negative.

This is a task which conforms to the insights of Johnson-Laird (1996) that complex multifaceted problems demand the development of alternative models to be solved and that effective model development solves such problems more rapidly. Therefore, those who can develop more effective mental models to solve the problems more quickly should be those who have a more "rational" problem-solving style. Conversely, those who take longer to solve the problems should be more "emotional" problem solvers who develop mental models more poorly and hence experience difficulty solving life problems and subsequently experience helplessness. It is

postulated that the proposed moral dilemma procedure may be able to evaluate if there are differences between those who use either a “rational” or an “emotional” problem-solving style and whether this difference is correlated with the experience of depression and its resolution.

If this theoretical standpoint is to be supported, the challenge task should also show that those who are depressed and those who have recovered from depression both demonstrate a continuing difficulty in dealing with this kind of cognitive challenge irrespective of current mood . That is, those who are depressed and those who have recovered from depression should both demonstrate a longer response time than those who have never been depressed because the depressed and recovered depressed participants are postulated to share a deficit in problem-solving ability/mental model development for this kind of problem. It is postulated that this deficit in mental model development/problem-solving, because it remains after the resolution of the depression, is an underlying factor in the development of cognitive exhaustion and helplessness.

The present study compared never depressed, recovered depressed and presently depressed participants on a number of measures. It is hypothesised that, consistent with the concept of cognitive exhaustion (Sedek & Kofta, 1990), and the postulated cognitive vulnerability which underlies this potential for cognitive exhaustion with challenge, that those participants who are presently depressed and those participants who have recovered from their depression will demonstrate a deficit in problem-solving, as measured by response time, when compared with those participants who have never been depressed. It is hypothesised that this deficit in problem-solving is a product of the influence of the problem-solving errors, functional

fixedness and negative set, which interfere with problem-solving because of a lack of the ability to suppress these errors and to develop effective models.

METHOD

Design

The experiment consisted of the following groups: (1) participants who were *presently depressed*; (2) participants who had *recovered from depression*; and (3) participants who had *never been depressed*. Placement of the participants within each experimental group was made on the basis of (a) their scores on the Beck Depression Inventory – Second Edition (BDI-II; Beck, Steer, & Brown, 1996) and (b) their history of depressive symptoms and current depressive symptomatology or the lack of experience of, or the resolution of, such symptoms.

The participants in the presently depressed group (Group 1) met the criteria for the disorder, Major Depressive Disorder, as set out in the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM – IV) of the American Psychiatric Association. Membership of this group was established by (1) clinical interview using the DSM – IV criteria, (2) a history of depression, and (3) if they had a BDI-II score of 20 or above and if their scores on the Depression scale of the Symptom Checklist 90 Revised (SCL-90-R: Derogatis, 1977) were above a T score of 63 the cut score for a diagnosis of depression. A score of 20 or above on the BDI-II and above a T score of 63 on the SCL-90-R has generally been considered to indicate that the person suffers from a moderate level of severity of depressive symptoms (BDI-II Manual, p 11; SCL-90-R Manual, p 58). Both measures were used to ensure

that those participants who were placed in this group did, in fact, satisfy the criteria for being presently depressed.

The recovered depressed group (Group 2) comprised participants who had previously suffered from signs and symptoms consistent with the DSM –IV criteria for Major Depressive Disorder but who no longer did so following treatment, and who had a BDI-II score of less than 10. A score of 10 or below is generally considered to indicate that the person either experiences minimal or no depression (BDI-II Manual, p 11). These participants also had a T score of less than 63 on the Depression scale of the SCL-90-R (SCL-90-R Manual, p 58).

Participants were placed in Group 3, never depressed, if they had no history of depression and if they did not presently comply, and had never complied, with the DSM – IV criteria for Major Depressive Disorder or Dysthymic Disorder and if they had a BDI-II score of less than 10. These participants also had a T score of less than 63 on the Depression scale of the SCL-90-R.

Participants in all three groups were assessed with the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1977). Participants in all three groups who scored above the upper limit of the normal range, above a T score of 63 on the Anxiety and/or the Phobic Anxiety scales of the SCL-90-R were excluded from the experiment because high levels of anxiety in those who are depressed can produce slower processing of emotional material by these depressed participants (Lawson & McLeod, 1999; Mathews & McLeod, 1985; Nunn, Mathews, & Towner, 1997; Williams, Mathews, & McLeod, 1996). Since the experimental instrument relies on speed of processing (response time) as the measure of processing difficulty, it was important to exclude those potential participants who were suffering from elevated levels of anxiety as such participants would respond more slowly. If anxiety effects were not

reduced or managed, a slow response time could equally be a response to either the effect of the cognitive errors postulated to underlie defective problem-solving in depressed or recovered depressed participants or the effect of anxiety itself, with no way to elucidate the cause of this slow response time, which could have a significant and negative effect upon the value of the response time measures as a measure of problem-solving difficulty.

The participants shared a similar level of education, were of similar ages (mean 43.5 years, sd 8.43) and were of similar socio-economic status. None of the participants were representatives of minority groups. There was a roughly equal participation of males and females (8:10) in the study.

Table 1

Demographic details of the participants

	Participant No.	Age	Gender	Occupation	Matrix Reasoning/Cognitive Ability – Scaled Scores
Group 1	4	50	M	Author	13
	6	44	M	Consultant	9
Presently	7	33	M	Technician	10
Depressed	8	51	F	Teacher	13
	12	44	M	Manager	12
	16	55	M	Technician	13
Group2	2	46	M	Manager	14
	5	55	F	Manager	15
Recovered	9	44	F	Professional	9
Depressed	10	55	F	Clerical	13
	15	53	M	Manager	10
Group3	1	31	F	Professional	16
	3	40	F	Professional	14
Never	11	44	F	Clerical	10
Depressed	13	30	F	Clerical	13
	14	36	M	Manager	17
	18	36	F	Student – Tertiary	16
	19	37	F	Manager	15

As females are seen as being more likely than males to suffer from depression (1.9 % for males and 3.2% for females, World Health Report 2002), the gender split may represent an over-representation of males in the participant groups. However, the

World health Report 2001 also suggests that male depression may be under-diagnosed, as males are less likely to admit to, or seek assistance for, depressive illness. The World health Report 2001 (chapter 2, p 3) indicates that, as males are far more likely to suffer from alcohol related disorders than depression, the implication is that men's under-representation in depressive illness statistics is a response to their self-medication with alcohol, and that in fact men are as likely to suffer from depression as women.

Participants

The sample consisted of 18 participants recruited from the general population and from the client base of a psychology practice in a rural area of Australia. There were 6 participants in group 1 (presently depressed); 5 participants in group 2 (recovered-depressed); and 7 participants in group 3 (never-depressed).

Never-depressed (Group 3) participants were recruited from the spouses of those participants who were being assessed from the recovered-depressed (Group 2) and presently depressed groups (Group 1) and from the general population.

Recovered-depressed (Group 2) and presently-depressed (Group 1) participants were recruited by the experimenter, from the client/patient population of the psychology practice. On referral to the study, all participants were engaged in an information session, which explained the rationale behind the research and the tasks to be undertaken. They were then invited to give formal consent to participation and completed an informed consent document.

Participants were excluded from the research if they had signs of cognitive dysfunction or low levels of mental ability, as such factors would produce confounding effects within the study. Such participants would not be suitable because: (a) they could produce very slow response times; (b) they may be unable to manage

the material; or, (c) they may be unable to engage with the experimental measure. To control for the confounding effects of low mental ability or cognitive dysfunction, the participants were assessed with the Matrix Reasoning subtest from the Wechsler Adult Intelligence Scale – Third Edition (WAIS-III; Wechsler, D., 1997). Participants who obtained scores below the lower limit of the normal range, below a Scaled Score of 8 – which indicates lower cognitive function and a specific difficulty with problem-solving – were excluded from the research.

Potential participants were excluded from the research if they achieved scores below the twenty-fifth percentile on both Trails A and B of the Trail Making Test (Reitan & Wolfson, 1985). The work of Armitage (1946), Spreen & Benton, (1965), Lezak (1995), and Reitan (1958) indicates that the Trail Making Test is highly vulnerable to the effects of brain injury. Lezak (1995) indicates that the Trail Making Test has a test-retest reliability coefficient of between .60 and .90.

Scores on the Trail Making Test which are below the twenty-fifth percentile are suggestive of low cognitive function and/or cognitive dysfunction, especially executive function problems. Such executive function problems, if not eliminated or controlled for, would be a significant source of error for the research.

Selection Measures

Beck Depression Inventory – Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item test which measures the affective, somatic, behavioural, motivational, and cognitive symptoms of depression. Each item has four response categories, which are scored 0, 1, 2, and 3, according to the severity of the symptoms. Possible scores range from 0 to 63, with higher scores reflecting more severe depressive symptomatology.

The BDI-II was chosen as a test to place participants in their respective groups because it is a very commonly-used self-report measure of the severity of depressive symptoms, and has been shown to have very good reported reliability and validity (Beck, Steer, & Garbin, 1998; Moilanen, 1995; Ping & Xitao, 2000). These, and other, researchers have reported internal consistency scores in the order of .84 (Cronbach *a)* and test-retest reliability scores in the order of .71 for this test.

Participants were placed in their respective groups based on their scores on the BDI-II and their satisfaction of the selection criteria, compliance with the DSM – IV criteria for Major Depressive Disorder and a history of depression.

Symptom Checklist-90-Revised (SCL-90-R: Derogatis, 1977). The SCL-90-R is a 90-item self-report symptom inventory. Each item is rated on a 5-point scale of distress, from 0 to 4, indicating the range of responses from "not at all" affected to "extremely" affected by each participant. The SCL-90-R produces a corrected score for item endorsements on the nine clinical scales of this test. The clinical scales are: Somatisation, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism. The corrected scores range from a lowest possible score of 0.00 to a maximum score of 4.00. These scores are then converted into T Scores, a standard score, with a mean of 50 and a standard deviation of 10. SCL-90-R T Scores above 63 are seen as "indicating the existence of significant and limiting symptoms in the area assessed by the clinical scale" (Symptom Checklist-90-Revised; Derogatis, 1977; Manual, P. 58). The SCL-90-R is as a widely-used assessment instrument which has good internal consistency for the clinical scales raging between .77 and .90 and sound test-retest reliability for the nine clinical scales, ranging between .68 and .90 (Derogatis, Rickels, & Rock, 1976;

Horowitz, Rosenberg, Baer, Ureno, & Villasenor, 1988). The SCL-90-R was used to reinforce the designation of participants into the three groups.

Life Events Survey (LES; Sarason, Johnson, & Siegel, 1978). The LES was used to assist in establishing if there were any recent life events which could have a priming, and therefore confounding, effect upon the participants. This is a 57-item self-report measure which allows participants to indicate the impact upon them of the events which have occurred in their lives, over the past year. The LES is divided into two sections: Section 1, which is completed by all participants, is a 47-item list of specific events and three blank spaces for the participant to insert other events and to rate them similarly to the standard 47 items; and, Section 2 which contains 10 items for those involved in an academic environment. The participant rates each listed relevant event on a 7-point Likert scale, going from –3, "extremely negative" to +3, "extremely positive". Scores on the positive and negative life events are summed to produce individual positive and negative scores and an overall score. The LES produces both positive and negative life events scores, with the negative score being highly correlated with the development of psychopathology (Sarason, Johnson, & Siegal, 1978). Sarason et al. found that the LES had a test-re-test reliability of between .29 and .53. Skaff, Finney, and Moos (1999) found that the LES had a coefficient alpha of .79.

The Life Events Scale was used to screen out any participants who had experienced a recent life event that could have had an effect on their group placement. It was postulated that a negative life event could have a priming effect, especially on those participants who were recovered from their depression, such that their depression was revivified. The LES was used to pre-empt such a situation by identifying whether or not he participants could have been primed by a recent event.

Matrix Reasoning. The Matrix Reasoning subtest is a test of non-verbal ability which loads very well, .72, on general intelligence factor "G" and on the fluid intelligence factor (Kaufman & Lichtenberger, 1999; Tulsky & Hsin-Yi Chen, 1998). Matrix Reasoning also loads well on the use of conceptual rules and on higher-order verbal conceptualisation (Dugbartey, Sanchez, Rosenbaum, Mahurin, Davis, & Townes, 1999).

The Matrix Reasoning test comprises 29 items, 3 practice items and 26 test items. The participant is required to select the correct response, to complete a logical pattern, from the five alternative answers offered for each test item. Participants' responses are scored and a Scaled Score is computed based on the norms provided for the test.

Trail Making Tests. Potential participants were excluded from the research if they achieved scores below the 25th percentile on both Trails A and B of the Trail Making Test (Reitan & Wolfson, 1985). Armitage (1946), Reitan (1958), Breen and Benton (1965), and Lezak (1995) indicate that the Trail Making Test is highly vulnerable to the effects of brain injury. Lezak indicates that the Trail Making Test has a test-retest reliability coefficient of between .60 and .90.

As the present research attempts to tap into the difference in cognitive functioning, especially problem-solving, any cognitive dysfunction which may exist will adversely affect the participant's ability to solve problems. This lack of ability to solve problems, irrespective of emotional status, will affect the ability to manage the challenge task in the experimental instrument, producing a confounding variable.

Automatic Thoughts Questionnaire (ATQ). The ATQ (Hollon & Kendall, 1980) is the most frequently used self-report measure in the evaluation of cognitive symptomatology in depressive states, tapping into the automatic thoughts of those

who suffer from depressive symptomatology. The ATQ was used to examine whether those participants who were placed in Group 2, recovered depressed, no longer showed signs of depressogenic schemas, which may not have been elucidated by the BDI-II. Such unrecognised schemas could have had a further confounding effect upon the performance of the participants, and thus they had to be controlled for. The recovered depressed participants scores on the ATQ indicated that they did not suffer from negative automatic thoughts at a level consistent with the experience of depression or at a level which would indicate that they were troubled by such negative thoughts.

The ATQ is a 30-item instrument in which participants rate the frequency with which the 30 statements, which encapsulate the kind of negative thought processes endured by depressed individuals, were a part of the participants' thought processes over the preceding week. The degree of frequency ranges from 1, “not at all”, to 5, “all the time”. The score is the sum of the responses. Hollon and Kendall (1980) indicate that the mean for non-depressed participants is 48 (M = 48.75, SD =10.89) and the mean for depressed participants is 79 (M = 79.64, SD = 22.29).

There are a large number of studies that support the concurrent validity of the ATQ and its ability to differentiate depression from other pathology (Deardoff, Hopkins, & Finch, 1984; Dobson & Breiter, 1983; Glass & Arnkoff, 1997; Hill, Oei, & Hill, 1989; Ingram, Kendall, Siegle, Guarino, & McLaughlin, 1995; Ingram & Wisnicki, 1988; Kazdin, 1990; McHugh & Wierzbicki, 1998; Sahin, 1992). In their meta-analysis of the reliability and validity of the ATQ, Glass and Arnkoff found that a large number of studies support the ATQ and its ability to separate depressive symptomatology from a lack of pathology. However, they also found that the ATQ may also tap cognitions associated with trait anxiety.

Hollon and Kendall (1980) also indicate that the ATQ was not designed to distinguish between anxiety and depression. They indicate that the ATQ correlates as highly with trait anxiety as it does with depression. However, McDermut and Haaga (1994) indicate that participants' depressive state of mind ratios, formed from the ATQ and the Automatic Thoughts Questionnaire – Positive (ATQ-P: Ingram & Wisnicki, 1988), accounted for a significantly higher percentage of the variance than did anxiety.

The work of Glass and Arnkoff (1997) suggests that the ATQ is a reliable and valid measure and that it is one which is able to differentiate between depression, a lack of psychopathology, and sensitivity to treatment. They also suggest that there are many studies, including that of Kendall, Howard, and Hays (1989), which are supportive of their evaluation of the ATQ. Glass and Arnkoff suggest that the ATQ has reliability and internal consistency ratings at the .9 level. This is consistent with the findings of Holland and Kendall (1980) during the development of the ATQ. They found a split half reliability of .97 and a coefficient alpha of .96.

