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Emotional Processing Deficits in Alexithymia: A Theoretical Overview and Empirical Investigation of Attentional Biases

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Abstract

The Literature Review focuses specifically on studies of emotional processing deficits in alexithymia. It is concluded that the precise psychological processes maintaining such deficits remain poorly understood. The adoption of an information processing approach is suggested to add greater conceptual clarity in this area, providing a theoretical framework to guide systematic empirical investigations of cognitive processes in these emotional deficits. It is suggested that alexithymia may be associated with an attentional orientation towards emotional information which, however, fails subsequently to be fully cognitively elaborated (e.g. rational evaluation and semantic appraisal). Difficulties in further in-depth processing of this information may be responsible for problems in the differentiation, articulation, understanding and modulation of ongoing emotional experiences. The Empirical Paper investigates associations between alexithymia and visual attentional biases towards positive and negative emotional words presented at short and long duration exposures. In the long exposure condition the alexithymia group showed significantly more attentional bias towards emotional stimuli than the low alexithymia group. Group differences remained after taking into account the effects of current anxiety and depression. The findings reflect greater sustained attention to emotional information in alexithymia. Methodological considerations are discussed as well as clinical implications and directions for future research.

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CONTENTS

EMPIRICAL PAPER

Emotional Processing Deficits in Alexithymia: A Theoretical Overview and Empirical Investigation of Attentional Biases

Overview

This dissertation aimed to explore a central defining characteristic of alexithymia: deficits in processing emotions. A psychometrically sound self-report scale had been developed to measure this alexithymia (Bagby, Parker & Taylor, 1994). Moreover, the construct had been validated over a three decades of research (Taylor, Bagby & Parker, 1997). Notwithstanding this, an understanding of the precise psychological processes maintaining emotional deficits in alexithymia remained unclear (Weinryb, 1995).

What seemed most in need of explanation was the fact that that people with alexithymia experienced emotions, in particular negative affect, but had difficulties identifying these and communicating them to others. This presentation was aptly described by Friedlander, Lumley, Farchione & Doyal (1997), who stated: "people with alexithymia experience affect, but they lack the ability to differentiate, cognitively elaborate, label and subsequently regulate the affect ... as a result, the affect remains diffuse but active ... experienced as global, undifferentiated, negative subjective state" (p. 233).

In the Literature Review (*Emotional Processing Deficits in Alexithymia: A Critical Review*) it was argued that adopting an information processing approach would add conceptual clarity to the understanding of emotional deficits in alexithymia. This approach could provide a scientifically rigorous conceptual framework and empirically

validated methodologies for testing hypotheses (Mathews, 1997). Only a limited number of studies, however, had adopted this approach to understanding the specific cognitive mechanisms underlying emotional deficits in alexithymia. Of these, two were of particular relevance as they demonstrated processing biases towards emotional words (Parker, Taylor & Bagby 1993; Suslow, 1998). It seemed reasonable to assume that attentional biases were responsible for activation of affective experiences which, however, were not cognitively elaborated at subsequent stages of processing (e.g. conscious, rational and strategic evaluation and semantic appraisal of ongoing emotional experiences). Emotional experiences were thus deemed to remain undifferentiated, poorly understood and therefore unmodulated and persistently activated (Rachman, 1980). This led directly to the Empirical Paper, investigating attentional biases in the processing of emotional information.

The Empirical Paper (*Attentional Bias and Processing of Emotional Information in Alexithymia*) aimed to explore attentional biases in alexithymia. A dot-probe task was used to assess visual attention to emotional stimuli (words describing emotional states). It was predicted that there would be an initial bias towards emotional information at an early stage of attentional allocation, followed subsequently by disengagement of attention, preventing further emotional processing. The study adopted a brief stimulus exposure duration to explore automatic attentional biases towards emotional stimuli and longer exposure to assess attentional disengagement. This study added to previous research by investigating both early automatic attentional shifts and later stages associated with maintenance or disengagement of attention (LaBerge, 1995; Posner &

Peterson, 1990). This investigation also added to the previous studies by taking into consideration concurrent anxiety and depression as important confounding variables that had been ignored in previous research.

The results indicated that, contrary to expectation, higher alexithymia was associated with greater sustained attention towards emotional information generally (i.e. both positive and negative word stimuli). This effect occurred independently of concurrent anxiety and depression. One possible explanation for this finding was that sustained attention reflected greater cognitive efforts to process incoming emotional information in the high alexithymic group. This pattern may have reflected failed attempts to adequately process incoming emotional information. This explanation, however, remained speculative, as the dot-probe task assessed visual attention alone and did not permit an investigation into deeper levels of cognitive elaboration (e.g. strategic and semantic appraisal).

A main limitation of the present study, therefore, was that although attentional biases to emotional stimuli were found, the current findings did not allow one to draw conclusions about these additional aspects of cognitive processing of incoming emotional information in alexithymia. This will need to be the remit of future investigations. The present study also made use of a student population. Future research will need to replicate this study using a clinical sample to further confirm that attentional biases in alexithymia are independent of concurrent anxiety or depression.

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ABSTRACT

This paper outlines literature on emotional processing deficits in alexithymia with an aim to gain a greater understanding of psychological maintenance factors underlying difficulties identifying and describing emotional states. This paper initially looks at the definition, measurement and clinical relevance of alexithymia. Empirical studies investigating emotional processing deficits in alexithymia are then reviewed. Although there is empirical evidence suggesting emotional deficits in alexithymia, it is concluded that the precise cognitive processes maintaining such difficulties remain poorly understood. The information processing approach is introduced as a useful theoretical framework to provide greater conceptual clarity and guide more systematic empirical investigations in this area for the future. It is suggested that alexithymia may be associated with an attentional orientation towards emotional information which, however, fails subsequently to be fully cognitively elaborated. It is suggested that difficulties in further in-depth processing (e.g. conscious, rational and strategic evaluation and semantic appraisal of ongoing emotional experiences) may be responsible for problems in the differentiation, articulation, understanding and modulation of ongoing emotional experiences. Current studies investigating cognitive processes (e.g. perception, attention and memory) in alexithymia, however, are few in number and have methodological limitations. Implications for future research and clinical interventions are suggested.

INTRODUCTION

Alexithymia has been considered to be linked to broad and pervasive difficulties in processing of emotions which can lead to difficulties in regulating negative affective states and therefore increase vulnerability to a range of clinical disorders (Taylor, Bagby & Parker, 1997). Moreover alexithymic features such, as difficulties describing and communicating emotions and a cognitive style which focuses on external details rather than psychological experiences, can constitute an important factor in limiting therapeutic progress (Freyberger, 1977; Krystal, 1979; 1982; Sifneos, 1975).

This paper outlines literature on emotional processing deficits in alexithymia with an aim to gain a greater understanding of psychological maintenance factors in difficulties identifying and describing emotional states. A literature has accumulated around the aetiology of alexithymia, including a focus on the influence of early family environment (Kench & Irwin, 2000; King & Mallinckrodt, 2000) as well as neurophysiological determinants (Lumley & Sielky, 2000; Parker, Keightley, Smith & Taylor, 1999). A discussion of aetiological factors is, however, too broad to be included within the specific remit of this review and will not be addressed in this paper. The interested reader is referred to Taylor et al. (1997) for an in-depth discussion of this area.

This section will examine literature on definition, measurement and prevalence of alexithymia and its relationship to psychopathology. Empirical studies focussing specifically on emotional processing deficits in alexithymia will then be reviewed.

The concept and definition of alexithymia

Alexithymia was a term initially coined by Sifneos (1973), meaning "having no words for emotions" and was used to denote individuals who showed "a marked constriction in experiencing emotions, and particularly a difficulty in finding appropriate words to describe their feelings" (p. 255). Taylor et al. (1997) described people with alexithymic features as having the following attributes: (i) difficulty identifying feelings (ii) difficulty communicating feelings to others; (iii) constricted internal and subjective experiences; and (iv) an externally oriented cognitive style. An individual with predominant alexithymic features is therefore likely to have limited access and understanding of their own or others' subjective and emotional experiences and demonstrate a thinking and communication style which is concrete and bound to external rather than internal events.

Taylor et al. (1997) pointed out that although the above characteristics in alexithymia can be separated at a conceptual level, they are related. Difficulties identifying emotions and communicating these to others are associated with a cognitive and communication style that focuses on external facts rather than internal experiences, which in turn is likely to be associated with a constricted range of internal and subjective experiences.

Psychometric measurement of alexithymia

Both observer-rated and self-report measures of alexithymia have been developed.