Dysfunctional Attitudes Scale (DAS). Participants were also assessed with the Dysfunctional Attitudes Scale (DAS; Wiseman & Beck, 1978). This is a self-report measure of the degree to which individuals endorsed negative or dysfunctional beliefs commonly seen in depression. The DAS is the most frequently used measure of the negative cognitions which are usually seen to occur in people who are depressed.

The DAS is a 40-item test which uses a 7 - point Likert scale ranging from 1, "totally agree", to 7, "totally disagree". Scoring direction depends or whether a particular belief is judged to be dysfunctional or not. The score range on the DAS is from 40, the lowest possible score, to 280, with higher scores indicating a greater degree of dysfunctional attitudes and beliefs. The DAS is a very well researched

instrument with good validity and reliability, producing alpha coefficients of .80 (Brown, Hammen, Craske, & Wickens, 1995).

Experimental Measures

The Perspective Inventory (PI). The participants were challenged with a specially developed experimental test of social problem-solving, the Perspective Inventory. This is a 10-item experimental instrument that was developed to assess if Group 1, presently depressed participants, and Group 2, recovered depressed participants, demonstrated a difficulty with social problem-solving, *cognitive insufficiency*, and to establish if there was a relationship between this social problem-solving deficit and cognitive exhaustion (Kofta & Sedek, 1999; Sedek & Kofta, 1990; Sedek et al., 1993; von Heckler & Sedek, 1999). Sedek and his collaborators have established the relationship between cognitive exhaustion and the development of learned helplessness, a concept developed by Maier and Seligman (1976) and expanded upon by Abramson et al. (1978).

The PI is a paper and pencil challenge task which requires the participants to respond to moral dilemma-type vignettes. These vignettes are of the approach-avoidance kind and engage the participant in establishing the appropriateness or inappropriateness of the behaviour of the characters in the vignettes. The vignettes were designed to be complex enough to present an emotional processing challenge. The vignettes were equated for length, approximately three hundred words, and were both “positive” and “negative” in tone, five of each. The response time of the participants to complete their responses to the vignettes, exclusive of reading time for the vignettes, was the measure of sufficiency. That is, the actual time taken to decide on the relative quality of the responses of the characters in the stories was the response time.

The Modes of Processing Inventory. The Modes of Processing Inventory (MPI; Burns & D'Zurilla, 1999) is a 32-item instrument with a 5-point Likert scale ranging from 1, "not at all true of me", to 5, "extremely like me". The items are statements about how the participant would cope with a situation, such as: "To cope I usually go with my instincts rather than trying to reason things out".

The MPI arose out of the work of Epstein (1990, 1994) and his cognitive-experiential self-theory (CEST). CEST distinguishes between two different information-processing systems that are believed to underlie and play an important role in everyday coping – a rational system and an experiential system. CEST suggests that there are individual differences in the way in which a system of problem-solving is relied upon across a range of life situations and that these differences have an effect upon the adaptiveness of the responses to life situations. Epstein (1994) suggests that those who rely on "rational" information-processing are more adaptive than those who rely upon a more "experiential" information-processing system, who are less adaptive.

The MPI has been seen to be an effective tool in the establishment of information-processing orientation. The MPI uses a three factor solution rather than Epstein's two-factor model. This three factor solution indicates that there are three processing styles: rational, emotional and automatic. The MPI was included in the study to establish if processing style/orientation is a factor in cognitive sufficiency and cognitive exhaustion, especially as Burns and D'Zurilla (1999) found that participants with a more emotional processing style have a more predominately negative emotional state.

The internal consistency measures for the three constructs are .90, .88 and .80, respectively. However, the test-retest reliability for the three constructs – rational, emotional and automatic processing – were, respectively .56, .61 and .56.

Social Problem-solving Inventory – Revised. The Social Problem-solving Inventory – Revised (SPSI-R; D'Zurilla, Nezu, & Maydeu-Olivares, 1997) is a 52-item self-report instrument, with five subscales which measure two effective/positive problem-solving dimensions and three defective/negative problem-solving dimensions. The items are endorsed on a 5-point Likert scale going from 0, "not true of me at all" to 4, "extremely true of me". The positive scales are Positive Problem Orientation and Rational Problem-solving; while the negative scales are Negative Problem Orientation, Impulsivity/Carelessness Style and Avoidance Style. The alphas for the positive problem-solving factors are, respectively, .80 and .95, while the alphas for the negative subscales are .92, .89 and .89, respectively (SPSI-R Manual). The literature suggests (D'Zurilla & Nezu, 1990; D'Zurilla & Sheedy, 1991; Elliott, Sherwin, Harkins, & Marmosh, 1995; Nezu & D'Zurilla, 1989) that those people with a positive and rational problem-solving orientation are less likely to develop negative emotional states than those who have negative problem orientation, impulsive/careless or avoidant problem-solving styles.

Problem-solving Inventory. The Problem-solving Inventory (PSI; Heppner, 1988) is a 35-item instrument with three problem-solving orientation dimensions – Problem-Solving Confidence, Approach-Avoidance Style and Personal Control. These dimensions are endorsed on a 6-point Likert scale ranging from 1, "strongly agree", to 6, "strongly disagree". The three scales have an effective level of internal consistency – .85 for Problem-Solving Confidence, .84 for Approach-Avoidance

Style and .72 for Personal Control. Heppner (1988) indicates that test-retest reliability is in the order of .83 to .89, over a two-week period.

The PSI was included to elucidate whether the dimensions/scales of this test were associated with negative emotional states and to assess if Problem-Solving Confidence and the perception of Personal Control, in problem-solving, were also associated with shorter response times on the challenge task (PI).

In summary, the participants were assessed with both group placement and experimental tests. These tests are summarised below, in Table 2.

Table 2

Selection and Placement Assessment Instruments	**Experimental Instruments**
• Beck Depression Inventory – Second • Edition (BDI-II) • Symptom Checklist 90 Revised (SCL-90-R) • Automatic Thoughts Questionnaire (ATQ) • Dysfunctional Attitudes Scale (DAS) • Life Events Survey (LES) • Matrix Reasoning (MR) • Trail Making Test (Trails A&B)	• Perspective Inventory (PI) • Modes of Processing Inventory (MPI) • Social Problem-solving Inventory – Revised (SPSI-R) • Problem-solving Inventory (PSI)

Procedure

The participants were assessed by the researcher in individual sessions of approximately two hours duration. The assessment sessions were conducted in a quiet office. The assessment commenced with the establishment of informed consent to be involved in the research. Following this introductory process and the gaining of informed consent, the participants were involved in a brief interview to establish if they had been exposed to any recent crises or traumas. This was done because it has been recognised that such life events could prime any underlying depressogenic schemas in recovered-depressed participants (Georgieff, Dominey, Michel, Marie-Cardine, & Dalery, 1998; Hedlund & Rude, 1995; Segal & Ingram, 1994). These

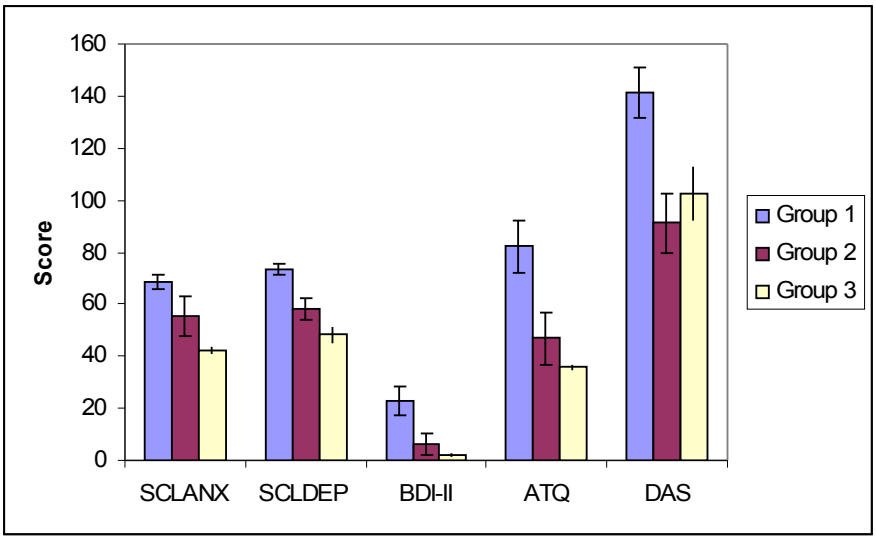
authors suggest that such a process would produce cognitive effects which would interfere with the assessment process and the validity of the participants' responses. The participants were then assessed with a number of tests, which were presented in a changing order to manage the effect of fatigue and the serial position of the instruments in the assessment process.

In summary, the participants were first assessed with instruments associated with cognitive function and present emotional status, to establish both their suitability to participate in the study and their allocation within the appropriate groups. They were then assessed with tests of problem-solving style and orientation and with the challenge task to establish if any relationships existed between their problem-solving style/orientation and cognitive insufficiency. The relationship between cognitive exhaustion and the presence or absence of depressive symptomatology was finally evaluated.

RESULTS

Selection & Placement Instruments

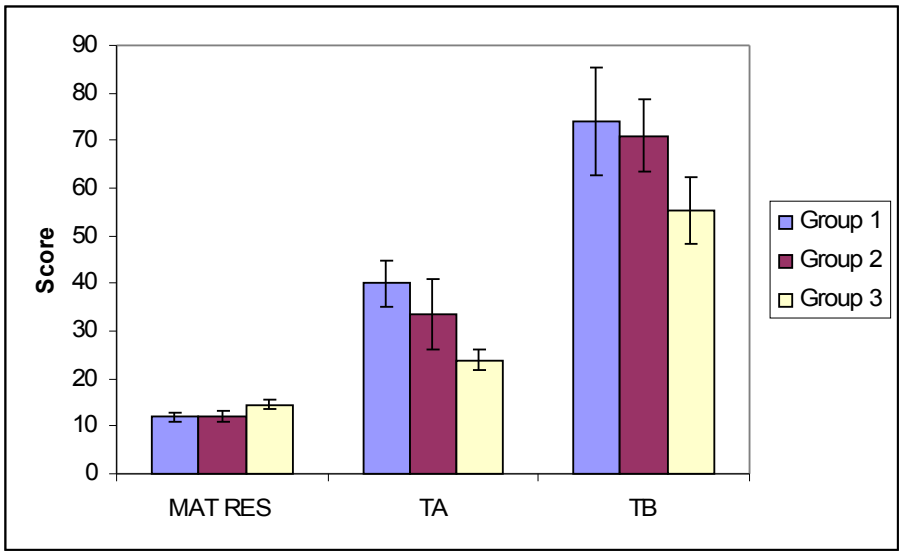
The Means and Standard Errors for the set of Selection and Placement Assessment Instruments are presented graphically in Figures 1 to 3. These figures present this data in three groups. Figure 1, tests of emotional status; Figure 2, tests of cognitive function; and Figure 3, the test of present exposure to positive or negative life events.



Key: SCLANX: Symptom Checklist-90-Revised, Anxiety Scale; SCLDEP: Symptom Checklist-90-Revised, Depression Scale; BDI-II: Beck Depression Inventory –II; ATQ: Automatic Thoughts Questionnaire; DAS: Dysfunctional Attitudes Scale. Group 1: presently depressed; group 2: recovered depressed; group 3: never depressed.

Figure 1

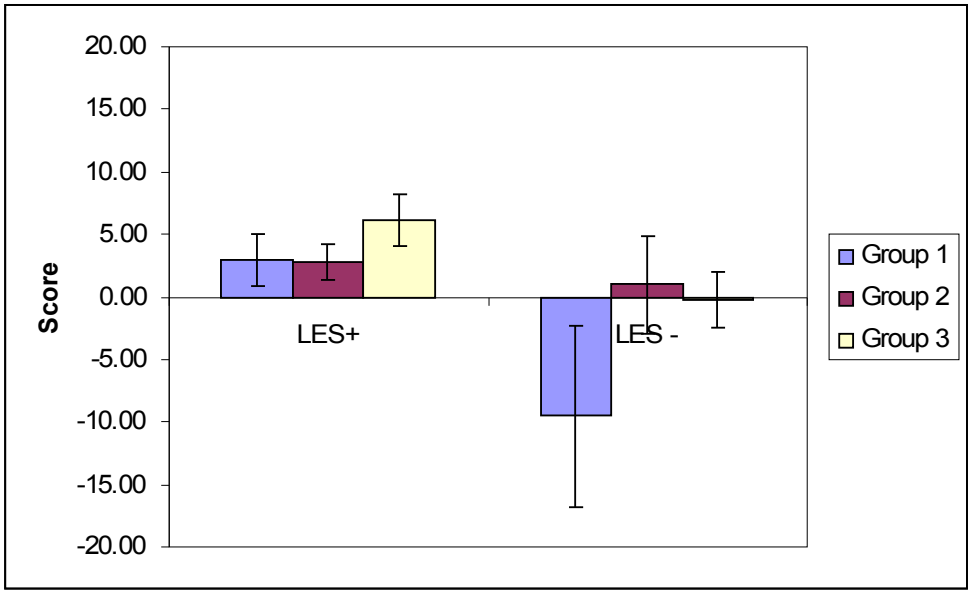
Means and standard errors of placement tests for anxiety, depression, automatic thoughts and dysfunctional attitudes for the three groups.



Key: MAT RES: Matrix Reasoning; TA: Trails A; TB: Trails B. Group 1: presently depressed; group2: recovered depressed; group 3: never depressed.

Figure 2

Means and standard errors of placement tests for tests of cognitive function, Matrix Reasoning and Trails A & B, for the three groups.



Key: LES+: Life Events Scale – Positive Scale; LES -: Life Events Scale – Negative Scale. Group 1: presently depressed; group2: recovered depressed; group 3: never depressed.

Figure 3

Means and standard errors of placement tests for exposure to positive and negative life events for the three groups.

The Means, Standard Deviations, and Standard Errors for the set of Selection and Placement Instruments are also presented in Table 3 below, and Table 4, in Appendix 3.

Table 3

Selection and Placement Assessment Instruments – Means and Standard Deviations

Test	**Group 1** **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group3** **Never Depressed**
SCL90R Anxiety	68.67 (7.20)	55.20 (16.79)	42.29 (4.19)
SCL90R Depression	73.33 (5.64)	58.2 (9.78)	48.14 (7.79)
Beck Depression Inventory – II	22.83 (13.09)	6.20 (9.52)	2.29 (1.79)
Automatic Thoughts Questionnaire	82.33 (24.64)	47.00 (22.57)	35.71 (3.55)
Dysfunctional Attitudes Scale	141.33 (24.15)	91.20 (25.32)	102.43 (28.12)
Matrix Reasoning	12.00 (2.53)	12.20 (2.59)	14.57 (2.44)
Trails A	40.00 (12.24)	33.60 (16.64)	23.86 (5.43)
Trails B	74.00 (27.85)	71.00 (16.99)	55.43 (18.69)
Life Events Scale: Positive	3.00 (5.06)	2.80 (3.27)	6.14 (5.52)
Life Events Scale: Negative	-9.5 (17.73)	1.00 (8.80)	-0.71 (5.88)

SCL90R = Symptom Checklist 90 Revised

The between group comparison for the Selection and Placement Instruments are presented in Table 5.

Table 5

ANOVA Between Group comparisons Selection and Placement Instruments

Test	Group 1 Presently Depressed	Group2 Recovered Depressed	Group3 Never Depressed	
SCL90R Anxiety		-13.47*	-26.38*	Group 1
	13.47*		-12.91*	Group 2
	26.38*	12.91*		Group 3
SCL90RDepression		-15.13*	-25.19*	Group 1
	15.13*		-10.06*	Group 2
	25.19*	10.06*		Group 3
Beck Depression Inventory- II		-16.63*	-20.55*	Group 1
	16.63*		-3.91	Group 2
	20.55*	3.91		Group 3
Automatic Thoughts Questionnaire		-35.33*	-46.62*	Group 1
	35.33*		-11.29	Group 2
	46.62*	11.29		Group 3
Dysfunctional Attitudes Scale		-50.13*	-38.90*	Group 1
	50.13*	-11.23	11.23	Group 2
	38.90*			Group 3
Matrix Reasoning		0.20	2.57	Group 1
	-0.20		2.37	Group 2
	-2.57	-2.37		Group 3
Trails A		-6.40	-16.14*	Group 1
	6.40		-9.74	Group 2
	16.14*	9.74		Group 3
Trials B		-3.00	-18.57	Group 1
	3.00		-15.57	Group 2
	18.57	15.57		Group 3
Life Events Scale : positive		-0.20	3.14	Group 1
	0.20		3.34	Group 2
	-3.14	-3.34		Group 3
Life Events Scale: negative		10.50	8.79	Group 1
	-10.50		-1.71	Group 2
	- 8.79	1.71		Group 3

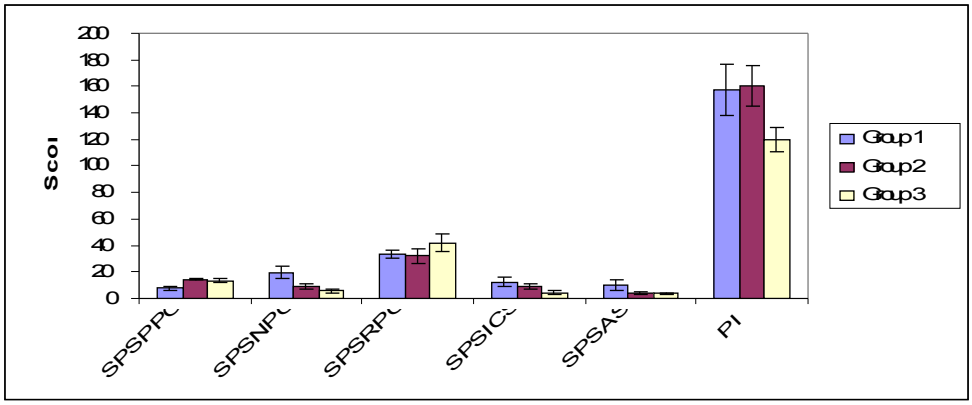
*p<.05 SCL90R = Symptom Checklist 90 Revised

These tables indicate that the selection and placement tests appropriately placed the participants into their respective groups – group 1 presently depressed; group 2 recovered depressed; and group 3, never depressed. These tables also indicate that there was no significant difference between the groups in terms of cognitive potential or function. However, Table 5 indicates that group 1 had significantly lower, but within normal limits, scores on Trails A, when compared with group 3 but that this was not evident on the more difficult Trails B. This suggests that

the differences in the time taken to complete the challenge tasks by the three groups were not a response to the existence of cognitive dysfunction in any of the groups. Similarly, no significant difference was found between the experience of negative or positive life events among the groups. Therefore, it is unlikely that any group was primed to produce either an exacerbation or a resolution of their emotional state, prior to the assessment process, which could have had a confounding effect on the time taken on the challenge task.

Experimental Instruments

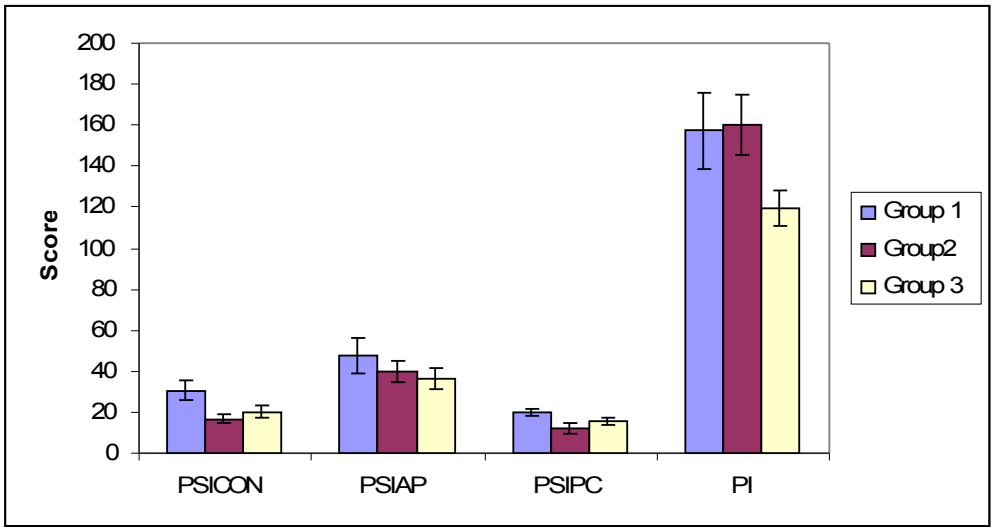
The Means and Standard Errors for the set of Experimental Instruments are presented graphically in Figures 4 to 6. These figures present this data in three groups: Figure 4, the Social Problem-solving Inventory – Revised (D'Zurilla, Nezu, & Maydeu-Olivares, 1997); Figure 5, the Problem-solving Inventory (Hepner, 1988); and Figure 6, the Modes of processing Inventory (Burns & D'Zurilla, 1999). Each of these sets of test data are accompanied by the Means and Standard Errors for the participants' responses to the challenge task, the Perspective Inventory (PI).



Key: SPS: Social Problem-solving Inventory: PPO: Positive Problem Orientation; NPO: Negative Problem Orientation; RPO: Rational Problem-solving; ICS: Impulsivity/Carelessness Style; AS: Avoidance Style. Group 1: presently depressed; group 2: recovered depressed; group 3: never depressed.

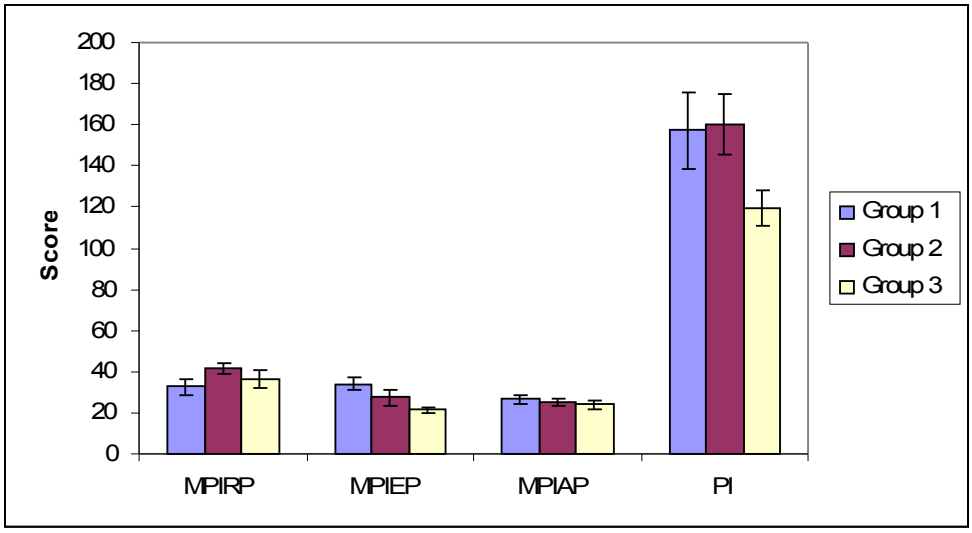
Figure 4

Means and Standard Errors for the sub tests of the Social Problem-solving Inventory



Key: PSI: Problem-solving Inventory: CON: Problem-solving Confidence; AP: Approach – Avoidance Style; PC: Personal Control. Group 1: presently depressed; group 2: recovered depressed; group 3: never depressed.

Figure 5.
Means and Standard Errors for the sub tests of the Problem-solving Inventory



Key: MPI: Modes of Processing Inventory: RP: Rational Problem-solving; EP: Experiential Problem-solving; AP: Automatic Problem-solving. Group 1: presently depressed; group 2: recovered depressed; group 3: never depressed.

Figure 6

Means and Standard Errors for the sub tests of the Problem-solving Inventory

The Means, Standard Deviations, and Standard Errors, for the set of Experimental Instruments are presented in Tables 6 and 7

Table 6

Experimental Instruments Means and Standard Deviations

	Group 1 **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group 3** **Never Depressed**
Social Problem-solving Inventory – Revised			
Positive Problem Orientation	7.83 (3.31)	14.60 (1.51)	13.43 (3.91)
Negative Problem Orientation	19.50 (11.05)	9.20 (4.55)	5.71 (3.03)
Rational Problem Orientation	33.83 (7.41)	32.00 (11.81)	41.71 (17.56)
Impulsiveness/Carelessness	12.50 (9.11)	9.00 (4.63)	4.43 (3.15)
Avoidance	10.50 (9.79)	4.00 (3.24)	3.57 (1.98)
Problem-solving Inventory			
Problem-solving Confidence	30.67 (11.76)	16.80 (4.26)	20.29 (8.38)
Approach/Avoidance	47.67 (20.30)	39.80 (12.45)	36.57 (13.36)
Personal Control	19.67 (4.67)	12.00 (5.65)	15.29 (4.46)
Total			
Modes of Processing Inventory			
Rational Problem-solving	32.83 (9.52)	41.20 (5.86)	36.43 (10.99)
Experiential Problem-solving	34.17 (7.36)	27.40 (8.73)	21.43 (3.82)
Automatic Problem-solving	26.67 (5.43)	24.80 (3.76)	23.86 (6.59)
Perspective Inventory	157.33 (46.11)	160.40 (33.32)	119.71 (23.44)

Table 7

Experimental Instruments Means and Standard Errors

	Group 1 **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group 3** **Never Depressed**
Social Problem-solving Inventory – Revised			
Positive Problem Orientation	7.83 (1.35)	14.60 (0.68)	13.43 (1.48)
Negative Problem Orientation	19.50 (4.51)	9.20 (2.03)	5.71 (1.15)
Rational Problem Orientation	33.83 (3.03)	32.00 (5.28)	41.71 (6.64)
Impulsiveness/Carelessness	12.50 (3.72)	9.00 (2.07)	4.43 (1.19)
Avoidance	10.50 (4.00)	4.00 (1.45)	3.57 (0.75)
Problem-solving Inventory			
Problem-solving Confidence	30.67 (4.80)	16.80 (1.91)	20.29 (3.17)
Approach/Avoidance	47.67 (8.29)	39.80 (5.57)	36.57 (5.05)
Personal Control	19.67 (1.91)	12.00 (2.53)	15.29 (1.69)
Total			
Modes of Processing Inventory			
Rational Problem-solving	32.83 (3.89)	41.20 (2.62)	36.43 (4.15)
Experiential Problem-solving	34.17 (3.00)	27.40 (3.90)	21.43 (1.44)
Automatic Problem-solving	26.67 (2.22)	24.80 (1.68)	23.86 (2.49)
Perspective Inventory	157.33 (18.82)	160.40 (14.90)	119.71 (8.86)

Between group comparison data are presented in Table 8.

Table 8

Experimental Instruments Between Group comparisons

Test	Group 1 Presently Depressed	Group 2 Recovered Depressed	Group 3 Never Depressed	
Social Problem-solving Inventory – Revised				
Positive Problem		6.77*	5.60*	Group 1
Orientation	-6.77*		-1.17	Group 2
	-5.60*	1.17		Group 3
Negative Problem		-10.30*	-13.79*	Group 1
Orientation	10.30*		-3.49	Group 2
	13.79*	3.49		Group 3
Rational Problem		-1.83	7.88	Group 1
Orientation	1.83		9.71	Group 2
	-7.88	-9.71		Group 3
Impulsiveness/		-3.50	-8.07*	Group 1
Carelessness	3.50		-4.57	Group 2
	8.07*	4.57		Group 3
Avoidance		-6.50	-6.93	Group 1
	6.50		-0.43	Group 2
	6.93	0.43		Group 3
Problem-solving Inventory				
Problem-solving		-13.87*	-10.38	Group 1
Confidence	13.87*		3.49	Group 2
	10.38	-3.49		Group 3
Approach/		-7.87	-11.10	Group 1
Avoidance	7.87		-3.23	Group 2
	11.10	3.23		Group 3
Personal Control		-7.67*	-4.38	Group 1
	7.67*		3.29	Group 2
	4.38	-3.29		Group 3
Modes of Processing Inventory				
Rational Problem-		8.37	3.60	Group 1
solving	-8.37		-4.77	G2
	-3.60	4.77		Group 3
Experiential		-6.77	-12.74*	Group 1
Problem-solving	6.77		-5.97	Group 2
	12.74*	5.97		Group 3
Automatic Problem-		-1.87	-2.81	Group 1
solving	1.87		-0.94	Group 2
	2.81	0.94		Group 3
Perspective		3.07	37.62	Group 1
Inventory	-3.07		-40.69	Group 2
	37.62	40.69		Group 3

*p<0.05

These data indicate that there are few strong trends, in response to the sample size and the number of the instruments used. However, it is observable that problem-solving confidence is associated with not having experienced depression or having recovered from depression.

However, as the sample sizes in this study were small, it was recognised that the association described above could be erroneous and the product of Type 1error. To elucidate the nature of the relationships found, an analysis of the data was undertaken. Initially, this looked at the relationship between the Beck Depression Scale – Second Edition (BDI-II) and the Symptom Checklist 90 Revised Depression (SCL Depression) scales to establish their commonalities.

The Beck (BDI-II) and SCL Depression Scales

Examination of the distributions of the Beck and SCL Depression scale scores indicated approximate symmetry in the SCL but strong right skew for the BDI-II. A natural logarithmic transformation was applied to 1 plus the BDI-II scores resulting in an approximately symmetrical distribution, log(BDI-II + 1). The relationship between the log(BDI-II + 1) and SCL-Depression scale scores is displayed in Figure 7. It may be observed there that the relationship is approximately linear between the Beck Depression Scores on the logarithmic scale and the SCL-Depression scores.

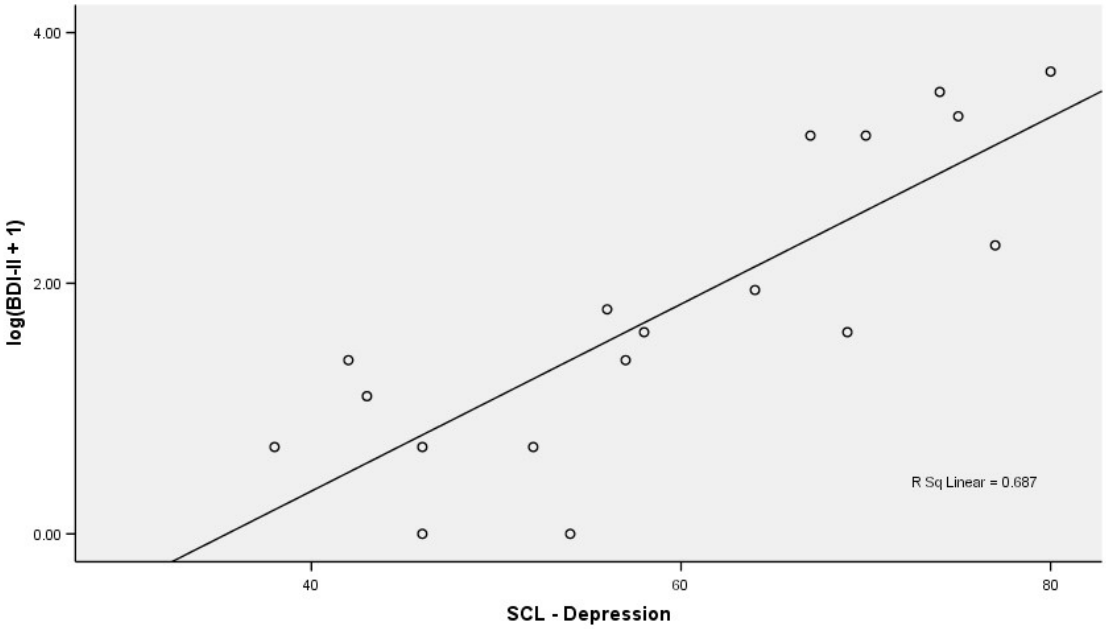


Figure 7

Scatter plot of log(BDI-II + 1) by SCL-Depression scores

This figure indicates that although the tests of depression status, BDI-II and SCL-90-R, use disparate criteria to establish depression status – the BDI-II being more focused on behavioural and cognitive signs of depressive symptomatology and the SCL-90-R being more focused on the emotional signs against a background of common criteria – they are equally effectively at establishing depression status. The liner relationship revealed in this figure demonstrates this.