Observer-rated measures. Amongst the most commonly used observer-rated measures of alexithymia in the research literature are the *Beth Israel Hospital Psychosomatic Questionnaire* and the *Alexithymia Provoked Response Questionnaire.*

The Beth Israel Hospital Psychosomatic Questionnaire (BIPQ; Sifneos, 1973) is a 17-item questionnaire, eight items of which focus specifically on alexithymic characteristics. Following an unstructured conversation with the respondent and attention to their ability to describe emotions and report internal subjective states, the observer is asked to rate the interviewee on a series of items. Items include: "Does the patient use appropriate words to describe emotion?"; "Does the patient tend to describe circumstances surrounding an event rather than feelings?"; "Is the thought content associated more with external events than with fantasy or emotion?". Bagby, Taylor & Parker (1994) later revised this measure, by adding four items and altering the rating scale from dichotomous to a seven-point Likert type response format. The scale thus included six items assessing the ability to identify and communicate emotions and six items assessing concrete and externally oriented thinking. The authors reported adequate inter-rater reliability amongst three independent clinicians and concurrent validity in terms of correlations with a self-report measure of alexithymia, the Toronto Alexithymia Scale – 20 (Bagby, Taylor & Parker, 1994).

The Alexithymia Provoked Response Questionnaire (APRQ; Krystal, Giller & Cicchetti, 1986) is a structured interview in which respondents are asked to imagine themselves in stressful scenarios and asked a series of questions to ascertain their emotional reactions (e.g, "How would you feel if someone insulted you?"; "How would you feel if someone pulled a gun on you?"; "How would you feel if someone called you a thief?"). The individual's responses are then rated for alexithymia according to whether: 1) they tend to describe actions rather than affect; 2) they contain detailed descriptions of a situation but lack an affective response; 3) they describe physical sensations but not affective states; and 4) if emotional words are used which are out of context in relation to the situation. Krystal et al. (1986) reported adequate inter-rater reliability scores as well as concurrent validity in terms of significant correlations with the BIPQ. Pierce, Faryna, Davidson, Markart & Krystal (1989) replicated these findings.

Self-report measures. Three self-report measures feature predominantly in the research literature: the *MMPI Alexithymia Scale,* the *Schalling-Sifneos Personality Scale* and the *Toronto Alexithymia Scale –20.*

The 22 items of the MMPI Alexithymia Scale (MMPI-A; Kleiger & Kinsman, 1980) were derived from an administration of the Minnesota Multiphasic Personality Inventory (MMPI; Good & Branter, 1974; cited in Kleiger & Kinsman, 1980) to a group of 112 hospitalized respiratory patients. Items were selected from the MMPI that distinguished alexithymic from non-alexithymic individuals from this sample, according to scores on the BIPQ, which had been concurrently administered. As might be expected, the items

derived for the MMPI-A correlated significantly with the BIPQ; the authors also reported preliminary evidence of significant test-retest reliability. The items, however, demonstrated poor face validity.

The Schalling-Sifneos Personality Scale (SSPS; Apfel & Sifneos, 1979) includes 20-items rated on a 4-point Likert-type scale. Participants are asked to rate their agreement with statements such as: "I find it hard to find the right words for my feelings"; "I do not tend to examine my own feelings"; "One may say that I lack imagination". The authors failed to investigate the psychometric properties of this measure. Subsequent studies investigating the psychometric properties of both of the above self-report scales, however, have since shown them to demonstrate poor validity and reliability (Bagby, Parker & Taylor, 1991; Bagby, Taylor & Atkinson, 1988; Federman & Mohns, 1984; Krystal, Giller & Cicchetti, 1986; Lesser & Lesser, 1983; Parker, Taylor, Bagby & Thomas, 1991; Salminen, Saarijarvi & Aarela, 1995).

The Toronto Alexithymia Scale – 20 (TAS-20; Bagby, Parker & Taylor, 1994; Bagby, Taylor & Parker, 1994) contains twenty items, each scored on a 5-point Likert scale. These items have been found to divide into three main factors: 1) difficulty identifying feelings (e.g., "I am often confused about what emotion I am feeling"); 2) difficulty describing feelings to others (e.g., "It is difficult for me to reveal my innermost feelings, even to close friends") and 3) external-concrete thinking (e.g, "I prefer talking to people about their daily activities rather than their feelings"). Studies have shown this factor structure to be consistent in both clinical and non-clinical populations (Bagby, Parker &

Taylor, 1994) and across sample populations from different nationalities (Parker, Bagby, Taylor, Endler, & Schmitz, 1993). The TAS-20 is the most psychometrically validated measure of alexithymia, having shown good internal consistency, test-retest reliability and convergent, discriminant and criterion validity (Bagby, Parker & Taylor, 1994; Bagby Taylor & Parker, 1994; Taylor, 1994; Taylor et al., 1997).

Summary. Observer-rated and self-report measures of alexithymia have been described. The observer-rated scales reviewed show some limited evidence of psychometric validity. Two of the self-report scales (the MMPI and the SSPS) have problems relating to reliability or validity. The TAS-20, however, has extensively been shown to be the most psychometrically sound measure of alexithymia. Understandably, therefore, this scale has been the most widely used and appears in most of the research discussed in this review.

Clinical relevance of alexithymia: relationship to psychopathology

Over the last three decades a number of researchers have investigated the presence of alexithymic features in clinical populations. Prevalence rates of "alexithymic" individuals (i.e., where alexithymic features are predominant) among general psychiatric outpatient groups have been found to be around 30-40%. (Saarijarvi, Salminen, Tamminen & Aarela, 1993; Taylor, Parker, Bagby & Acklin, 1992; Todarello, Taylor, Parker & Fanelli, 1995).

As might be expected, therefore, alexithymia has also been related to general symptomatology of psychological distress (Bach, Bach, Bohmer & Nutzinger, 1994; Honkalampi, Saarinen, Hintikka, Virtanen & Viinamaki, 1999; Taylor, Parker, Bagby & Acklin, 1992). More specifically, alexithymia has consistently been found to correlate with measures of anxiety and depression both in clinical and non-clinical populations (Bagby, Taylor & Ryan, 1986; Hendryx, Haviland & Shaw, 1991; Lumley & Norman, 1996; Parker, Taylor, Bagby & Acklin, 1993; Taylor, Parker, Bagby & Acklin, 1992; Wise, Mann & Hill, 1990).

The exact nature of the relationship between alexithymia and psychological distress, however, remains poorly understood. It has been suggested that alexithymia may be a secondary by-product of elevated distress levels or alternatively may represent a phenomenon in its own right (Sifneos, 1994). Taylor et al. (1997) propose the latter possibility, suggesting that alexithymia represents a broader and more pervasive deficit in processing emotions which is not solely attributable to concurrent psychopathology.

Recent research tends to support Taylor et al.'s (1997) position. A number of longitudinal studies have indicated that alexithymic features remain even after general levels of psychological distress have abated (Porcelli, Leoci, Guerra, Taylor & Bagby, 1996; Salminen, Saarijarvi, Aarela & Tamminen, 1994). More particularly, alexithymia features remain even following reductions in anxiety and depression (Haviland, Shaw, Cummings & MacMurray, 1988; Martinez-Sanchez, Alto-Garcia, Adam, Medina & Espana, 1998; Wise, Mann & Randell, 1995). Conversely, Fukunishi and colleagues (Fukunishi, Kikuchi,

Wogan & Tabuko, 1997; Fukunishi, Michiko and Tabuko, 1997), who found evidence of reductions of alexithymia concomitant with reductions in psychological distress following psychiatric treatment. In both studies, however, the authors failed to outline the exact nature of the psychiatric treatment. Neither did the authors discuss what effect this treatment may have had directly on alexithymia itself (a discussion about whether alexithymia is amenable to clinical interventions will follow). Moreover, in both studies, although there were statistically significant reductions in alexithymia, these were not necessarily clinically significant. In one of the studies, for example, 32% of participants still showed predominant alexithymic features.

Thus several findings suggest that although there may be some overlap between alexithymia and anxiety and depression, core alexithymic features seem to be independent (Taylor et al., 1997). Alexithymia may be specifically associated with difficulties processing affective states that give rise to the problems in differentiating, articulating, understanding and modulating emotional experiences (Friedlander, Lumley, Farchione & Doyal, 1997). Studies have shown that alexithymia correlates negatively with measures that assess a person's propensity and ability to reflect upon their emotional and psychological experiences. A number of studies have found negative correlations between alexithymia and "psychological mindedness" (Bagby, Taylor & Parker, 1988; 1994; Bagby et al., 1986; Taylor, Bagby & Parker, 1992; Taylor, Bagby, Ryan & Parker, 1990; Taylor, Ryan & Bagby, 1985), which reflects a person's ability to reflect, understand and communicate their subjective experiences (Conte, Plutchick, Jung, Picard, Karasu & Lotterman, 1990). Authors have also found significant negative

correlations between alexithymia and other related concepts reflecting an introspective orientation towards one's thoughts and feelings, such as *private self consciousness* (Kirmayer & Robbins, 1993), *affective orientation* (Yelsma, 1996) and *openness to experience* (Bagby, Taylor & Parker, 1994; Wise & Mann, 1994; Wise, Mann & Shay, 1992).

Although prevalence of alexithymia is higher amongst in psychiatric populations, alexithymic features can be considered to vary along a continuum within the general population (Taylor et al., 1997). Prevalence rates of alexithymia of around 13-18% have been found in non-clinical adult and student populations (Parker, Taylor & Bagby, 1989; Salminen, Saarijarvi, Aarela, Toika & Kauhanen, 1999). Early studies (Parker et al. 1989; Taylor et al., 1990) suggested that alexithymia shows weak or no associations with demographic characteristics such as level of education, income, socioeconomic status or intelligence. More recent studies among clinical and non-clinical populations, however, consistently show that levels of alexithymia are higher amongst males, those less well educated, those with lower socioeconomic status and amongst older age groups (Bagby, Parker & Taylor, 1994; Honkalampi et al., 1999; Joukamaa, Sohlman & Lehtinen, 1995; Kauhanen, Kaplan, Julkunen, Wilson & Salonen, 1993; Kirmayer & Robbins, 1993; Lane Sechrest & Riedel, 1998; Parker, Bagby, Taylor, Endler & Schmitz, 1993; Saarijarvi et al., 1993).

How sociodemographics, gender and age factors may influence alexithymia remains speculative. Of interest is research that has indicated generally greater emotional

inhibition and less expression in males and among older individuals (Fischer & Good, 1997; McConatha, Leone & Armstrong, 1997; McConatha, Lightner & Deaner, 1994). It is possible that the ability to recognize and describe one's emotional states to others is influenced by educational experiences as well as broader generational and cultural factors relating to age and gender. These factors in turn may have an impact on alexithymic features.

Summary. The findings cited above suggest that alexithymia is characterized by a number of conceptually inter-related features: difficulties identifying emotions and communicating these to others, a constricted range of internal and subjective experiences and a cognitive style that focuses on external details rather than internal experiences. Alexithymic features have been associated with a propensity to experience negative affective states. The exact nature of the relationship between alexithymia and psychological distress remains unclear at present, although alexithymic features remain, despite reductions in concurrent levels of anxiety and depression. Moreover, alexithymic features vary along a continuum and are present in non-clinical populations. These findings suggest that, although related, core alexithymic features does not seem to be a simple by-product of concurrent distress. Alexithymia may instead reflect more stable difficulties in processing emotions. Experimental studies to investigating emotional deficits in alexithymia will now be investigated.

EXPERIMENTAL STUDIES OF EMOTIONAL DEFICITS IN ALEXITHYMIA

Empirical studies have shown that alexithymia is associated with more restricted emotional expression during written self-disclosure tasks (Paez, Valesco & Gonzalez, 1999), during psychiatric interview (Troisi, Belsanti, Bucci, Mosco, Sinti & Verucci, 2000; Troisi, DelleChiaie, Russo, Russo, Mosco & Pasini, 1996) and in describing affective responses in relation to experimentally presented emotion-provoking stimuli such as words (Jacob & Hautekeete, 1999) and pictures (Roedema & Simons, 1999). Consistent with literature quoted above, those emotional responses that are elicited tend to be more negative amongst individuals with higher alexithymia scores (Cox, Blount & Rozak, 1998; Rief, Heuser & Fichter, 1996)

A number of experimental studies have also shown alexithymia to be associated more specifically with difficulties labeling emotional stimuli during experimental tasks (Lane, Sechrest, Riedel, Shapiro & Kaszniak, 2000; Lane, Sechrest, Riedel, Weldon, Kaszniak & Schwartz, 1996; Mann, Wise, Trinidad & Kohanski, 1994; Parker, Taylor & Bagby, 1993a).

Parker et al. (1993a) showed photographs of facial expressions of emotions to a group of 216 male and female university students. Participants were divided into low and high alexithymic groups on the basis of being below the 33rd and above the 66th percentile, respectively. The high alexithymia group was found to be significantly less accurate in recognizing the emotions shown in the photographs than the low alexithymic group. Similar

findings were reported by Mann et al. (1994) using a sample of 62 male and female hospital staff members from a general hospital. In view of the relationship between alexithymia and concurrent emotional distress, however, both studies were limited by their failure to control for the possible impact of anxiety and depression on the performance of this task.

More recently Lane et al. (1996) administered an affect recognition task, involving verbal (i.e., words and sentences) and non-verbal (i.e., facial expressions and photographs depicting emotional scenes) emotional stimuli. The stimuli represented a range of emotions (happiness, surprise, sadness, fear, anger, disgust and neutral). The sample consisted of 380 participants recruited from the community representing males and females from different age groups and socioeconomic classes; all participants were without previous psychiatric history. Higher scores on the TAS-20 were associated with less accurate emotional labelling across the verbal and non-verbal tasks. These significant associations remained even when the effects of age, gender, socioeconomic status and current dysphoria were partialled out. These findings were later replicated by Lane et al. (2000).

Four studies, however, have failed to reproduce the above differences between alexithymic and non-alexithymic individuals in the recognition of emotional stimuli (Berenbaum & Prince, 1994; Mayer, DiPaolo & Salovey, 1990; McDonald & Prkachin, 1990; Pandey & Mandal, 1997). Methodological limitations in two of these studies, however, may account for the lack of significant differences. The studies by Pandey & Mandal (1997) and McDonald & Prkachin (1990) used small sample sizes (10 and 12 participants in each group); moreover, McDonald & Prkachin made use of the Schalling-Sifneos Personality

Scale, which has been shown to be psychometrically unreliable. The studies by Berenbaum (1994) and Mayer et al. (1990), however, did not have these methodological limitations, having both used larger samples and adopted the TAS to measure alexithymia.

The discrepancy between these two groups of findings may also be partly attributable to the nature of the emotional perception task involved in the latter studies. Berenbaum & Prince (1994) asked participants to extrapolate the predominant emotion of the main character from a brief story, while Mayer et al. (1990) asked participants to put emotional labels to abstract designs and colours as well as facial expressions of emotions. It is possible that these tasks can be performed using a range of abilities that may not be impaired by alexithymia (e.g., recognizing the main character's emotional state from a story may rely on inferential and deductive skills; identifying the emotions from colours or abstract designs may rely on a knowledge of cultural norms and aesthetic principles). As the underlying competencies required to successfully perform these tasks remain unclear it is difficult to interpret how performance on these relate to self-reported emotional deficits in alexithymia.

More broadly, the above considerations point to the need to pin-point the exact psychological processes which underlie and maintain emotional processing deficits in alexithymia, an understanding of which still remains at present somewhat speculative and elusive (Lumley, 2000; Weinryb, 1995). In the next section it will proposed that the information processing approach may provide a useful framework for introducing greater conceptual clarity and experimental rigour to this area of investigation.

INFORMATION PROCESSING APPROACH

The majority of studies reviewed in the previous section indicate that alexithymia is associated with emotional deficits. However, a lack of understanding of the specific cognitive processes that underlie the tasks in the different studies makes it difficult to draw definite conclusions about the precise psychological mechanisms responsible. This difficulty leads one to question of whether investigations into alexithymia need to be expanded. Rather than asking whether alexithymic people can label emotions it seems more fruitful to explore more broadly how emotions are processed in alexithymic individuals and how this may differ from non-alexithymic individuals.

In the remainder of this review it will be proposed that the information processing approach can provide a useful theoretical framework for systematically investigating cognitive mechanisms underlying emotional deficits in alexithymia. A distinct advantage of this approach is that it provides a general theoretical structure from which to make specific hypotheses about cognitive processes which can then be empirically verified by the use of a range of tested and validated experimental methodologies (Mathews, 1997).

A fundamental assumption underlying the information processing approach is that emotions are the product of the operation of cognitive processes. The type of emotional information and the way it is processed can thus help understand maintenance factors in emotional disorders such as anxiety and depression (Williams, Watts, MacLeod & Mathews, 1997). Information processing theory suggests that stimuli undergo various

stages of processing. These stages progress from initial pre-attentive stimulus registration and encoding (which occurs predominantly at an automatic level and outside of conscious awareness) towards post-attentive stages, which can entail more elaborate and strategic processing of information, including semantic processing (Wells & Matthews, 1994).