As the tests of problem-solving orientation appeared to be measuring very similar concepts, and as the complexity of multiple measures of similar concepts was interfering with the elucidation of any possible relationships, it was decided to reduce the number of variables through the undertaking of a principal components analysis (PCA), especially in view of the small sample size (N = 18). While the small sample size itself places limits on the expected empirical stability of the PCA solution, the conceptual integrity of the solution and the high communalities observed indicate that the solution may be useful.

Prior to analysis, each of the 9 subscales of the tests of problem-solving orientation was transformed to a common metric based on the 1, 2, 3, 4, 5 response format of the MPI and coded such that a higher score indicated a more positive cognitive orientation. The functions employed for this purpose are reported in Appendix 3. Two components with eigenvalues > 1 were extracted accounting for 74.2% of the item variance. All communalities were greater than 0.72 except for the experiential problem-solving subscale of the MPI which had a communality of 0.41. The rotated (Varimax with Kaiser Normalisation) component matrix is reported in Table 9.

Table 9

Rotated (Varimax with Kaiser Normalisation) component matrix from PCA of 9 cognitive orientation subscales

Subscale	Component 1	Component 2
PSI - Approach/Avoidance Style	0.89	-0.04
PSI - Problem-solving Confidence	0.87	-0.25
PSI - Personal Control	0.81	-0.25
SPSI - Positive Problem Orientation	0.83	-0.37
SPSI - Negative Problem Orientation	0.79	-0.53
SPSI - Rational Problem-solving	0.70	0.45
MPI - Rational Problem-solving	0.87	0.09
MPI - Automatic Problem-solving	0.07	0.88
MPI - Experiential Problem-solving	-0.36	0.53

Key: PSI: Problem-solving Inventory; SPSI: Social problem-solving Inventory – Revised; MPI: Modes of Processing Inventory;

Five of the subscales with highest loadings on component 1 measure a positive attitude or approach to problem-solving (SPSI - positive problem orientation, SPSI - negative problem orientation, PSI - personal control, PSI - approach/avoidance style and PSI – problem-solving confidence), whereas the subscales with highest loadings on component 2 measure automatic and experiential processing (MPI - automatic problem-solving, MPI - experiential problem-solving). These two scales did not correlate with any of the other scales and did not seem to have any interaction with depression status The two remaining subscales with highest loadings on component 1 (MPI - rational problem-solving, and SPSI - rational problem-solving) are measures of rational processing. While these load together with the positive attitude or approach to problem-solving subscales on component 1, they are conceptually distinct, as they also load on component 2, and also do not contribute to the variance. Neither of these latter outcomes was expected, as the literature (D'Zurilla & Nezu, 1990; D'Zurilla & Sheedy, 1991; Elliott, Sherwin, Harkins, & Marmosh, 1995; Nezu & D'Zurilla, 1989) suggests that a rational problem-solving orientation should be correlated with

positive affectivity while an experiential problem-solving style should be correlated with negative affectivity.

The five positive attitude or approach to problem-solving subscales were tested for reliability as a composite and were found to have a Cronbach's alpha coefficient of 0.94. The alpha coefficient was not increased by the removal of any subscale. The mean of these items was calculated as a composite score for 'positive problem-solving'.

Relationships between depression scale scores and cognitive orientation variables

The depression scale scores were conceived of as responses or dependent upon the cognitive orientation variables. A multiple regression model was fitted to each of the log(BDI-II +1) and SCL-Depression variables with the composite positive problem-solving variable and the 4 problem orientation subscales excluded from the composite being fitted by the stepwise method.

Log(BDI-II + 1) by problem orientation subscales

Two predictor variables were retained in the model (positive problem-solving and MPI rational problem-solving). The model RSQ was 0.64 with F = 13.235, df = 2,15, p = 0.000. The parameter estimates, their standard errors, t-statistics and p-values are reported in Table 10.

Table 10

Log(BDI-II + 1) by problem orientation subscales: multiple regression parameter estimates, standard errors, t-statistics and p-values

	Estimate	SE	t	p
Intercept	4.696	0.815	5.760	0.000
Positive problem-solving	-1.736	0.360	-4.828	0.000

MPI - rational problem-solving	0.839	0.352	2.384	0.031

It is appears from the coefficient signs in Table 10 that depression scores decrease with increasing positive problem-solving and increase with rational problem-solving. This latter result was considered to be counter-intuitive and separate simple regression models were fitted to examine the unadjusted effects of each predictor. The positive problem-solving predictor was significant (F = 16.079, df = 1,16, p = 0.001) with RSQ = 0.50 while the MPI – rational problem-solving predictor was non-significant (F = 1.318, df = 1,16, p = 0.268) with RSQ = 0.08. This is consistent with the fact that rational problem solving (MPI and SPSI) did not contribute to the factor 1 on the principal components analysis and related to no other factor. This was not consistent with the literature. The parameter estimates from these simple regression models, their standard errors, t-statistics and p-values are reported in Table 11.

Table 11

Log(BDI-II + 1) by problem orientation subscales: simple regression parameter estimates, standard errors, t-statistics and p-values

	Estimate	SE	t	P
Intercept	5.251	0.888	5.911	0.000
Positive problem-solving	-1.101	0.275	-4.010	0.001
Intercept	3.063	1.148	2.668	0.017
MPI - rational problem-solving	-0.420	0.366	-1.148	0.268

Although MPI – rational problem-solving was a non-significant predictor of log(BDI-II + 1), its simple regression coefficient was negative as expected.

The relationship between the log(BDI-II +1) and positive problem-solving scores is shown in Figure 8.

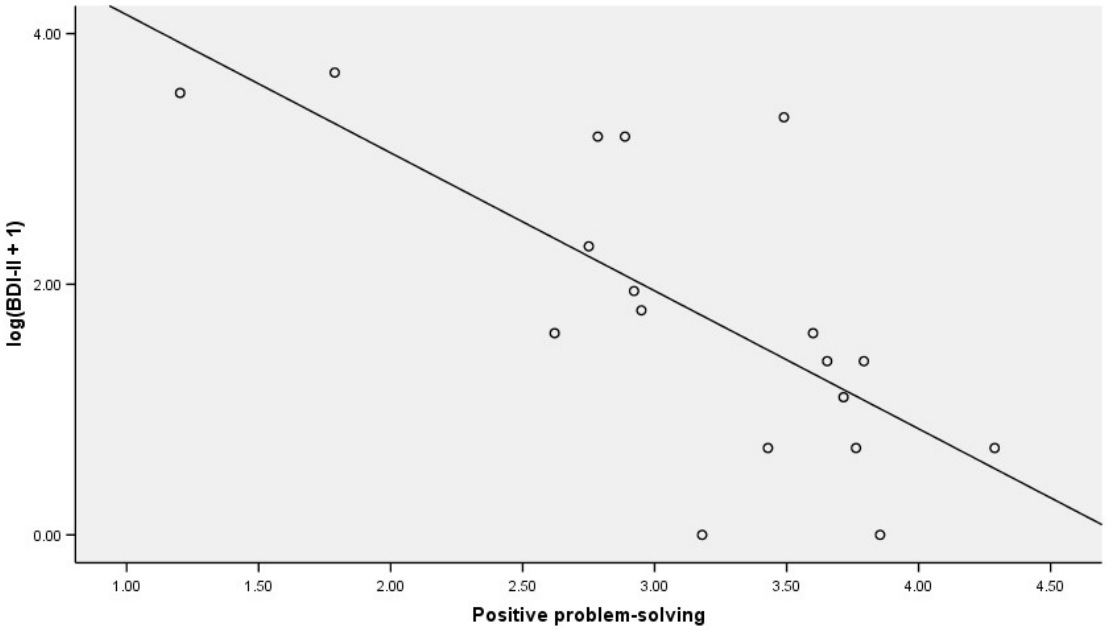


Figure 8

Scatter plot of log(BDI-II + 1) by positive problem-solving

<u>SCL-Depression scores by problem orientation subscales</u>

A stepwise multiple regression model with positive problem-solving and the remaining problem orientation subscales as potential predictors included only positive problem-solving as a significant predictor. The model RSQ was 0.51 with F = 16.881, df = 1,16, p = 0.001. The parameter estimates, their standard errors, t-statistics and p-values are reported in Table 12.

Table 12

SCL-Depression scores by problem orientation subscales: simple regression parameter estimates, standard errors, t-statistics and p-values

	Estimate	SE	t	p
Intercept	98.318	9.749	10.085	0.000
Positive problem-solving	-12.383	3.014	-4.109	0.001

The relationship between the SCL-Depression and positive problem-solving scores is shown in Figure 9.

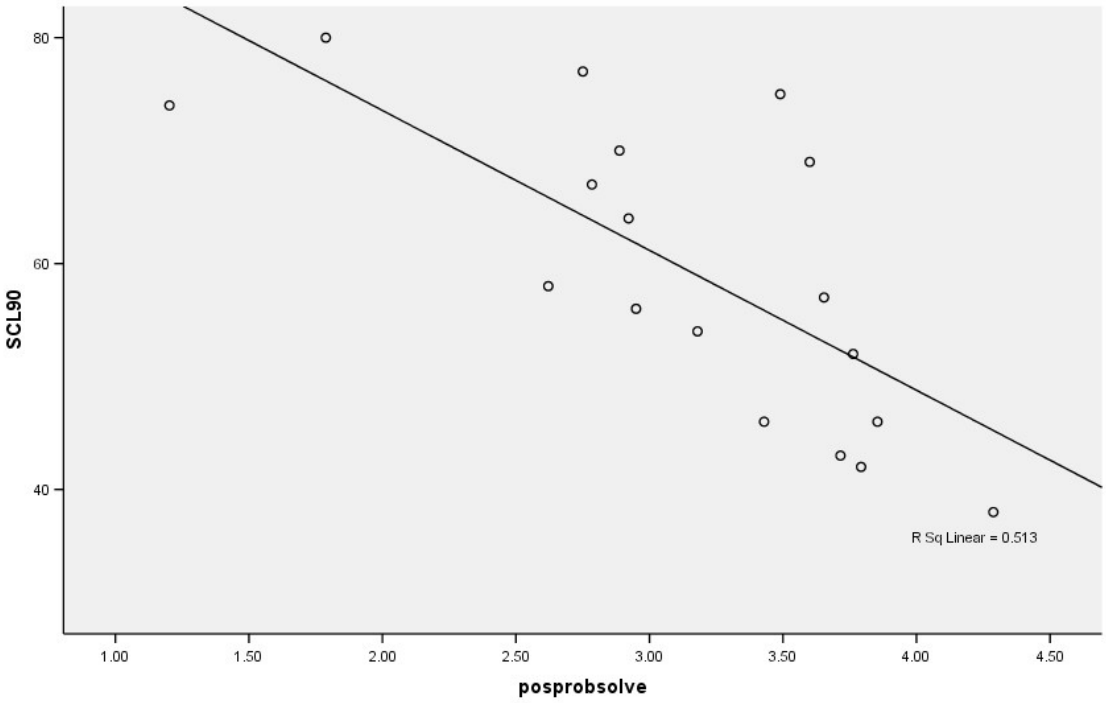


Figure 9

Scatter plot of SCL-Depression by positive problem-solving scores

Relationship between total challenge task time and cognitive orientation variables

The total challenge task response time was conceived of as a response or dependent upon the cognitive orientation variables. A multiple regression model was fitted to the total challenge task response time variable with the composite positive problem-solving variable and the 4 problem orientation subscales excluded from the composite being fitted by the stepwise method. No variables were entered into the model by the procedure. Correlation coefficients between the total challenge task response time variable with the composite positive problem-solving variable and the 4 problem orientation subscales excluded from the composite found a maximum, non-significant correlation of 0.188 ($p = 0.455$).

Relationship between total depression scale scores total challenge task response time

The total challenge task response time was conceived of as a response or dependent upon the depression scale scores. A simple regression model was fitted to the total challenge task response time variable with each of the log(BDI-II + 1) scores and the SCL-Depression scores. In neither case was a significant relationship found (log(BDI-II + 1) $F = 0.061$, $df = 1/16$, $p = 0.808$; SCL-Depression $F = 0.451$, $df = 1/16$, $p = 0.511$).

Relationship between total challenge task response time and depression status

The means and standard deviations of the total challenge task response time by depression status are reported in Table 13.

Table 13

Means, standard deviations and standard errors of the total challenge task response time by depression Status

	Depression Status	Mean	SD	SE
Group 1	Presently Depressed	157.33	46.12	18.90
Group 2	Recovered Depressed	160.40	33.32	14.94
Group 3	Never Depressed	119.71	23.44	8.86

These data are presented graphically in Figure 10.

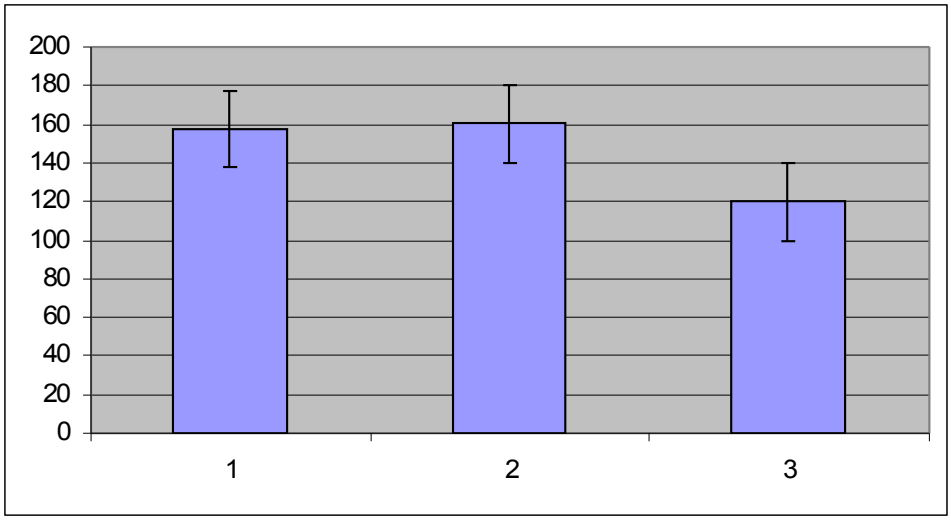


Figure 10

Means and standard errors for three experimental groups on Perspective Inventory

Whilst there was little difference in the mean total challenge task response time between the presently and recovered depressed groups, both groups considered together took significantly longer than the never depressed group to complete the challenge tasks (independent samples t = 2.380, df = 16, p = 0.030).

Relationship between depression status and positive problem-solving

Depression status was conceived of a response or dependent upon positive problem-solving. A multinomial logistic regression model was fitted to the 3 categories of depression status with positive problem-solving as predictor. The relationship was significant by the likelihood ratio test (Chi Square = 7.948, df = 2, p = 0.019) with a

Nagelkerke pseudo RSQ of 0.403) The parameter estimates from 2 paramaterisations of the same model are reported in Table 14.

Table 14

Multinomial logistic regression model of Depression Status by Positive Problem-solving: Parameter estimates, their standard errors and tests of significance

Depression Status Ratio	Estimate	B	SE	Wald	df	p
Presently Depressed	Intercept	7.547	4.599	2.693	1	0.101
/ Never Depressed	Positive problem-solving	-2.528	1.476	2.935	1	0.087
Recovered Depressed	Intercept	-2.068	4.536	0.208	1	0.648
/ Never Depressed	Positive problem-solving	0.498	1.289	0.149	1	0.699
Recovered Depressed	Intercept	-9.615	5.387	3.185	1	0.074
/Presently Depressed	Positive problem-solving	3.026	1.673	3.272	1	0.070
Never Depressed	Intercept	-7.547	4.599	2.693	1	0.101
/Presently Depressed	Positive problem-solving	2.528	1.476	2.935	1	0.087

Whilst positive problem-solving was not a significant predictor of any of the 4 log odds ratios in Table 14, 3 of the 4 are nearly so. Nonetheless, the directions of the effects of positive problem-solving on the log odds ratios are interesting: the odds of being presently depressed to never having been depressed decrease with increasing positive problem-solving; the odds of being recovered depressed to never having been depressed are clearly unrelated to positive problem-solving; the odds of being recovered depressed to being presently depressed increase with increasing positive problem-solving; and the odds of never having been depressed to being presently depressed increase with increasing positive problem-solving.

DISCUSSION

This study was designed to: (1) elucidate if a deficit in processing social problems existed in those participants who were depressed or who had recovered from depression compared with those participants who have never been depressed; (2) to identify whether this processing difference was correlated with measures of problem-

solving style; and (3) to isolate a factor that may be acting to produce the deficit in social problem-solving and the development of effective or ineffective problem-solving styles.

The preliminary analysis indicates that the selection and placement instruments effectively classified the participants into three groups. The analysis indicates that the scores on the BDI-II and the SCL-90-R of those placed into Group 1, *presently depressed*, satisfy the selection criteria with regard to their level of experience of symptoms of depression and that those participants classified as Group 2, *recovered depressed*, and Group 3, *never depressed*, did not suffer from symptoms of depression at a level consistent with the experience of depression, as indicated by their BDI-II, SCL Depression, ATQ and DAS scores. The participants who took part in this study, in the presently depressed and recovered depressed groups, were those selected from the total pool of possible participants numbering twenty-two. The selection and placement instruments excluded some possible participants and also revealed that there were no significant differences between all three of the groups in terms of their fluid intelligence/working memory (Matrix Reasoning) or divided attention (Trail Making Test). Similarly, the three groups did not differ significantly on self-reported exposure to recent life experiences, either positive or negative. The fact that they did not differ with regard to the exposure to recent life events suggests that the potential for the priming of the underlying schemas of the recovered depressed participants was low and, hence, that a possible revivification of underlying, but asymptomatic, schemas and the interference of these in the study was unlikely (Georgieff et al., 1998; Hedlund & Rude, 1995; Ingram & Ritter, 2000; McHugh & Wierzbicki, 1998; Miranda, Gross, Persons, & Hahn, 1998; Segel, Gemar, & Williams, 1999; Segel & Ingram, 1994).

The study also indicates that the presently depressed group was significantly different, in that they had higher scores – indicating that they experienced more dysfunctional attitudes and negative automatic thoughts – than those in the recovered depressed and never depressed groups, as indicated by their scores on the ATQ and DAS. The analysis indicates that the recovered depressed and never depressed groups demonstrated no significant differences on the ATQ and DAS, suggesting that participants in the recovered depressed and never depressed groups were not presently troubled by negative automatic thoughts or dysfunctional attitudes. These findings are consistent with previous research with the ATQ (Deardoff et al., 1984; Dobson & Breiter, 1983; Glass & Arnkoff, 1997; Hill, Oei, & Hill, 1989; Ingram et al., 1995; Ingram & Wisnicki, 1988; Kazdin, 1990; McHugh & Wierzbicki, 1998; Sahin, 1992), and the postulated positive relationship between the existence of negative automatic thoughts and symptoms of depression. This relationship was also demonstrated with the DAS, where the absence of dysfunctional attitudes was associated with the lower incidence of symptoms of depression both generally and when compared with those who were in the presently depressed group (Brown, Hammen, Craske, & Wickens, 1995). These findings were consistent with the cognitive theory of depressogenesis, in that the negative emotional state, depression, was correlated with high scores on the ATQ and DAS.

The analysis of the problem-solving orientation tests – the Social Problem-solving Inventory (SPSI-R), the Problem-solving Inventory (PSI) and the Modes of Processing Inventory (MPI) indicates that they have a great commonality with regard to their underlying structure. The principal components analysis reduced the initial eleven sub tests of the problem-solving orientation extant in the PSI and SPSI-R to one global problem-solving orientation factor 'positive problem-solving', which

contained all of the subtests minus the rational problem-solving subtest from the SPSI-R, the rational problem-solving subtest from the MPI and the MPI sub tests automatic and experiential processing. The subtests that were removed had little effect on the variance and low correlations with either the L(BDI-II) or the SCL Depression scores. However, the positive problem-solving orientation factor was negatively correlated with scores on both the L(BDI-II) and the SCL Depression.

The positive problem-solving orientation factor had a correlation with membership of the three groups – *presently depressed*, *recovered depressed* and *never depressed* – as indicated. This correlation suggests that a positive problem-solving orientation is a protective factor for depression and for recovery from depression. Interestingly, a positive problem-solving orientation was not predictive of total response time for any of the three groups on the challenge task (Perspective Inventory). Likewise, a significant relationship was not established between total response time and depression scores.

However, once the presently depressed and recovered depressed participants were grouped together, which was appropriate given their very similar mean scores on the challenge task, the difference between their mean scores and the mean scores of the never depressed participants was significant. This finding suggests that there is something different between the presently depressed and recovered depressed groups, with regard to their ability to solve social problems, and the never depressed group. A confounding variable in these results is the possible impact of anxiety on the participants' response times. Unfortunately, in spite of efforts to ensure that three groups contained only participants who did not suffer from anxiety, the mean anxiety score of the presently depressed group was at a level consistent with the experience of mild anxiety. It is possible that this anxiety was a factor in their slower response

times. However, the recovered depressed group, whose response times on the challenge task were very similar to the presently depressed group, had anxiety scores that were significantly lower than the presently depressed group.

This set of data produced a model wherein depression status was correlated with a positive problem-solving orientation, and vice versa; depression status was not correlated with total response time on the challenge task; a positive problem-solving orientation was not related to response time on the challenge task; a rational problem-solving orientation was not correlated with response time; and wherein a rational problem-solving orientation was not correlated with the absence of the experience of symptoms of depression, which was inconsistent with the literature (Burns & D'Zurilla, 1999; D'Zurilla & Nezu, 1987; Elliott, Johnson, & Jackson, 1997; Heppner & Anderson, 1985). This literature indicates that there are strong relationships between these problem-solving styles and the experience of symptoms of depression and especially that a rational problem-solving orientation is a protective factor against the experience of symptoms of depression. The most robust finding of this study was that a more positive problem-solving orientation was correlated with low scores on the Log (BDI-II +1) and SCL Depression and hence the minimal experience of symptoms of depression.

These findings with regard to problem-solving orientation and its effect on the experience of symptoms of depression are consistent with the work on cognitive exhaustion carried out by Sedek et al. (Kofta & Sedek, 1999; Kofta et al., 1998; Sedek & Kofta, 1990; Sedek et al, 1993; von Hecker & Sedek, 1999) who found that continued effort in problem-solving without success produced a higher level of hopelessness, fatigue, an avoidance of problem-solving and less effective problem-solving in the future. In effect Sedek et al. were suggesting that unsuccessful effortful

processing produced fatigue and then cognitive exhaustion. The view of Sedek el al. was that cognitive exhaustion arose because of the defective filtering of information, which produced an inability to sort information into meaningful units, such as to allow the development of solutions for the problem. The inability to sort information into usable units then produced cognitive overload and fatigue in response to the effort required to process this unmanageable information load. In this study, the longer response times of the presently and recovered depressed groups is postulated to be a response to this continuing inability to sort information and to the fatigue and subsequent inefficiency in problem-solving that is produced by this inability to sort information.

The research of Sedek et al. (1999) is consistent with the findings of Barwise (1993) and Johnson-Laird (1996) who indicated that humans develop mental models to solve problems more effectively. They indicated, however, that mental models can become increasingly complex with the increasing complexity of the problem and the information to be processed with it. Barwise (1993) and Johnson-Laird (1996) indicate that need to handle this increasing complexity and information can put such a cognitive load on the problem-solver that they can become exhausted by the processing load, and that this exhaustion can affect subsequent problem-solving attempts both in terms of success in problem-solving and the motivation to engage in problem-solving in the future. Kant, D'Zurilla, and Maydeu-Olivares (1997) also argue that defective problem-solving skills may be an important factor in the development of negative affectivity, depression, and the development of a negative self-appraisal with regard to problem-solving.

The work of Sedek et al. and Johnson-Laird on cognitive exhaustion and mental modelling offers interesting explanations for the development of different

problem-solving styles, more positive problem-solving styles being associated with more effective information sorting and management and hence and more effective cognitive function, less cognitive exhaustion, more effective mental model development and problem processing, and a more positive orientation to problem-solving. Of course, the converse would be true where less effective processing and problem solution would be associated with a lower level of effective life management, a negative problem orientation, and negative affectivity. The findings, above, linking a positive problem-solving orientation with the absence of the experience of symptoms of depression is supportive of the work of Sedek et al. and Johnson-Laird.

Although this study produced data that supported the relationship between a positive problem-solving orientation and the absence of the experience of symptoms of depression, the lack of a correlation between depression status (even though presently depressed and recovered depressed groups had longer response times on the Perspective Inventory) and the total response time calls into question the relationship between less effective processing, fatigue, cognitive exhaustion, and depression status. If longer response times are a sign of less effective problem-solving leading to cognitive exhaustion, then the lack of a correlation between these factors and depression status calls the concept of cognitive exhaustion as a precursor for depression into question.

Hambrick and Engle (2003) indicate that problem-solving and working memory capacity are affected by problem-solving errors, functional fixedness and negative set. Kelemen and Di Yanni (2003) and German and Barrett (2005) indicate that functional fixedness is a normal response to life, in that it allows humans to develop automatic responses to life, which reduce the expensive demands of conscious or effortful processing. Given this information it is possible that the

difference in response time on the challenge task between the combined presently depressed and recovered depressed groups and the never depressed group (p=.03) may be evidence that depressed people do tend to have problem-solving difficulties based in these cognitive errors and that these impact upon information sorting and management and the ability to produce effective solutions. It may be that the inability to suppress these cognitive errors is the factor that produces defective solutions and/or cognitive exhaustion and a negative problem-solving orientation.

The first question posed in this study, was: *to elucidate if a deficit in processing social problems existed in those participants who were depressed or who had recovered from depression compared with those participants who have never been depressed;* the results of this study do not suggest that those participants who are depressed or who have been depressed and have since recovered from depression have a deficit in social problem-solving, as indicated by their total response times when processing social problems, compared with never depressed participants. Although there are significant response time differences between the combined presently depressed and recovered depressed groups and the never depressed group these did not reach significance when total response times were compared.

The second question was: *to identify whether this processing difference was related to measures of problem-solving style;* strong support was found for the correlation between a positive problem-solving orientation and the absence of symptoms of depression and the inverse of this. Little support was found for a positive correlation between a rational problem-solving orientation and the absence of symptoms of depression. Likewise no correlations were found for the interaction between depression and an approach-avoidance, experiential or automatic problem-solving orientation.

The third question, was: *to isolate any factors that may be acting to produce the deficit in social problem-solving and the development of an effective or ineffective problem-solving style*. The study produced little data with which to address this question. The results indicate that participants who are or have been depressed have extended response times when compared with those participants who have never been depressed. This difference in response times could be caused by the negative effect of anxiety in the presently depressed group. However this would not account for the similar response times produced by the recovered depressed group (p=.88), whose experience of anxiety was well within normal limits. It also worthy to note that people who suffer from symptoms of depression do have a less effective cognitive function overall, in response to changes in cerebral blood flow. However, this was not demonstrated in this study. If it is the case that people who suffer from symptoms of depression do have a less effective cognitive function overall, it is interesting that those who were designated as being recovered depressed participants, who on all measures did not demonstrate the experience of symptoms of depression or of automatic negative thoughts or dysfunctional attitudes, did have slower response times on the challenge task which were very similar to the presently depressed participants.

A hypothesis worthy of further study would be that participants in the presently depressed and recovered depressed groups may have, consistent with the work on human problem-solving carried out by Pretz, Naples and Sternberg (2003), an inability to suppress previous solutions, models or rule structures, during problem-solving, and that this inability to suppress interferes with their ability to process information and that this difficulty in suppression produces their slower response times. The fact that this postulated difficulty with suppression, and increased response

time, seems to remain after depression has remitted is supportive of the formulation that this inability to suppress interference in problem-solving may be a factor in the initial development of defective mental models, less effective problem-solving, subsequent negative problem-solving orientation, hopelessness, and negative affectivity.

The small sample size used in this study was a response to the difficulty in finding participants who were depressed **only**, that is participants who did not suffer from a comorbid and confounding condition. The difficulty of trying to achieve this was evidenced by the fact that, eventually, participants who suffered from mild anxiety were included in the presently depressed group. This was recognized as a confounding variable, given the research evidence which suggests (Lawson & McLeod, 1999; Mathews & McLeod, 1985; Nunn, Mathews, & Towner, 1997; Williams, Mathews, & McLeod, 1996) that depressed participants typically tend to have co-morbid anxiety, which adversely affects response times on timed tasks. Interestingly, both the presently depressed group, who suffered from mild anxiety, and the recovered depressed group, who did not suffer from anxiety, had similar response times, which tends to undermine the need for the original high level of rigor aimed for. If this is the case then a further larger study would be more possible.

Certainly the small sample size has placed severe limits on the usefulness of any data arising from this study, as it may not be representative of the larger population, even though the initial selection criteria were the presence or absence of depression and whether the participant had been previously depressed or not. The sample size certainly affects the generalisability of the information arising from this study. However, it is clear that, even with this small sample size significant trends arose which were supportive of a processing deficit, as revealed by longer response

times, in those participants who have recovered from depression, which is similar to that of those participants who are presently depressed.

This study used a three group design to try to establish differences on measures of problem-solving orientation, problem-solving response time, and level of experience of symptoms of depression between three groups of participants. It was felt that having a cohort of never depressed participants would allow a comparison of depressed and not depressed participants in a way that would elucidate the effect of differences in problem-solving orientation while at the time trying to gain an understanding of whether problem-solving orientation was a product of a less effective way of processing social problems. The results of this study suggest that these aims were achieved to some extent.

A further limitation of this study is that participants were placed by brief interview and in response to scores on selection and placement tests, this process of selection may have limited the accuracy of the depressive diagnosis. A future study could address this limitation by using a DSM-IV based assessment interview to further validate group placement.

Although this study is limited by its small sample size, the study did find support for the existence of a problem-solving deficit in both presently depressed and recovered depressed participants when compared with never depressed participants. The study provided some data upon which to postulate that this problem-solving deficit was a product of an inability to suppress previous solutions to social problems, especially as there was little evidence in support of the influence of anxiety on response times or in support of the concept of cognitive exhaustion. If this problem-solving deficit exists as a precursor to depression then that would suggest that a stronger focus on training in problem-solving skills during cognitive-behavioural

therapy for depression would be beneficial, consistent with the work of Barrett et al., (1999).

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Appendix 1: The Perspective Inventory.

THE PERSPECTIVE INVENTORY:

This instrument is designed to understand people's perspectives on life.

In this instrument, you will be asked to respond to a set of short stories.

Each of these stories will ask you to rank **either** the behaviour of the characters in the stories **or** to rank alternative options for the characters to take. There are **no** right or wrong answers, what is correct is purely **your own opinion**.

You will be given as much time as you need to read the stories and rank the behaviour of the characters or rank alternative options.

After each story, you will have to do the ranking. Although you will be timed, there is **no time limit** and no need to rush to finish.

1. The Farm Story:

Once upon a time there was a family. The mother, Gwen, father, Tom, and two older teenage children, Robyn and Jim lived a long way from town. Gwen and Tom owned a farm and Gwen worked part time in the town, to keep them afloat. Robyn also worked and Jim was in his last year of school.