The information-processing approach becomes clinically relevant when it is applied to understanding how emotionally valenced information is processed through these different stages in emotional disorders. In particular, theories have focussed on the way individuals differ in how they selectively process specific types of information. In the literature this phenomenon has been referred to as "cognitive bias". Mathews (1997) defined *bias* as "any systematic preference in the priorities used in making ... decisions ... influencing the selection or rejection of information having emotional meaning" (p.49). It is suggested that maintenance of negative affect in emotional disorders occurs primarily through selective processing of negative mood congruent information. Such information is thus cognitively over-represented and perpetuates negative emotional arousal (Williams et al., 1997). The information processing approach has been applied to understanding how adverse emotional states and clinical conditions (primarily anxiety and depression) are maintained by biased processing of negatively valenced information. Hypotheses have then been tested using experimental tasks particularly designed to investigate specific cognitive processes such as perception, attention and memory.

A considerable amount of literature has accumulated demonstrating attentional *biases* towards negatively valenced information in anxiety and depression. In particular, the

general pattern of findings suggest that anxiety is associated with a bias in initial automatic attentional orienting to negative information (Bradley, Mogg & Lee, 1997; Mogg, Bradley, deBono & Painter, 1997; Mogg, Bradley & Williams, 1995), whereas depression may be more closely associated with a bias in sustained attention to negative information (Bradley, Mogg, White, Groom & deBono, 1999; Mathews, Ridgeway & Williamson, 1996).

Memory biases for negative information have also been shown, although these have more commonly been associated with depression. In a number of such studies depression has reliably been shown to be associated with biases in free recall of memory for negatively valenced stimuli (Denny & Hunt, 1992; Matt, Vacquez & Campbell, 1992; Watkins, Mathews, Williams & Fuller, 1992). These findings suggest that such biases are linked to deeper, more elaborate and extensive levels of processing negatively valenced information. This level of processing is argued to subsequently facilitate the active retrieval of such information during free recall (Williams et al., 1997).

As the study of anxiety and depression are not the primary focus of this review these investigations will not be elaborated further here. The interested reader is referred to the following comprehensive reviews of this literature: Mathews (1997); Mathews & MacLeod (1994); Wells & Matthews (1994); Williams et al. (1997). The next section will focus specifically on information processing studies in alexithymia.

Information processing studies in alexithymia

Extensive search of the alexithymia literature over the last three decades reveals only a limited number of studies specifically investigating cognitive factors (e.g. perception, attention or memory) in relation to emotional processing deficits in alexithymia. Two studies of particular relevance have investigated biased processing of emotionally valenced stimuli. In the first study Parker, Taylor & Bagby (1993b) administered the emotional Stroop task to a group of 16 alexithymic and 54 non-alexithymic students (differentiated according to cut-off scores using the TAS-20). In the emotional Stroop task individuals are presented with emotionally valenced words printed in different colours (e.g., the word "cancer" printed in green). The individual is asked simply to name the colour of the word (green), while ignoring the content of the word itself. Longer response latencies to naming the colour reflect the degree to which the individuals attention has been diverted towards the content of the word, thus creating interference with the primary colour-naming task. The results indicated that the alexithymic group showed greater response delays to negatively valenced threat words ("rape", "victim") compared to the non-alexithymic group. No significant group differences were found, however, in their response latencies to emotionally neutral words (e.g., "moderate", "typical"). These findings suggest that alexithymic individuals show an attentional bias towards emotionally negatively valenced words.

A second, more recent, study was carried out by Suslow (1998), who administered a word priming task to a group of 32 undergraduate students and hospital staff members.

Participants were briefly presented (200 millisecond exposure) with prime words that were either neutral (e.g., "epoch", "settlement") or emotionally valenced in a positive (e.g., "clever", "sincere") or negative direction (e.g., "jail", "bad"). Reaction times in responding to similarly valenced target words presented 100 milliseconds after were then measured. They found the "difficulties describing emotions" sub-scale of the TAS-20 correlated significantly with a greater priming effect for negatively valenced words: words such as "jail", "greedy", "bad" facilitated the detection of similar emotionally congruent negative target words. The short stimulus exposure duration used by the authors allowed an assessment of early and automatic processing of stimuli (Bradley, Mogg, Falla & Hamilton 1998; Mogg et al., 1995; 1997). The author concluded from the analyses that difficulties describing emotions amongst their alexithymic group were associated with early and automatic biases towards negatively valenced stimuli. Interestingly, the "externally oriented thinking" sub-scale of the TAS-20 was also associated with a significant priming for *positively* valenced words. This suggests that alexithymic individuals may orient towards both positive and negative emotional information. This may reflect attempts at the initial stages of information processing to prioritize incoming emotionally toned information.

The above findings provide some evidence that self-reported difficulties identifying and communicating emotional experiences are associated with processing biases towards emotionally valenced information. Suslow's (1998) study suggests that such biases may already occur at early automatic stages of information processing and Parker et al.'s (1993b) study suggests that alexithymia is associated with an attentional bias for negative

words. Attention to negative information in particular may be relevant in explaining the above mentioned associations between alexithymia and adverse emotional states. Recent cognitive theories of emotional disorders have proposed that an automatic bias for negative information plays a key role in activating anxious mood states (e.g. Williams et al., 1997). If alexithymia is also associated with such a bias, this may explain why it is associated with more pronounced negative emotional states.

Studies quoted at the beginning of this review indicated that alexithymic individuals are, in fact, more likely than non-alexithymic individuals to report experiencing diffuse and poorly differentiated negative emotional states (Taylor et al., 1997). They therefore don't necessarily experience less affect than non-alexithymic individuals. Instead, alexithymic individuals by definition report difficulties identifying, discriminating and communicating these emotional experiences. This clinical presentation was aptly described by Friedlander et al. (1997), who stated that "people with alexithymia experience affect, but they lack the ability to differentiate, cognitively elaborate, label and subsequently regulate the affect ... as a result, the affect remains diffuse but active ... experienced as global, undifferentiated, negative subjective state" (p. 233).

One approach to understanding this picture from an information processing perspective is to postulate that a proneness to experience negative emotions is due to their activation through attentional biases towards negative information. Subsequent lack of ability to differentiate and discriminate between specific emotional states may be due to limited elaborative processing of this information at later post-attentive stages. This is consistent

with the argument that processing of emotional information progresses from initial perceptual encoding through to deeper and more strategic elaboration of incoming information. Deeper and more deliberate processing may include a semantic appraisal of ongoing emotional experiences (Beck & Clark, 1997; Mogg & Bradley, 1998). This may involve, for example, understanding current subjective responses within the framework of an assessment of the current context as well as memorial and ideational information relating to one's own and others' habitual responses to similar emotion-eliciting situations (Beck & Clark, 1997; Greenberg & Pascual-Leone, 1997; Rachman, 1980; Williams et al., 1997). More elaborate processing of this nature may facilitate the differentiation, understanding and modulation of ongoing emotional experiences. In a seminal paper on emotional processing, Rachman (1980) suggested that the successful processing of emotionally salient information leads to a habituation process and therefore a subsiding over time in the intensity of the emotional experience. Following successful emotional processing the individual can thus identify and describe their affective states without experiencing undue emotional disturbance. Conversely, incomplete processing was argued to lead to experiencing more intense states of emotional distress that remain persistently activated.

Hypothesized failures to process emotional information may be due to cognitive avoidance that forestalls deeper elaborative processing of these negative emotions (Amir, Foa & Coles, 1998; Foa & Kozak, 1986; Mathews, 1990; Mogg, Mathews & Weinman, 1987; Williams, Stiles & Shapiro, 1999). This would be consistent with the externally oriented thinking characteristic of alexithymia as well as studies indicating that

alexithymia correlates negatively with measures assessing a predisposition to introspect as a means of understanding one's internal emotional and psychological experiences (Bagby, Taylor & Parker, 1994; Kirmayer & Robbins, 1993; Wise & Mann, 1994; Yeslma, 1996). An alternative, but complementary, explanation might be that a lack of further processing is due to intrinsic (possibly developmentally determined) deficits in the cognitive skills required to process emotional stimuli at these more advanced and strategic levels (Lane & Schwartz, 1987; Taylor et al., 1997).

It is important to emphasize, however, that these hypotheses remain speculative. Further research is required before cognitive processes underlying emotional deficits in alexithymia can be confidently outlined. Information processing research in this area to date is somewhat limited. Both of the studies investigating biases in information processing described here shared an important methodological limitation: neither controlled for concurrent levels of anxiety and depression. Alexithymia has been found to be associated with anxiety and depression, which are themselves associated with attentional biases towards negatively valenced information (e.g. Mathews et al., 1996). Future investigations of information processing in alexithymia will thus need to ascertain whether or not these biases in alexithymia occur independently of concurrent anxiety and depression. The above studies therefore clearly need replicating, controlling for this important confounding variable. This area will be explored in more detail in the Empirical Paper, which will investigate attentional biases to emotional information in alexithymia.