Jim had just got his licence and loved driving the family cars, sometimes too fast. One day while driving Robyn to work, Jim lost control and crashed. Robyn was unhurt but the car was badly damaged. Soon after, Gwen came along and found her children and the damaged car. Gwen knew that Tom would be very angry with Jim for driving fast and wrecking the car and so she asked Robyn to say that she had been driving.

Jim was very scared of Tom and so Robyn decided that she would help Jim, but wanted something in return. She asked him to cover for her while she stayed out late to see her boyfriend. Jim agreed to this. When Tom later saw the damaged car he was very angry but, because he liked Robyn, he did not punish her.

On her night out, Robyn was involved in another crash, this time in her boyfriend's car. However, she did not know how to tell Tom about it because she had lied to him. Jim was angry and scared that he had been involved and told Tom about Robyn's crash in her boyfriend's car. When Tom found out, he became very angry and hit Robyn, who said sorry for her behaviour but did not reveal the truth about Jim's crash.

Gwen was very distressed by Tom's actions and then decided to leave the family, because the pressure of her life was too hard to manage.

Who behaved the best? Please rank the characters in order from **1 (best) -- 4 (worst)** in terms of their behaviour**.**

Best **Worst**

1._____ 2._____ 3._____ 4._____

2. The Lottery Story:

A man named Michael was finding it very hard to provide for his family with the money he earned from his job. One day, a stranger gave Michael a letter. When he opened the letter, he found that he had been made a great offer. The letter told him that he had won a chance to earn $20 million, but there were a few catches. The first catch was that he would only receive the money if he was prepared to give some part of it to a number of charities and/or people he knew, who would be helped greatly by the money.

The other catch was that he had to work out how much to give and who to give it to. He was told that he had to give the money in a way that the donor would think was

good, or he would receive nothing and that he was only allowed to make five donations.

He was told that he could give the money to family or friends who were in need, as well as to known charities. Being very concerned about losing the money, he chose to write down a list of charities that he thought the donor would also support.

His short list of charities that he thought he should donate to included: cancer research; the Fred Hollows Foundation; his brother who was dying from AIDS and who needed constant care and medication; research into birth defects in children; soup kitchens for the needy; World Vision; the RSPCA; Red Cross; the Salvation Army; the Starlight Foundation; and Legacy.

Please assist Michael by placing your **five** choices from the charity list in order, from **1 (the most needy/deserving) -- 5 (the least needy/deserving)**.

1._____ 2._____ 3. _____

4. _____ 5. _____

3. The Travelling Story:

Josie's partner, Ted, was in a distant hospital after being involved in a truck accident in Western Australia. He had been doing a lot of extra trips to try to make enough money to pay for their truck and their house, but things had become harder as fuel prices had risen. Because he was tired from all of these trips, he had gone to sleep at the wheel and crashed their truck.

Josie was very worried about Ted, because the news from the hospital was not clear and they had only told her that his condition was serious. Josie really wanted to see Ted, even though she had no money to pay for the trip.

Josie asked Ted's best friend, John, if he would take her, because he drove through the area where Ted was. He was not willing to drive out of his way, but he told her that Jim, another driver, might take her, as he was going that way next trip. Josie asked Jim to take her. Jim agreed to take her but only if she slept with him. She had no money and because she needed to see Ted, she did sleep with Jim and he took her to Ted.

Ted was very glad to see Josie, but she felt very guilty. When she told Ted about sleeping with Jim and how she had managed to travel to see him without any money, he became very angry and broke up with her.

Two nurses, Frank and June, heard what had happened to Josie and about Ted's behaviour and became very angry. They then told Ted off and reduced the amount of care and attention they gave him from then on.

Who behaved the best in the situation? Rank the characters in the story from **1 (best) -- 5 (worst)** in terms of their behaviour.

Best **Worst**

1. _____ 2. _____ 3. _____4._____5._____

4. The Karen Story:

Karen was born with a heart defect. She had a very low level of energy and could not play sport. The doctors told her parents that she was unlikely to live past her early twenties unless she had a heart transplant, when she reached her late teens.

Karen's parents, Phillip and Kaitlin, were very worried about their daughter. They were lucky because they were quite wealthy and, so, they could afford the best of treatment for Karen. In spite of this, as she aged, the state of her health became worse.

Phillip and Kaitlin approached Karen's doctor, Dr Jones, about the situation. He put Karen on the transplant list, but said that her chances of an early transplant were low. Dr Jones told them that there were much shorter waiting lists for hearts abroad, but that it would depend on whether they could pay.

When she was told, Karen became upset that her parents were thinking about buying a heart for her. She rang Dr Jones and asked to be removed from the transplant programme because of her belief that buying human organs was an awful thing to do. Dr Jones did not do this. He spoke to her parents and told them of Karen's wishes. Her parents endorsed his efforts to search for a heart from abroad.

Karen found out about this also. A nurse she had made friends with at the hospital, who could accept Karen's feelings towards her health and heart transplant, told her. The nurse also knew that the transplant was to go ahead, in spite of Karen's wishes. When Karen found out about these plans, she became very upset. She then left home and vanished. When Karen was found, some time later, her defect had advanced too far for the transplant to be a success.

Who behaved best in this situation? Rank the people in the story from **1 (best) -- 5 (worst)** in terms of their behaviour.

Best **Worst**

1._____ 2._____ 3._____4._____5._____

5. The Friends Story:

Michelle and Brian had saved very hard and now had $10,000 for a trip abroad, but they could not agree on where to go. Michelle loved art and wanted to go to Europe. Brian wanted to surf his way around the world.

Brian wanted to change Michelle's mind about how good Europe would be so she would come on his surfing holiday. Brian saw, Eric, a friend who came from Europe, who was an expert traveller. He knew that Eric thought that Europe was over-rated and hoped that he could change Michelle's mind about Europe. Eric agreed to help Brian because he thought Europe might disappoint Michelle when she got there.

Michelle also saw one of their friends, Tom. Tom liked Europe and had travelled there a lot. He liked Michelle and disliked her being with Brian. Tom agreed to talk to Brian into going to Europe. Tom also said he would go with Michelle, if she chose to go to Europe alone.

Tom told Brian that Michelle was not happy and that she thought that a surfing holiday was a waste of money. Tom told Brian that Michelle and Brian had little in common, that they had no future and that it would be better if they went on different trips, to avoid making Michelle sad.

Frank, a friend of Michelle and Brian who liked Michelle a lot, heard about the problem and talked to Eric. Eric became angry at being blamed and told Michelle that she was being unfair to Brian. Frank also told Tom to leave Michelle alone and to stop making trouble. Brian and Michelle were soon able to conclude that they did not have much in common, that they could not really talk to each other and that they should break up.

Who behaved the best in this situation? Please rank the characters in order from **1 (best) -- 5 (worst)** in terms of their behaviour.

Best **Worst**

1. _____ 2._____ 3._____ 4._____ 5._____

6. **The Counsellor Story:**

Mike and Jenny were married and happy. They had three cheerful children, one of whom had a genetic problem. Then Jenny found out that she was pregnant. Although they were happy about having a fourth baby, they became concerned that their next child could have the same genetic problem as their last child.

Mike and Jenny then went to see a genetic counsellor, Bronwyn, for advice. Bronwyn informed them that they had a very high chance of having a second child with the genetic problem. They discussed the case and Bronwyn said they should think about it and come back to see her, later.

Mike and Jenny went home and talked about it for a long time. Jenny at last told Mike that, despite the chance of problems, she wanted to have the baby. Mike agreed to support her in her choice.

In the meantime, Bronwyn spoke to a senior counsellor, Helen, about Mike and Jenny's case. Bronwyn felt, very strongly, that they should not have the baby because of the very high risk of problems. Helen discussed this with Bronwyn and made her aware that she was putting her values onto other people and that this was clouding her judgement. Helen then asked Bronwyn to refer Mike and Jenny to another counsellor. Bronwyn felt upset because of Helen's view of her and her thoughts about the case.

In their next session, Bronwyn found it hard to work with Mike and Jenny. When they informed Bronwyn that they had agreed that they wanted to have the baby, Bronwyn became very upset and told them how selfish they were being and how wrong their choice was. This made Mike and Jenny very upset and they left the session.

Who behaved the best in this situation? Please rank the characters from **1 (best) -- 4 (worst)** in terms of their behaviour.

Best **Worst**

1. _____ 2._____ 3._____ 4._____

7. The Holiday Story:

The Kirks were a happy family who often went on family trips. This was a joyous family custom, even though the three children, Rachel, Amanda and Nicole, were all young adults with partners of their own. They always planned where to go by having large family meetings. So far they had been to the Barossa Valley, Noosa, the Gold Coast and Adelaide, for the Festival. Sometimes, if it proved a favourite, they would travel to the same place more than once.

This time, they had had more time to save money and were feeling a bit bolder. The parents, Stephen and Cathy Kirk, were in their fifties and still quite active, but they

wanted to be able to relax more on this trip. Last time, at the Adelaide Festival, there was constant walking to different venues, so they thought that a tour of Tasmania would be a good, restful place to visit.

Rachel and her partner were very active and wanted to go scuba diving. They felt that a trip to the Maldives would be the best option for them. Amanda and her partner were more like Stephen and Cathy and felt that ten days on a cruise ship, with the chance to visit some small islands, was the perfect choice for them.

Nicole and her partner liked to party, liked the beach and liked to do thrilling and fun things. They wanted to go back to Noosa, yet Nicole and Rachel, and their partners, felt that New Zealand would also be a great choice because of the skiing and white water rafting options that were at hand.

Please assist the Kirks by deciding on a ranking of their possible holiday options from **1 (most appealing) -- 5 (least appealing),** given their interests and concerns.

Most appealing **Least appealing**

1. _____ 2. _____3. _____ 4. _____ 5. _____

8. The Vicki Story:

Vicki was a single mother who had two children at primary school. Her ex-husband, Kevin, saw the children often and was able to assist Vicki and the children. Vicki also had a part time job, which she loved, that helped to support the children and her.

One day Vicki was with one of her friends, Jan, having coffee, when Jan told her that she was going to leave her husband and children and move to Brisbane. Jan told Vicki that she realised that her marriage would not work and that she thought that the children would be better off with their father, who they were closer to.

Vicki was very surprised by Jan's news and wanted to help, because she was close to both Jan and Jan's husband, Peter, and because she was worried about them. However, Jan told her that she wasn't to tell anyone. Jan also told her that she had met and begun seeing someone else.

Vicki was very upset and did not know what to do. She knew that Jan and her husband, Peter, had been seeing a marriage counsellor, Margaret. Vicki then thought she should ring Margaret to tell her about what Jan had said and get her advice. Margaret's husband, Fred, worked with Jan's husband, Peter. Fred told Peter that Margaret had been told that Jan was having an affair.

Peter became very upset and challenged Jan. Jan became angry with Peter and told him how they had failed each other. Jan then left the town with her new partner. Vicki felt very upset at the outcome of the problem.

Who behaved the best in this situation? Please rank the characters in order from **1 (best) -- 5 (worst)** in terms of their behaviour.

Best **Worst**

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

9. The University Story:

Scott had left school before year 12 to pursue a trade in carpentry. However, there was not much work around and it was very hard to find a full-time job. He then chose to retrain and went back to school to do the HSC. While at school, he was surprised to learn that he was gifted in English as well as Maths and Science.

Scott worked very hard and gained a very high mark in the HSC. He saw that he had more career options than he had ever thought.

Scott saw that he needed to plan for his future and saw a careers adviser. The careers adviser, Brett, looked at Scott's high scores and told him that he could do a great many things with his talents, but gave no further advice. Scott's uncle, Bill, was an accountant and thought that Scott would be a good accountant, because he was good at Maths.

Scott's friend, Bruce, felt that Scott would be a good engineer because he was good at Physics and Maths. Scott's girlfriend, Melanie, thought that Scott should become a doctor, because he was good with people and because he was very good at all of his subjects.

Scott was still confused, so he went to see his grandpa, Patrick. Patrick thought, like Brett, that Scott could do any one thing that he wanted. However, Patrick also felt that Scott needed to do something that would make him happy for life. Patrick told Scott that he had to really get to know himself and what would make him happy first, and then make a choice from all of the options that were open to him.

Please rank the advice given to Scott by all of the characters, using their names, from **1 (best) -- 5 (worst)** in terms of the usefulness of the advice they gave in assisting Scott to choose a career.

Best **Worst**

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

10. The Police Story:

Trevor had been in the police force for 18 years. He was an honest police officer who others had respect for, but because of changes in the force, he could not gain further training or promotion.

Trevor knew that some officers were being promoted because of certain senior officers, with whom they were friends. Trevor thought that people should be

promoted on merit and became very annoyed. His friend, Tony, had gained promotion and felt sorry for him. Tony told him that he should change his approach.

Tony told him to acquaint himself with a senior officer, Bob, who was in the drug squad. Bob said he would help Trevor if Trevor agreed to do special tasks for him. Trevor did this but soon learned that Bob was corrupt.

Trevor talked to Tony, who told him to keep quiet until he gained promotion. Although this upset him, Trevor did this for some time and waited for a promotion to come along so that he could escape the position.

While working for Bob, Trevor became very worried about being caught and spoke to his commander, Max. Max knew about Bob and told Trevor that Bob was too supreme and that Trevor would have more problems if he chose to report Bob. Max advised Trevor to be quiet and wait.

Because Trevor was so worried he went to internal affairs. He told the officer in charge, Stan, about Bob. Stan was keen to hear about the case and said he would follow it up. Some time later, Bob was transferred but Trevor heard nothing about charges against Bob.

Because nothing had happened, Trevor went to see his lawyer, who told him that Bob would never be charged and that he should forget about it. When Trevor applied for promotion, he was declined.

Please rank the behaviour of the characters from **1 (best) -- 5 (worst)** in terms of their behaviour.

Best **Worst**

1. _____ 2._____ 3._____ 4._____ 5._____

Appendix 2: Graphical representations of the interrelationships between the factors in the Experimental Study.