Equally, if difficulties discriminating and communicating emotions result from a lack of subsequent elaboration of this information at later stages of cognitive processing, one might expect poorer performance on tasks requiring greater depth of processing of emotional information. One could investigate this hypothesis using free-recall studies as used in research into depression, where deeper levels of cognitive processing have been linked to facilitated retrieval of emotionally valanced information (e.g. Matt et al., 1992).

The information processing approach thus has the potential to provide a useful framework for generating systematic research into the investigation of emotional deficits in alexithymia. This approach has been adopted extensively and fruitfully in the understanding of emotional disorders. An understanding of emotional deficits in alexithymia in terms of incomplete processing of emotional information outlined above provides an example of how this approach may be adopted in this area. This allows the generation of specific and empirically testable hypotheses, thereby adding conceptual clarity to our understanding of psychological factors underlying emotional processing deficits in alexithymia.

Summary. The information processing approach has been outlined in terms of its main assumption that emotions and emotional disorders are the product of the cognitive processing of emotionally salient negative information. It has been suggested that this approach offers a general framework from which the operation of specific cognitive processes underlying emotional processing can be explicitly outlined and these hypotheses can be tested empirically. This approach will allow greater conceptual clarity

in our understanding of alexithymia and psychological factors associated with emotional processing deficits. An understanding of alexithymia in terms of early activation of negative affect, due to attentional biases towards negative emotional information, followed by incomplete processing of emotional information at later stages was outlined. Current studies adopting an information processing approach to alexithymia are too few, however, to provide the basis for a firm theoretical model of cognitive aspects underlying emotional deficits in alexithymia at this stage. Current findings provide, however, the basis for promising directions for systematic future research. The Empirical Paper that follows will outline one such area: attentional biases for emotional stimuli in alexithymia.

Clinical implications

It has been argued that adopting an information processing approach offers a promising direction for future research into alexithymia. This approach may also have useful therapeutic implications for future directions in the clinical interventions with alexithymia. A number of authors have pointed out that alexithymic features constitute an important factor in limiting therapeutic progress (Freyberger, 1977; Krystal, 1979; 1982; Sifneos, 1975). This is because the therapeutic process itself requires the individual to be capable of focusing internally, identifying relevant emotions and communicating these (Greenberg & Pascual-Leone, 1997). Some have argued, however, that alexithymic features themselves are amenable to modification through clinical interventions aimed at focussing on internal states and developing the individual's emotional understanding

(Beresneviate, 2000; Fukunishi, Ichikawa, Ichikawa & Matsuzawa, 1994; Smith & Frawley, 1999; Swiller, 1988).

Being able to pinpoint specific cognitive processes underlying emotional deficits in alexithymia may help fine-tune therapeutic interventions aimed at increasing conscious discriminations of one's emotional experiences. Moreover, such an understanding could help clarify which aspects of the therapies offered may contribute to successful outcomes. It may be, for example, that successful therapies with alexithymia focus on developing more elaborate, strategic and semantic processing of affectively valenced stimuli and emotional cues. Finally, understanding whether emotional deficits are attributable to particular processing patterns specific to alexithymia itself or are secondary to processing biases attributable to concurrent psychological distress is also clinically important (Warnes, 1986). If alexithymic difficulties are maintained by processes which are primarily attributable to current distress, then therapy may need to primarily focus on reduction of that distress as the primary goal. If, however, such biases are attributable to alexithymia then therapy should take a direct approach to reducing these alexithymic features as a main therapeutic goal.

REFERENCES

- Amir, N., Foa, E.B. & Coles, M.E. (1998). Automatic activation and strategic avoidance of threat-related information in social phobia. Journal of Abnormal Psychology, 107, 285-290.

- Apfel, R.J. & Sifneos, P.E. (1979). Alexithymia: concept and measurement. Psychotherapy and Psychosomatics, 32, 180-190.

- Bach, M., Bach, D., Bohmer, F. & Nutzinger, D.L. (1994). Alexithymia and somatization: relationship to DSM-III-R diagnoses. Journal of Psychosomatic Research, 38, 529-538.

- Bagby, J.D.A., Parker, J.D.A. & Taylor, G.J. (1991). Reassessing the reliability and validity of the MMPI alexithymia scale. Journal of Personality Assessment, 56, 238-253.

- Bagby, R.M., Parker, J.D.A. & Taylor, G.J. (1994). The twenty-item Toronto Alexithymia Scale: I. item selection and cross-validation of the factor structure. Journal of Psychosomatic Research, 38, 23-32.

- Bagby, R.M., Taylor, G.J. & Atkinson, L. (1988). Alexithymia: a comparative study of three self-report measures. Journal of Psychosomatic Research, 32, 107-166.

- Bagby, R.M., Taylor, G.J. & Parker, J.D.A. (1988). Construct validity of the Toront Alexithymia Scale. Psychotherapy and Psychosomatics, 50, 29-34.

- Bagby, R.M., Taylor, G.J. & Parker, J.D.A. (1994). The Twenty-Item Toronto Alexithymia Scale: II convergent, discriminant and concurrent validity. Journal of Psychosomatic Research, 38, 33-40.

- Bagby, R.M., Taylor, G.J. & Ryan, D. (1986). Toronto Alexithymia Scale: relationship with personality and psychopathology measures. Psychotherapy and Psychosomatics, 45, 207-215.

- Beck, A.T. & Clark, D.A (1997). An information processing model of anxiety: automatic and strategic processes. Behaviour Research and Therapy, 35, 49-58.

- Berenbaum, H. & Prince, J.D. (1994). Alexithymia and the interpretation of emotion-relevant information. Cognition and Emotion, 3, 231-244.

- Beresneviate, M. (2000). Exploring the benefits of group psychotherapy in reducing alexithymia in coronary heart disease patients: a preliminary study. Psychotherapy and Psychosomatics, 69, 117-122.

- Bradley, B., Mogg, K., Falla, S.J. & Hamilton, S.R. (1998). Attentional bias for threatening facial expressions in anxiety: manipulation of stimulus duration. Cognition and Emotion, 12, 737-753.

- Bradley, B.P., Mogg, K. & Lee, S.C. (1997). Attentional biases for negative information in induced and naturally occurring dysphoria. Behaviour Research and Therapy, 35, 911-927.

- Bradley, B.P., Mogg, K., White, J., Groom, C. & deBono, J. (1999). Attentional bias for emotional faces in generalized anxiety disorder. British Journal of Clinical Psychology, 38, 267-278.

- Conte, H.R., Plutchik, R., Jung, B.B., Picard, S., Karasu, T.B. & Lotterman, A. (1990). Psychological mindedness as a predictor of psychotherapy outcome: a preliminary report. Comprehensive Psychiatry, 32, 426-431.

- Cox, W.M., Blount, J.P. & Rozak, A.M. (1998). Alexithymia and induced moods in alcohol-dependent males. Personality and Individual Differences, 24, 81-88.

- Denny, E.B. & Hunt, R.R. (1992). Affective valence and memory in depression: dissociation of recall and fragment completion. Journal of Abnormal Psychology, 101, 575-580.

- Federman, R. & Mohns, E. (1984). A validity study of the MMPI alexithymia subscale conducted on migraine headache outpatients. Psychotherapy and Psychosomatics, 41, 29-32.

- Fischer, A.R. & Good, G.E. (1997). Men and psychotherapy: an investigation of alexithymia, intimacy and masculine gender roles. Psychotherapy, 34, 160-170.

- Foa, E.B. & Kozak, M.J. (1986). Emotional processing of fear: exposure to corrective information. Psychological Bulletin, 99, 20-35.

- Freyberger, H. (1977). Supportive psychotherapeutic techniques in primary and secondary alexithymia. Psychotherapy and Psychosomatics, 28, 337-342.

- Friedlander, L., Lumley, M.A., Farchione, T. & Doyal, G. (1997). Testing the alexithymia hypothesis: physiological and subjective responses during relaxation and stress. The Journal of Nervous and Mental Disease, 185, 233-239.

- Fukunishi, I., Ichikawa, M., Ichikawa, T. & Matsuzawa, K. (1994). Effect of family group psychotherapy on alcoholic families. Psychological Reports, 74, 568-570.

- Fukunishi, I., Kikuchi, M., Wogan, J. & Takubo, M. (1997). Secondary alexithymia as a state reaction in panic disorder and social phobia. Comprehensive Psychiatry, 38, 166-170.

- Fukunishi, I., Michiko, K. & Takubo, M. (1997). Changes in scores on alexithymia over a period of psychiatric treatment. Psychological Reports, 80, 483-489.

- Good, P. & Branter, J. (1974). A Practical Guide to the MMPI in Psychology. Minneapolis: University of Minnesota Press.

- Greenberg, L.S. & Pascual-Leone, J. (1997). Emotion in the creation of personal meaning. In M. Power, & C.R. Brewin [Eds]. The Transformation of Meaning in Psychological Therapies: Integrating Theory and Practice, (pp. 157-173). New York: Wiley.

- Haviland, M.G., Shaw, D.G., Cummings, M.A. & MacMurray, J.P. (1988). Alexithymia: subscales and relationships to depression. Psychotherapy and Psychosomatics, 50, 164-170.

- Hendryx, M.S., Haviland, M.G. & Shaw, D.G. (1991). Dimensions of alexithymia and their relationships to anxiety and depression. Journal of Personality Assessment, 56, 227-237.

- Honkalampi, K., Saarinen, P. Hintikka, J., Virtanen, V. & Viinamaki, H. (1999). Factors associated with alexithymia in patients suffering from depression. Psychotherapy and Psychosomatics, 68, 270-275.

- Jacob, S. & Hautekeete, M. (1999). Alexithymia associated with a low self-estimated affective intensity. Personality and Individual Differences, 27, 125-133.

- Joukamaa, M., Sohlman, B. & Lehtinen, V. (1995). Alexithymia in primary health care patients. Journal of Psychosomatic Research, 39, 833-842.

- Kauhanen, J., Kaplan, G.A., Jalkunen, J.S., Wilson, T.W. & Salonen, J.T. (1993). Social factors in alexithymia. Comprehensive Psychiatry, 34, 330-335.

- Kench, S. & Irwin, H.J. (2000). Alexithymia and childhood family environment. Journal of Clinical Psychology, 56, 737-745.

- King, J.L. & Mallinckrodt, B. (2000). Family environment and alexithymia in clients and non-clients. Psychotherapy Research, 10, 78-86.

- Kirmayer, L.J. & Robbins, J.M. (1993). Cognitive and social correlates of the Toronto Alexithymia Scale. Psychosomatics, 34, 41-52.

- Kleiger, J.H. & Kinsman, R.A. (1980). The development of an MMPI alexithymia scale. Psychotherapy and Psychosomatics, 34, 17-24.

- Krystal, H. (1979). Alexithymia and psychotherapy. American Journal of Psychotherapy, 33, 17-31.

- Krystal, H. (1982). Alexithymia and the effectiveness of psychoanalytic treatment. International Journal of Psychoanalysis and Psychotherapy, 9, 353-388.

- Krystal, J.H., Giller, E.L. & Cicchetti, D.V. (1986). Assessment of alexithymia in posttraumatic stress disorder and somatic illness: introduction of a reliable measure. Psychosomatic Medicine, 48, 84-94.

- Lane, R.D. & Schwartz, G.E. (1987). Levels of emotional awareness: a cognitive-developmental theory and its application to psychopathology. American Journal of Psychiatry, 144, 133-143.

- Lane, R.D., Sechrest, L. & Riedel, R. (1998). Sociodemographic correlates of alexithymia. Comprehensive Psychiatry, 39, 377-385.

- Lane, R.D., Sechrest, L., Riedel, R., Shapiro, D.E. & Kaszniak, A.W. (2000). Pervasive emotion recognition deficit common to alexithymia and the repressive coping style. Psychosomatic Medicine, 62, 492-501.

- Lane, R.D., Sechrest, L., Riedel, R., Weldon, V. Kaszniak, A. & Schwartz, G.E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. Psychosomatic Medicine, 58, 203-210.

- Lesser, I.M. & Lesser, B.Z. (1983). Alexithymia: examining the development of a psychological concept. American Journal of Psychiatry, 140, 1305-1308.

- Lumley, M.A. (2000). Alexithymia and negative emotional conditions. Journal of Psychosomatic Research, 49, 51-54.

- Lumley, M.A. and Norman, S. (1996). Alexithymia and health care utilization. Psychosomatic Medicine, 58, 197-202.

- Lumley, M.A. and Sielky, K. (2000). Alexithymia, gender and hemispheric functioning. Comprehensive Psychiatry, 41, 352-359.

- Mann, L.S., Wise, T.N., Trinidad, A. & Kohanski, R. (1994). Alexithymia, affect recognition, and the five-factor model of personality in normal subjects. Psychological Reports, 74, 563-567.

- Martinez-Sanchez, F., Alto-Garcia, M., Adam, E.C., Medina, T.B.H. & Espana, J.J.S. (1998). Stability in alexithymia levels: a longitudinal analysis on various emotional answers. Personality and Individual Differences, 24, 767-772.

- Mathews, A. (1990). Why worry? The cognitive function of anxiety. Behaviour Research and Therapy, 28, 455-468.

- Mathews, A. (1997). Information-processing biases in emotional disorders. In D.M. Clark & C.G. Fairburn [Eds.]. Science and Practice of Cognitive Behaviour Therapy, (pp. 47-66). Oxford: Oxford University Press.

- Mathews A. & MacLeod, C. (1994). Cognitive approaches to emotion and emotional disorders. Annual Review of Psychology, 45, 25-50.

- Mathews, A., Ridgeway, V. & Williamson, D.A. (1996). Evidence for attention to threatening stimuli in depression. Behaviour Research and Therapy, 34, 695-705.

- Matt, G.E., Vacquez, C. & Campbell, W.K. (1992). Mood-congruent recall of affectively toned stimuli: a meta-analytic review. Clinical Psychology Review, 12, 227-255.

- Mayer, J.D., DiPaolo, M. & Salovey, P. (1990). Perceiving affective content in visual stimuli: a component of emotional intelligence. Journal of Personality Assessment, 54, 772-781.

- McConatha, J.T., Leone, F.M. & Armstrong, J.M. (1997). Emotional control in adulthood. Psychological Reports, 80, 499-507.

- McConatha, J.T., Lightner, E. & Deaner, S.L. (1994). Culture, age, and gender variables in the expression of emotions. Journal of Social Behavior and Personality, 9, 481-488.

- McDonald, P.W. & Prkachin, K.M. (1990). The expression and perception of facial emotion in alexithymia: a pilot study. Psychosomatic Medicine, 52, 199-210.

- Mogg, K. & Bradley, P. (1998). A cognitive-motivational analysis of anxiety. Behaviour Research and Therapy, 36, 809-848.

- Mogg, K., Bradley, B.P., deBono, J. & Painter, M. (1997). Time course of attentional bias for threat information in non-clinical anxiety. Behaviour Research and Therapy, 35, 297-303.

- Mogg, K., Bradley, B.P. & Williams, R. (1995). Attentional bias in anxiety and depression: the role of awareness. British Journal of Clinical Psychology, 34, 17-36.

- Mogg, K., Mathews, A. & Weinman, J. (1987). Memory bias in clinical anxiety. Journal of Abnormal Psychology, 96, 94-98.

- Paez, D., Velasco, C. & Gonzalez, J.L. (1999). Expressive writing and the role of alexithymia as a dispositional deficit in self-disclosure and psychological health. Journal of Personality and Social Psychology, 77, 630-641.

- Pandey, R. & Mandal, M.K. (1997). Processing of facial expressions of emotion and alexithymia. British Journal of Clinical Psychology, 36, 631-633.

- Parker, J.D.A., Bagby, R.M., Taylor, G.J., Endler, N.S. & Schmitz, P. (1993). Factorial validity of the 20-item Toronto Alexithymia Scale. European Journal of Personality, 7, 221-232.

- Parker, J.D.A., Keightley, M.L., Smith, C.T. & Taylor, G.J. (1999). Interhemispheric transfer deficit in alexithymia: an experimental study. Psychosomatic Medicine, 61, 464-468.

- Parker, J.D.A., Taylor, G.J. & Bagby, R.M. (1989). The alexithymia construct: relationship with sociodemographic variables and intelligence. Comprehensive Psychiatry, 30, 434-441.

- Parker, J.D.A., Taylor, G.J. & Bagby, R.M. (1993a). Alexithymia and the recognition of facial expressions of emotion. Psychotherapy and Psychosomatics, 59, 197-202.

- Parker, J., Taylor, G. & Bagby, M. (1993b). Alexithymia and the processing of emotional stimuli: an experimental study. New Trends in Experimental Psychiatry, 9, 9-14.

- Parker, J.D.A., Taylor, G.J., Bagby, R.M. & Acklin, M.W. (1993). Alexithymia in panic disorder and simple phobia: a comparative study. American Journal of Psychiatry, 150, 1105-1107.

- Parker, J.D.A., Taylor, G.J., Bagby, R.M. & Thomas, S. (1991). Problems with measuring alexithymia. Psychosomatics, 32, 196-202.

- Pierce, M.J., Faryana, A., Davidson, A., Markart, R. & Krystal, J.H. (1989). A comparison of interview and self-report alexithymia measures. Psychosomatic Medicine, 51, 254.