LEGEND

PER_IN_A: Perspective Inventory – Answer
PER_IN_R: Perspective Inventory – Reading

DAS: Dysfunctional Attitudes Scale
ATQ: Automatic Thoughts Questionnaire
BDI-II: Beck Depression Inventory II

TRAILS_A: Trail Making Test – A

TRAILS_B: Trail Making Test – B

MAT_RS: Matrix Reasoning (WAIS-III) Raw Score
MAT_SS: Matrix Reasoning (WAIS-III) Scaled Score

LES_NEG: Life Events Scale – Valence of Negative Events
LES_POS: Life Events Scale – Valence of Positive Events

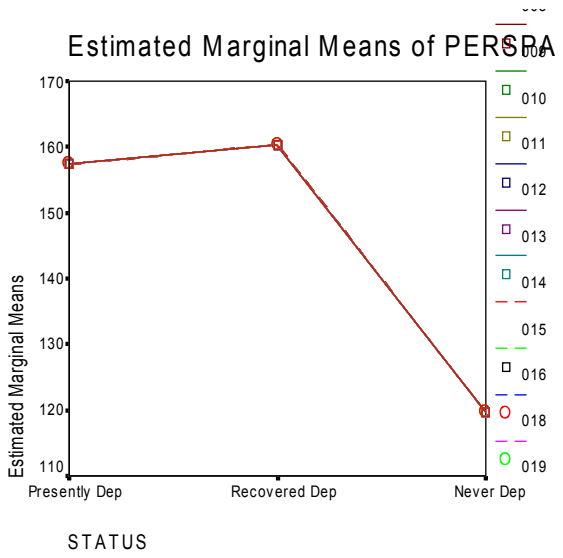
MPIAP: Modes of Processing Inventory – Automatic Processing
MPIEP: Modes of Processing Inventory – Experiential Processing
MPIRP: Modes of Processing Inventory – Rational Processing

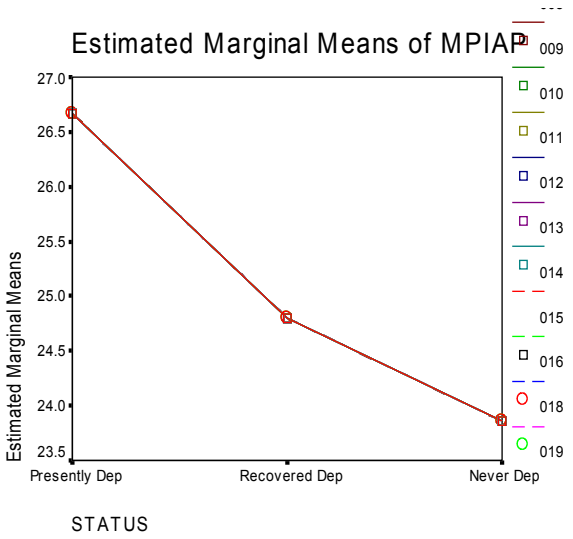
SPSRPS: Social Problem-solving Inventory – Rational Problem Solving
SPSNPO: Social Problem-solving Inventory – Negative Problem Orientation
SPSPPO: Social Problem-solving Inventory – Positive Problem Orientation
SPSICS: Social Problem-solving Inventory – Impulsivity/Carelessness Style
SPSAS: Social Problem-solving Inventory – Avoidance Style

SCLDEP: Symptom Checklist 90 Revised – Depression score
SCLANX: Symptom Checklist 90 Revised – Anxiety score

*PSIPC: Problem-solving Inventory – Personal Control
*PISAA: Problem-solving Inventory – Approach-Avoidance Style
*PSI_CON: Problem-solving Inventory – Problem-solving Confidence
*PSITOT Problem-solving Inventory – Total Score

(* Low scores indicate POSITIVE appraisals of problem-solving ability)
indicate POSITIVE appraisals of problem-solving ability)

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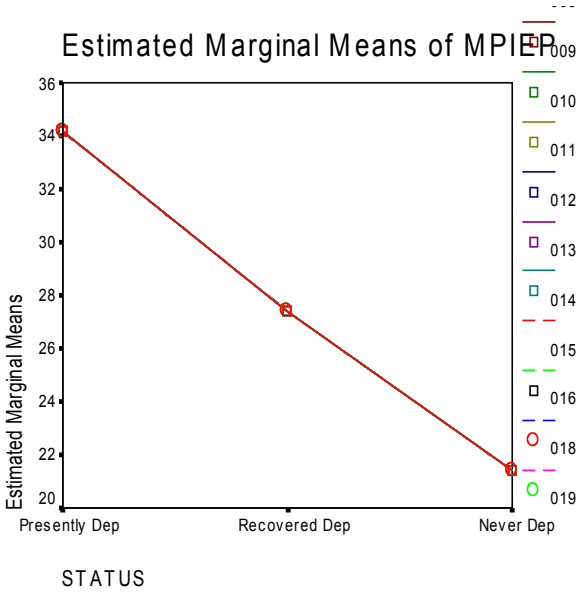
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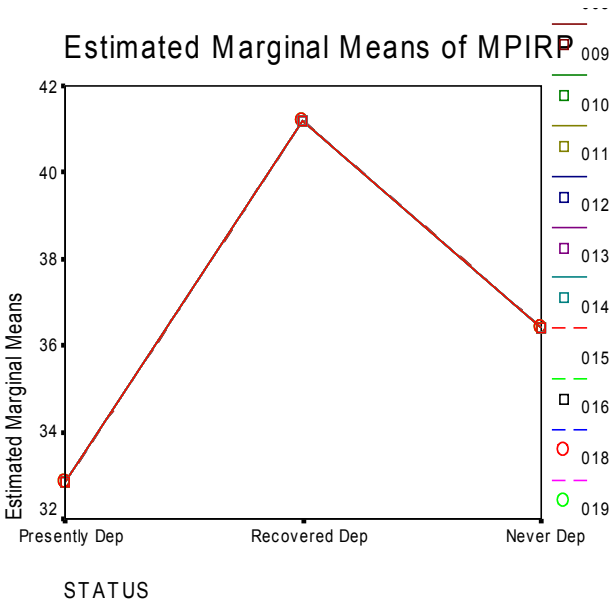
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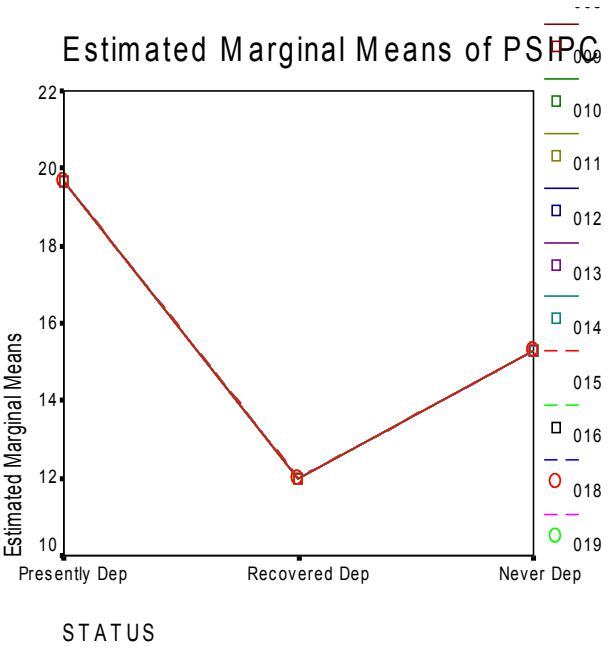
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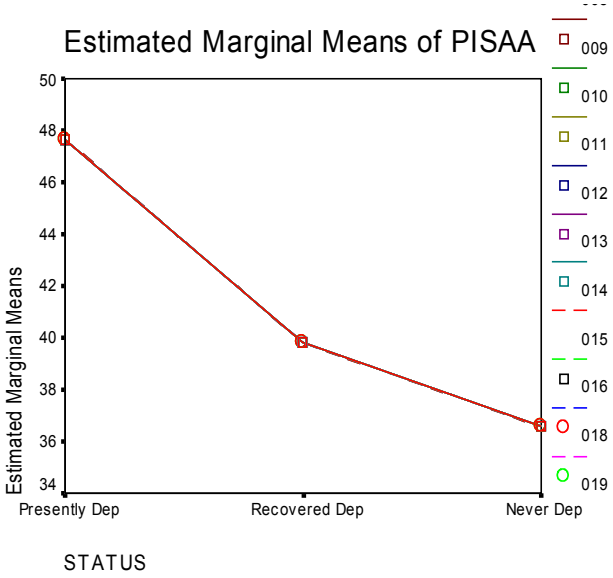
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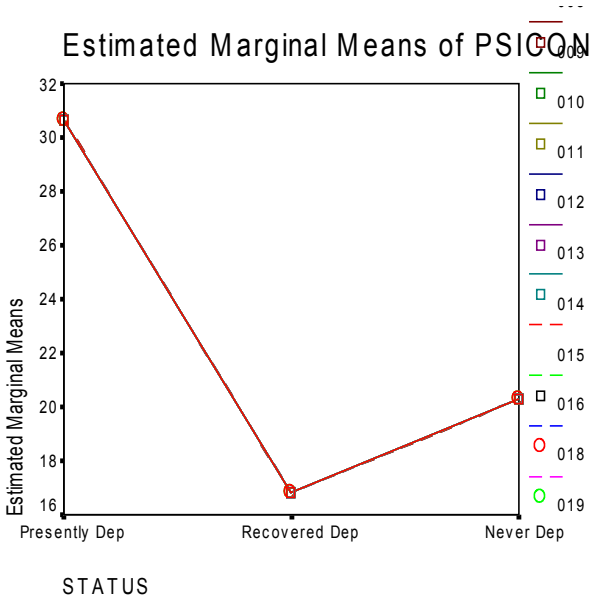
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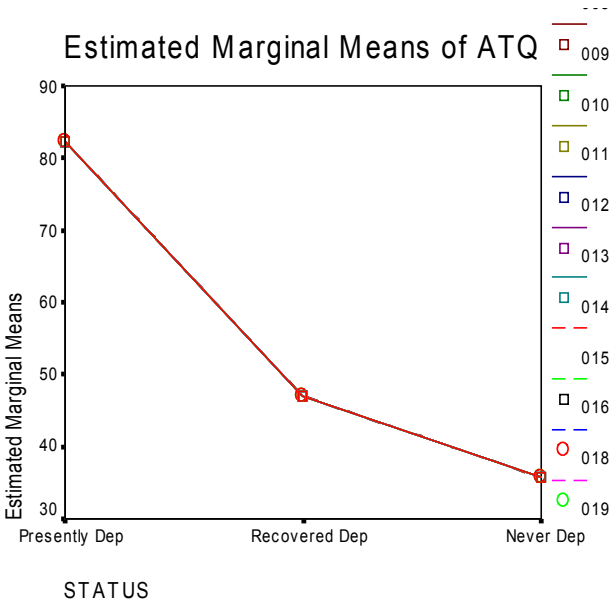
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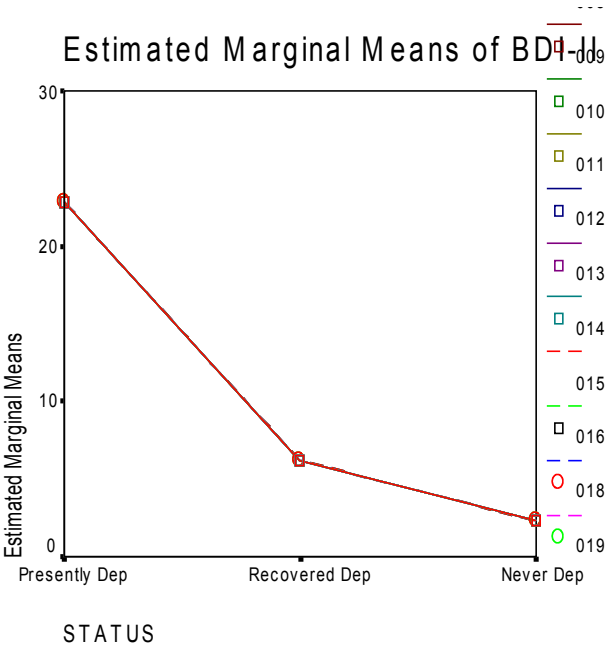
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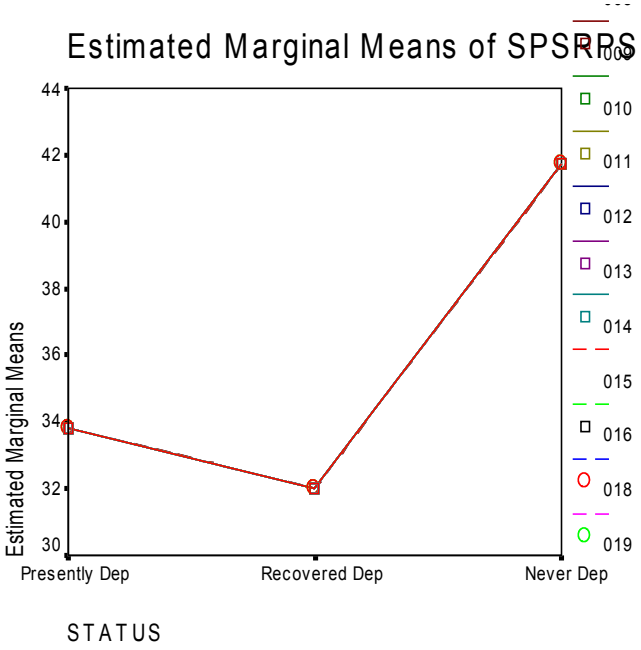
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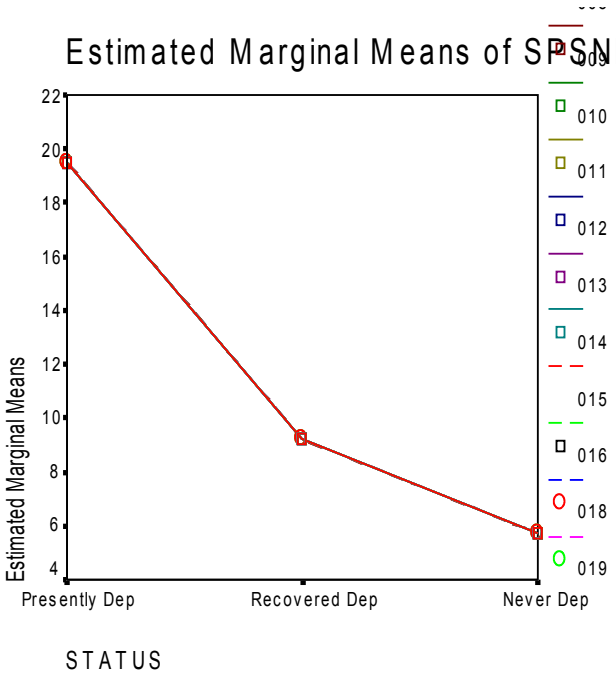
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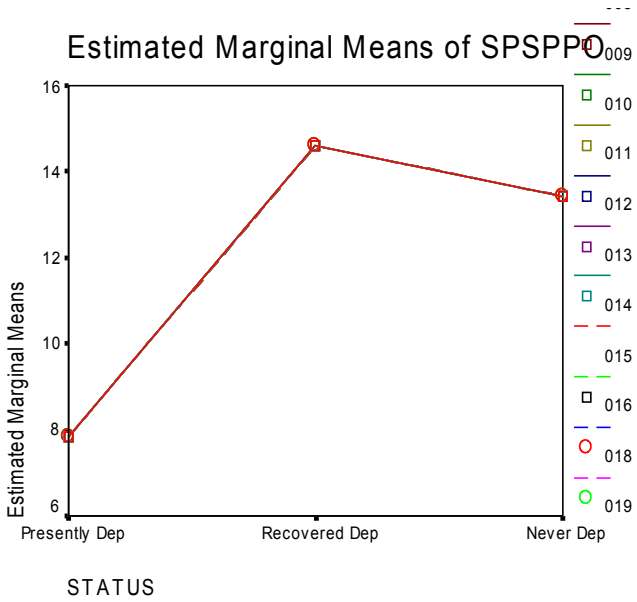
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Estimated Marginal Means
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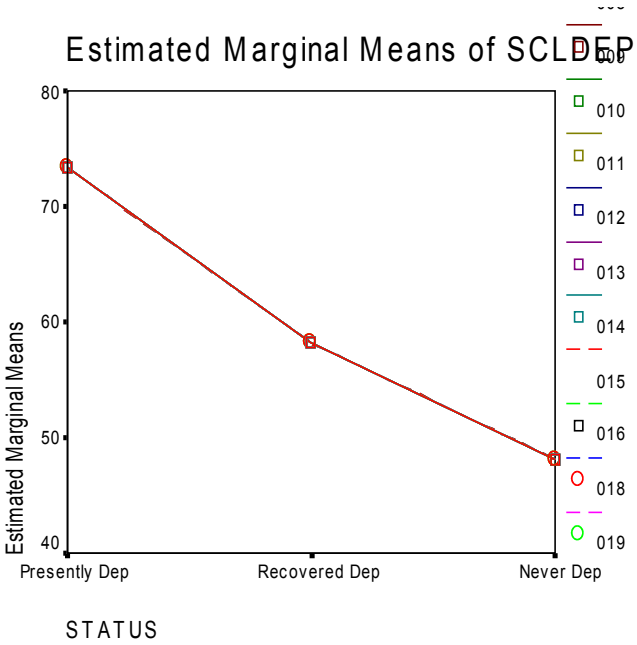
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Recovered Dep
Never Dep
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Appendix 3: Statistical tables and data.