- Porcelli, P., Leoci, C., Guerra, V., Taylor, G.J. & Bagby, R.M. (1996). A longitudinal study of alexithymia and psychological distress in inflammatory bowel disease. Journal of Psychosomatic Research, 41, 569-573.

- Rachman, S. (1980). Emotional processing. Behaviour Research and Therapy, 18, 51-60.

- Rief, W., Heuser, J. & Fichter, M.M. (1996). What does the Toronto Alexithymia Scale TAS-R measure? Journal of Clinical Psychology, 52, 423-429.

- Roedema, T.M. & Simons, R.F. (1999). Emotion-processing deficits in alexithymia. Psychophysiology, 36, 379-386.

- Saarijarvi, S., Salminen, J.K., Tamminen, T. & Aarela, E. (1993). Alexithymia in psychiatric consultation-liaison patients. General Hospital Psychiatry, 15, 330-333.

- Salminen, J.K., Saarijaervi, S. & Aarela, E. (1995). Two decades of alexithymia. Journal of Psychosomatic Research, 39, 803-807.

- Salminen, J.K., Saarijarvi, S., Aarela, E. & Tamminen, T. (1994). Alexithymia – state or trait? One year follow-up study of general hospital psychiatric consultation out-patients. Journal of Psychosomatic Research, 38, 681-685.

- Salminen, J.K., Saarijarvi, S., Aarela, E., Toika, T. & Kauhanen, J. (1999). Prevalence of alexithymia and its association with sociodemographic variables in the general population of Finland. Journal of Psychosomatic Research, 46, 75-82.

- Sifneos, P.E. (1973). The prevalence of 'alexithymic' characteristics in psychosomatic patients. Psychotherapy and Psychosomatics, 24, 151-155.

- Sifneos, P.E. (1975). Problems of psychotherapy of patients with alexithymic characteristics and physical disease. Psychotherapy and Psychosomatics, 26, 65-70.

- Sifneos, P.E. (1994). Affect deficit in alexithymia. New Trends in Experimental and Clinical Psychiatry, 10, 193-195.

- Smith, R.N. & Frawley, W.J. (1999). Alex: a computer aid for treating alexithymia. Multiple Approaches to Intelligent Systems, Proceedings, 1611, 362-371.

- Suslow, T. (1998). Alexithymia and automatic affective processing. European Journal of Personality, 12, 433-443.

- Swiller, H.I. (1988). Alexithymia: treatment utilizing combined individual and group psychotherapy. International Journal of Group Psychotherapy, 38, 47-61.

- Taylor, G.J. (1994). The alexithymia construct: conceptualization, validation and relationship with basic dimensions of personality. New Trends in Experimental Psychiatry, 10, 61-74.

- Taylor, G.J., Bagby, R.M. & Parker, J.D.A. (1997). Disorders of Affect Regulation: Alexithymia in Medical and Psychiatric Illnesses. New York: Cambridge University Press.

- Taylor, J.G., Bagby, J.D.A., Ryan, D.P. & Parker, J.D.A. (1990). Validation of the alexithymia construct: a measurement based approach. Canadian Journal of Psychiatry, 35, 290-297.

- Taylor, G.J., Parker, J.D.A, Bagby, R.M. & Acklin, M.W. (1992). Alexithymia and somatic complaints in psychiatric outpatients. Journal of Psychosomatic Research, 36, 417-424.

- Taylor, G.J., Ryan, D. & Bagby, R.M. (1985). Toward the development of a new self-report alexithymia scale. Psychotherapy and Psychosomatics, 44, 191-199.

- Todarello, O., Taylor, G.J., Parker, J.D.A. & Fanelli, M. (1995). Alexithymia in essential hypertensive and psychiatric outpatients. A comparative study. Journal of Psychosomatic Research, 39, 987-994.

- Troisi, A., Belsanti, S., Bucci, A.R., Mosco, C., Sinti, F. & Verucci, M. (2000). Affect regulation in alexithymia: an ethological study of displacement behaviour during psychiatric interviews. Journal of Nervous and Mental Disease, 188, 13-18.

- Troisi, A., DelleChiaie, R., Russo, F., Russo, M.A., Mosco, C. & Pasini, A. (1996). Nonverbal behaviour and alexithymic traits in normal subjects: individual differences in encoding emotions. Journal of Nervous and Mental Disease, 184, 561-566.

- Warnes, H. (1986). Alexithymia, clinical and therapeutic aspects. Psychotherapy and Psychosomatics, 46, 96-104.

- Watkins, P.C., Mathews, A., Williams, D.A. & Fuller, R.D. (1992). Mood congruent memory in depression: emotional priming or elaboration? Journal of Abnormal Psychology, 101, 581-586.

- Weinryb, R.M. (1995). Alexithymia: old wine in new bottles? Psychoanalysis and Contemporary Thought, 18, 159-195.

- Wells, A. & Matthews, G. (1994). Attention and Emotion: A Clinical Perspective. Hove: Psychology Press.

- Williams, J.M.G., Stiles, W.B. & Shapiro, D.A. (1999). Cognitive mechanisms in the avoidance of painful and dangerous thoughts: elaborating the assimilation model. Cognitive Therapy and Research, 23, 285-306.

- Williams, J.M.G., Watts, F.N., MacLeod, C. & Mathews, A. (1997). Cognitive Psychology and Emotional Disorders, 2nd Edition. Chichester: Wiley.

- Wise, T.N. & Mann, L.S. (1994). The relationship between somatosensory amplification, alexithymia and neuroticism. Journal of Psychosomatic Research, 38, 515-521.

- Wise, T.N., Mann, L.S. & Hill, B. (1990). Alexithymia and depressed mood in the psychiatric patient. Psychotherapy and Psychosomatics, 54, 26-31.

- Wise, T.N., Mann, L.S. & Randell, P. (1995). The stability of alexithymia in depressed patients. Psychopathology, 28, 173-176.

- Wise, T.N., Mann, L.S. & Shay, L. (1992). Alexithymia and the five-factor model of personality. Comprehensive Psychiatry, 33, 147-151.

- Yelsma, P. (1996). Affective orientations of perpetrators, victims and functional spouses. Journal of Interpersonal Violence, 11, 141-161.

Full title: Attentional Bias and Processing of Emotional Information in Alexithymia

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ABSTRACT

The current study adopted an information processing approach to understanding cognitive aspects of emotional deficits in alexithymia. More specifically this study investigated the associations between alexithymia and attentional biases towards emotional stimuli. A sample of 176 undergraduate students was divided into high and low alexithymia groups using a median split on the Toronto Alexithymia Scale – 20 (TAS-20). Attentional biases were investigated using a dot probe task. Positive and negative emotional words were paired with neutral control words and presented under two exposure conditions: short (100msec with a visual mask) and long (1500msec without visual mask). No differences in attentional bias were found between the high and low alexithymia groups in the short exposure condition. The two groups differed in the long exposure condition: the high alexithymia group showed significantly more attentional bias than the low alexithymia group. This difference was attributable to greater sustained attention towards emotional, including negatively valenced, words in the high alexithymia group. These group differences remained after partialling out the effects of current anxiety and depression. It was suggested that higher alexithymia may be associated with difficulties disengaging attention from emotional stimuli. With regard to negative emotional information, these findings were compatible with research literature indicating persistent negative emotional states associated with alexithymia. Methodological considerations were discussed as well as directions for future research and clinical implications.

INTRODUCTION

Alexithymia was a term initially coined by Sifneos (1972), meaning "having no words for emotions" and was used to denote individuals who have difficulties experiencing and expressing emotional states. Taylor, Bagby & Parker (1997) described people with alexithymic features as having the following attributes: (i) difficulty identifying feelings (ii) difficulty communicating feelings to others; (iii) constricted internal and subjective experiences; and (iv) an externally oriented cognitive style. An individual with predominant alexithymic features is therefore likely to have limited access to and understanding of their own or others' subjective and emotional experiences. In addition, their thinking and communication is likely to be concrete and bound to external rather than internal events. The authors devised a widely used and psychometrically validated self-report scale to measure alexithymia, the Toronto Alexithymia Scale–20 (TAS-20; Bagby, Parker & Taylor, 1994; Bagby, Taylor & Parker, 1994).

Over the last three decades studies have investigated the presence of alexithymic features in clinical populations. High prevalence rates of around 30-40% have been found among general psychiatric outpatients groups (Saarijarvi, Salminen, Tamminen & Aarela, 1993; Todarello, Taylor, Parker & Fanelli, 1995) compared to rates of around 13-18% in non-clinical adult and student populations (Parker, Taylor & Bagby, 1989; Salminen, Saarijarvi, Aarela, Toika & Kauhanen, 1999).