Table 3

Selection and Placement Assessment Instruments – Means and Standard Deviations

Test	**Group 1** **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group3** **Never Depressed**
SCL90R Anxiety	68.67 (7.20)	55.20 (16.79)	42.29 (4.19)
SCL90R Depression	73.33 (5.64)	58.2 (9.78)	48.14 (7.79)
Beck Depression Inventory – II	22.83 (13.09)	6.20 (9.52)	2.29 (1.79)
Automatic Thoughts Questionnaire	82.33 (24.64)	47.00 (22.57)	35.71 (3.55)
Dysfunctional Attitudes Scale	141.33 (24.15)	91.20 (25.32)	102.43 (28.12)
Matrix Reasoning	12.00 (2.53)	12.20 (2.59)	14.57 (2.44)
Trails A	40.00 (12.24)	33.60 (16.64)	23.86 (5.43)
Trails B	74.00 (27.85)	71.00 (16.99)	55.43 (18.69)
Life Events Scale: Positive	3.00 (5.06)	2.80 (3.27)	6.14 (5.52)
Life Events Scale: Negative	-9.5 (17.73)	1.00 (8.80)	-0.71 (5.88)

SCL90R = Symptom Checklist 90 Revised

Table 4

Selection and Placement Assessment Instruments – Means and Standard Errors

Test	**Group 1** **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group 3** **Never Depressed**

SCL90R Anxiety	68.67(2.94)	55.20(7.50)	42.29(1.58)
SCL90R Depression	73.33(2.30)	58.2(4.37)	48.14(2.94)
Beck Depression Inventory-II	22.83(5.34)	6.2(4.26)	2.29(0.68)
Automatic Thoughts Questionnaire	82.33(10.06)	47.00(10.09)	35.71(1.34)
Dysfunctional Attitudes Scale	141.33(9.86)	91.2(11.32)	102.43(10.63)
Matrix Reasoning	12.00(1.03)	12.20(1.16)	14.57(0.92)
Trails A	40.00(5.00)	33.60(7.44)	23.86(2.05)
Trails B	74.00(11.37)	71.00(7.60)	55.43(7.06)
Life Events Scale: Positive	3.00(2.07)	2.80(1.46)	6.14(2.09)
Life Events Scale: Negative	-9.50(7.24)	1.00(3.94)	-0.71(2.22)

Table 5

Between Group comparisons Selection and Placement Assessment Instruments

Test	**Group 1**	**Group2**	**Group3**	
	Presently Depressed	**Recovered Depressed**	**Never Depressed**	
SCL90R Anxiety		-13.47*	-26.38*	Group 1
	13.47*		-12.91*	Group 2
	26.38*	12.91*		Group 3
SCL90RDepression		-15.13*	-25.19*	Group 1
	15.13*		-10.06*	Group 2
	25.19*	10.06*		Group 3
Beck Depression		-16.63*	-20.55*	Group 1
Inventory- II	16.63*		-3.91	Group 2
	20.55*	3.91		Group 3
Automatic Thoughts		-35.33*	-46.62*	Group 1
Questionnaire	35.33*		-11.29	Group 2
	46.62*	11.29		Group 3
Dysfunctional		-50.13*	-38.90*	Group 1
Attitudes Scale	50.13*	-11.23	11.23	Group 2
	38.90*			Group 3
Matrix Reasoning		0.20	2.57	Group 1
	-0.20		2.37	Group 2
	-2.57	-2.37		Group 3
Trails A		-6.40	-16.14*	Group 1
	6.40		-9.74	Group 2
	16.14*	9.74		Group 3
Trials B		-3.00	-18.57	Group 1
	3.00		-15.57	Group 2
	18.57	15.57		Group 3
Life Events Scale :		-0.20	3.14	Group 1
positive	0.20		3.34	Group 2
	-3.14	-3.34		Group 3
Life Events Scale:		10.50	8.79	Group 1
negative	-10.50		-1.71	Group 2
	- 8.79	1.71		Group 3

*p<.05 SCL90R = Symptom Checklist 90 Revised

Table 6

Experimental Instruments Means and Standard Deviations

	Group 1 **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group 3** **Never Depressed**
Social Problem-solving Inventory – Revised			
Positive Problem Orientation	7.83 (3.31)	14.60 (1.51)	13.43 (3.91)
Negative Problem Orientation	19.50 (11.05)	9.20 (4.55)	5.71 (3.03)
Rational Problem Orientation	33.83 (7.41)	32.00 (11.81)	41.71 (17.56)
Impulsiveness/Carelessness	12.50 (9.11)	9.00 (4.63)	4.43 (3.15)
Avoidance	10.50 (9.79)	4.00 (3.24)	3.57 (1.98)
Problem-solving Inventory			
Problem-solving Confidence	30.67 (11.76)	16.80 (4.26)	20.29 (8.38)
Approach/Avoidance	47.67 (20.30)	39.80 (12.45)	36.57 (13.36)
Personal Control	19.67 (4.67)	12.00 (5.65)	15.29 (4.46)
Total			
Modes of Processing Inventory			
Rational Problem-solving	32.83 (9.52)	41.20 (5.86)	36.43 (10.99)
Experiential Problem-solving	34.17 (7.36)	27.40 (8.73)	21.43 (3.82)
Automatic Problem-solving	26.67 (5.43)	24.80 (3.76)	23.86 (6.59)
Perspective Inventory	157.33 (46.11)	160.40 (33.32)	119.71 (23.44)

Table 7

Experimental Instruments Means and Standard Errors

	Group 1 **Presently Depressed**	**Group 2** **Recovered Depressed**	**Group 3** **Never Depressed**
Social Problem-solving			

Inventory – Revised			
Positive Problem Orientation	7.83 (1.35)	14.60 (0.68)	13.43 (1.48)
Negative Problem Orientation	19.50 (4.51)	9.20 (2.03)	5.71 (1.15)
Rational Problem Orientation	33.83 (3.03)	32.00 (5.28)	41.71 (6.64)
Impulsiveness/Carelessness	12.50 (3.72)	9.00 (2.07)	4.43 (1.19)
Avoidance	10.50 (4.00)	4.00 (1.45)	3.57 (0.75)
Problem-solving Inventory			
Problem-solving Confidence	30.67 (4.80)	16.80 (1.91)	20.29 (3.17)
Approach/Avoidance	47.67 (8.29)	39.80 (5.57)	36.57 (5.05)
Personal Control	19.67 (1.91)	12.00 (2.53)	15.29 (1.69)
Total			
Modes of Processing Inventory			
Rational Problem-solving	32.83 (3.89)	41.20 (2.62)	36.43 (4.15)
Experiential Problem-solving	34.17 (3.00)	27.40 (3.90)	21.43 (1.44)
Automatic Problem-solving	26.67 (2.22)	24.80 (1.68)	23.86 (2.49)
Perspective Inventory	157.33 (18.82)	160.40 (14.90)	119.71 (8.86)

Table 8

Experimental Instruments Between Group comparisons

Test	**Group 1**	**Group 2**	**Group 3**	
	Presently Depressed	**Recovered Depressed**	**Never Depressed**	
Social Problem-solving Inventory – Revised				
Positive Problem		6.77*	5.60*	Group 1
Orientation	-6.77*		-1.17	Group 2
	-5.60*	1.17		Group 3
Negative Problem		-10.30*	-13.79*	Group 1
Orientation	10.30*		-3.49	Group 2
	13.79*	3.49		Group 3
Rational Problem		-1.83	7.88	Group 1
Orientation	1.83		9.71	Group 2
	-7.88	-9.71		Group 3
Impulsiveness/		-3.50	-8.07*	Group 1
Carelessness	3.50		-4.57	Group 2
	8.07*	4.57		Group 3
Avoidance		-6.50	-6.93	Group 1
	6.50		-0.43	Group 2
	6.93	0.43		Group 3
Problem-solving Inventory				
Problem-solving		-13.87*	-10.38	Group 1
Confidence	13.87*		3.49	Group 2
	10.38	-3.49		Group 3
Approach/		-7.87	-11.10	Group 1
Avoidance	7.87		-3.23	Group 2
	11.10	3.23		Group 3
Personal Control		-7.67*	-4.38	Group 1
	7.67*		3.29	Group 2
	4.38	-3.29		Group 3
Modes of Processing Inventory				
Rational Problem-		8.37	3.60	Group 1
solving	-8.37		-4.77	G2
	-3.60	4.77		Group 3
Experiential		-6.77	-12.74*	Group 1
Problem-solving	6.77		-5.97	Group 2
	12.74*	5.97		Group 3

Automatic Problem-solving		-1.87	-2.81	Group 1
	1.87		-0.94	Group 2
	2.81	0.94		Group 3
Perspective Inventory		3.07	37.62	Group 1
	-3.07		-40.69	Group 2
	37.62	40.69		Group 3

*p<0.05

2. Data reduction process.

Because of the large amount of data produced by the study, and the potential for this large amount of data with a small sample size to produce Type 1 error, a data reduction process was undertaken.

The data were considered in 3 categories:

a) the depression scores (Beck, Symptom Checklist DAS, ATQ ;

b) cognitive processing orientation scores, consisting of the Social Problem-solving Inventory – Revised (SPSI), Problem-solving Inventory (PSI), Modes of Processing Inventory (MPI), inventories and their subscales;

c) challenge task / problem processing response times.

Principal components analysis was employed to examine the structure of the sets of subscales measuring aspects of cognitive processing orientation (b above) with a view to constructing reliable summed scales and reducing the number of variables in subsequent analyses.

The subscales of the SPSI, PSI and MPI were examined separately. In the SPSI, although only one component with an eigenvalue greater than 1 was extracted, the positive problem orientation and negative problem orientation variables were clearly more closely related to each other than either was to the rational problem-solving variable and had communalities of approximately twice the size. These two variables correlated substantially at -0.81. The negative problem orientation scores were reversed by subtracting them from (min + max score) before taking the mean of the positive problem orientation and reversed negative problem orientation variables to compose a variable labelled composite positive problem orientation.

In the PSI, only one component with an eigenvalue greater than 1 was extracted, accounting for 82% of item variance, with similar communalities of all the subscales. Reliability analysis on the 3 subscales returned a Cronbach's alpha coefficient of 0.80. The mean of these 3 subscales was computed to construct a variable labelled composite problem-solving.

Relationship between the depression variables, logBeck and SCL90

The relationship between the Log Beck scale and the SCL90 scale scores was linear with an R-square of 0.69, as plotted in Figure 10.

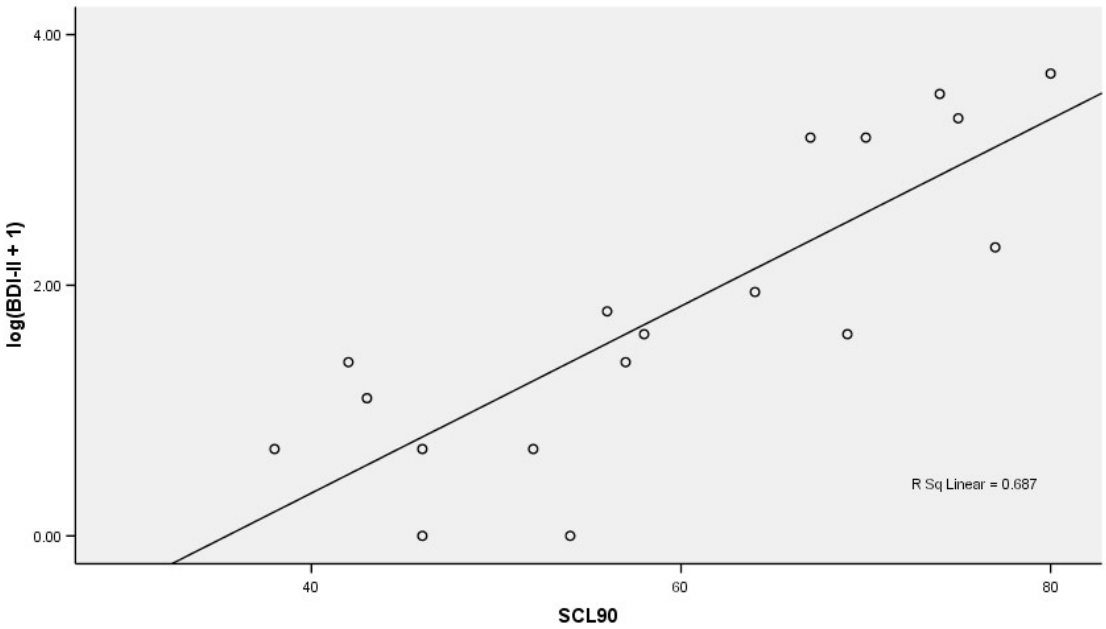

Figure 10

Scatterplot of log(BDI-II +1) by SCL Depression.

This observation indicated that it was reasonable to logarithmically transform the Beck scale score. In addition, although and RSQ was relatively substantial, it appears that the two scales measure somewhat different aspects of depression. Accordingly, these variables considered separately in subsequent analyses.

Analyses with the log Beck scale scores as response

General Linear Model (GLM) was employed to assess prediction of the log Beck scale scores a) from the cognitive processing orientation variables and b) the problem-solving task time variable.

Log Beck by the cognitive processing orientation variables:

Separate models with the log Beck scale scores as response and depression status, each cognitive processing orientation variable and their interaction as explanatory variables.

P-values for the effects from these models are reported in Table 15.

Table 15

Variable	Status (S)	Variable (V)	S x V
compositePSI	0.034	0.003	0.079
composite SPSI	0.031	0.011	0.073
MPIRP	0.277	0.518	0.748
MPIEP	0.207	0.495	0.075
MPIAP	0.540	0.695	0.350
SPSRPS	0.237	0.691	0.536
ATQ	0.176	0.923	0.251
DAS	0.938	0.750	0.570

Key: PSI: Problem-solving Inventory; SPSI: Social Problem-solving Inventory – Revised; MPIRP: Modes of Processing, Rational Problem-solving; MPIEP: Modes of Processing, Experiential Problem-solving; MPIAP: Modes of Processing, Automatic Problem-solving; ATQ: Automatic Thoughts Questionnaire; DAS: Dysfunctional Attitudes Scale.

At the next stage, the compositePSI, compositeSPSI and MPIEP variables were examined for their intercorrelation prior to fitting a model to include all potentially significant explanatory variables. Whilst compositePSI and compositeSPSI were substantially correlated at 0.86, their correlations with MPIEP were substantially lower at 0.33 and 0.56 respectively. In order to reduce multicolinearity among the explanatory variables, the mean of compositePSI and compositeSPSI was calculated to construct a new variable labelled positive problem-solving orientation (ppso).

A model was then fitted to logBeck as response with status, ppso and MPIEP as main effects together with the interactions of status with each of ppso and MPIEP. The status by MPIEP interaction was clearly non-significant and removed ($p = 0.362$). At this point the status by ppso interaction was significant and retained but the MPIEP variable was only of marginal significance ($p = 0.069$). The MPIEP main effect was then removed.

The p-values for the final model (RSQ = 0.818) are reported in table 16. The parameter estimates and their standard errors are reported in Table 17.

Table 16

Tests of Between-Subjects Effects

Dependent Variable: log(BDI-II + 1)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	19.641(a)	5	3.928	10.752	.000
Intercept	.003	1	.003	.009	.927
status	4.750	2	2.375	6.501	.012
posprob	5.571	1	5.571	15.247	.002
status * posprob	3.544	2	1.772	4.850	.029
Error	4.384	12	.365		
Total	81.318	18			
Corrected Total	24.026	17			

a R Squared = .818 (Adjusted R Squared = .741)

Table 17

Parameter Estimates

Dependent Variable: log(BDI-II + 1)

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.431	.690	.625	.544	-1.071	1.933
[status=1]	1.691	1.018	1.662	.122	-.526	3.908
[status=2]	-3.126	1.306	-2.393	.034	-5.971	-.280
[status=3]	0(a)	.	.	.	.	.

posprob	.049	.052	.934	.369	-.065	.163
[status=1] * posprob	-.009	.062	-.142	.889	-.143	.125
[status=2] * posprob	.268	.099	2.715	.019	.053	.484
[status=3] * posprob	0(a)	.	.	.	.	.

a This parameter is set to zero because it is redundant.

Key: status=1: presently depressed group (group 1); status=2: recovered depressed group (group 2); status=3: recovered depressed group (group 3).