Alexithymia has been associated with a vulnerability to experience diffuse negative emotional states and with susceptibility to poorly regulated levels of distress (Taylor et al., 1997; Taylor, Parker, Bagby & Acklin, 1992; Wise & Mann, 1994). More specifically, alexithymia correlated positively with measures of anxiety and depression in both clinical and non-clinical populations (Hendryx, Haviland & Shaw, 1991; Parker, Taylor, Bagby & Acklin, 1993; Wise, Mann & Hill, 1990). A number of authors have argued that, although correlated, alexithymia is a separate construct from either anxiety or depression. Longitudinal studies have indicated that levels of alexithymia remain stable, relative to fluctuations in levels of anxiety and depression (Haviland, Shaw, Cummings & MacMurray, 1988; Martinez-Sanchez, Alto-Garcia, Adam, Medina & Espana, 1998; Wise, Mann & Randell, 1995).

Alexithymia is therefore a clinically relevant concept that has been well defined and validated over three decades of research (see Taylor et al., 1997). Notwithstanding this, a number of authors have pointed out that an understanding of the precise psychological processes maintaining emotional deficits in alexithymia remains largely unclear and speculative (Lesser & Lesser, 1983; Salminen, Saarijaervi & Aarela, 1995; Weinryb, 1995). One way of introducing greater clarity to this area is to adopt an information processing approach to understand how emotional information may be cognitively processed differently in those with alexithymic features. A main advantage of this approach is its provision of a clear conceptual and theoretical framework for generating specific hypotheses. This approach also provides tried and tested experimental methods

and procedures for testing these hypotheses systematically and empirically (Mathews, 1997; Williams, Watts, MacLeod & Mathews, 1997).

A fundamental assumption underlying the information processing approach is that emotions are the product of the operation of cognitive processes. The type of emotionally relevant information and the way it is processed from initial encoding to later stages of cognitive elaboration can thus help understand the maintenance of normal and abnormal emotional processes (Williams et al., 1997). A considerable amount of literature has accumulated investigating the role of *biases* in determining which emotionally relevant information is given priority for cognitive processing. Mathews (1997) has defined *bias* as "any systematic preference in the priorities used in making ... decisions ... influencing the selection or rejection of information having emotional meaning" (p.49). It has been suggested that adverse emotional states are maintained through biased and selective processing of negatively valenced information, resulting in a cognitive over-representation of negative information and thus perpetuating states of emotional distress.

Attention has been of particular interest in information processing approaches in terms of its key role in biased selection of emotionally salient information (Wells & Matthews, 1994). Both anxiety and depression have been associated with biases in selective attention towards negatively valenced information (Mathews, Ridgeway & Williamson, 1996; Mogg, Bradley & Williams, 1995).

With regard to alexithymia, a number of empirical studies have suggested that alexithymia is associated with difficulties processing emotions (Lane, Sechrest, Reidel, Brown, Kaszniak, and Schwartz, 1995; Lane, Sechrest, Reidel, Weldon, Kaszniak, and Schwartz, 1996; Roedema & Simons, 1999). Limited research has been carried out, however, to specifically investigate cognitive factors (e.g. perception, attention or memory) underlying these emotional deficits. Two experimental studies investigating information processing biases are of particular relevance (Parker, Taylor and Bagby, 1993; Suslow, 1998). The first study, by Parker, Taylor and Bagby (1993), used a group of 70 undergraduate students. They adopted a modified version of the Stroop task, where participants were asked to name the colour in which visually presented words were printed, while ignoring the word itself. The alexithymic group was more distracted by emotionally negatively valenced words (e.g., "rape", "victim") and therefore took longer to name the colour of these than the non-alexithymic group. The two groups did not differ, however, in their performance with neutral words (e.g., "moderate", "typical"). It has been commonly suggested that longer reaction times on the Stroop task indicate an attentional bias towards the content of the word interfering with the colour-naming task. The specific location of this interference, in terms of early or later stages of attentional allocation, however, remains unclear (MacLeod, 1991).

Evidence of biases at early stages of processing in alexithymia was more recently found by Suslow (1998), using a word-priming task amongst a group of 32 undergraduate students and hospital staff members. They found that self-reported "difficulties describing emotions", as assessed by the TAS-20, were associated with a significant

priming effect for negatively valenced words. That is, rapidly presented (200 msec) negatively valenced prime words (e.g., "jail", "greedy", "bad") facilitated the detection of emotionally congruent negative target words presented subsequently. Interestingly, "externally oriented thinking" was associated with a bias towards positive words (e.g., "clever", "sincere").

The above studies, therefore, provide preliminary evidence that alexithymia may be associated with an information processing bias towards emotionally valenced information. Suslow's (1998) study indicates early automatic biases and Parker, Taylor and Bagby's (1993) findings suggest attentional biases towards negatively valanced stimuli. A question that remains unanswered is whether processing biases are present during both early and later stages of attentional allocation. Authors have distinguished between an initial automatic shifting towards a stimulus and subsequent maintenance or disengagement of attention (LaBerge, 1995; Posner & Peterson, 1990). It is possible that individuals with increased alexithymic features show different patterns of attentional bias at early and later stages. Specifically, they may show a bias favouring early automatic processing of negative information. Such a bias would lead to an activation of negative emotional states, which could account for a predisposition to experience emotional distress. At later stages of processing, however, higher alexithymia may be associated with an attentional bias away from processing of emotional information. Disengagement of attention at this stage would thus prevent further emotional processing (Amir, Foa and Coles, 1998; Williams, Stiles and Shapiro, 1999). The above studies, however, do not clarify the time course of processing biases in alexithymia.

The above studies also shared an important methodological limitation: neither study controlled for potential confounding effects of concurrent anxiety and depression on attentional biases. If one is to argue that alexithymia has an independent influence on attentional biases, one would need to demonstrate that these occur separately from current anxiety and depression. Not having controlled for this important confounding factor in the above studies leaves this question unanswered. Finally, the above studies investigated biases towards emotionally valenced words (e.g., "cancer", "death" or "sincere"). Given that alexithymia is hypothesized to represent difficulties processing information relevant to emotional experiences, it would seem more useful to investigate attentional biases towards stimuli describing specific emotional states (e.g., words such as "sad", "angry" or "happy").

The present study, therefore, aims to add to the research literature on information processing in alexithymia. In particular this study will investigate attentional biases for emotionally valenced information in alexithymia. In addition to previous research the present study will investigate the time course of attentional biases at early and later stages. This study will also investigate whether potential biases occur independently of concurrent levels of anxiety and depression. Finally, this study will investigate attentional biases in relation specifically to information concerning both positive and negative emotional states.

To investigate these issues a dot-probe task (Mogg et al., 1995) will be adopted. This widely used task assesses visual attentional allocation. In this task a series of word pairs (e.g. a negative and a neutral word) are presented simultaneously and then a small dot appears in the location of one of the words. The task measures an individual's speed in detecting probes that appear either in the place of a previously presented negative stimulus (e.g., the word "sad") or of a neutral stimulus (e.g., the word "cat"). Quicker response latencies to probes that appeared in the position of certain types of previously presented stimuli (e.g., negatively valenced words) indicate that the participant had been preferentially allocating their visual attention to those stimuli. Moreover, manipulating the exposure duration of the word stimulus permits one to investigate the time course of attentional biases. Early stages in attentional allocation can be investigated by exposing the word stimulus for very brief exposure intervals (e.g. less that 200msec) followed by a visual mask. These exposure conditions do not allow the opportunity for detailed, elaborate processing of the word stimuli and so are more likely to reveal effects in early, more automatic, aspects of attentional process. By contrast, later stages of attentional allocation are investigated by allowing the participant to view the stimulus for a longer duration, such as a second or more. This is more likely to reveal effects in later aspects such as sustained attention. In this study one short stimulus exposure duration (100msec) condition and one long exposure (1500msec) condition will be used. The 100msec exposure duration was used to measure early automatic shifts in attention, while the 1500msec exposure was used to measure processes linked with maintenance of attention over longer time intervals (Bradley, Mogg, Falla & Hamilton, 1998; Mogg, Bradley, de Bono & Painter, 1997; Mogg et al., 1995).

Aims and hypotheses

To summarize, the aims and hypotheses of the current study are as follows:

Aim 1: To investigate whether alexithymia is associated with early attentional biases *towards* negative emotional information.

Hypothesis 1: Participants with higher alexithymia scores will show relatively faster reaction times (RTs) to probes following stimuli describing negative emotional states on a dot-probe task, when the negative stimuli are presented at a brief exposure duration (100msec).

Aim 2: To investigate whether alexithymia is associated with attentional biases *away* from emotional information at later stages of attentional allocation, which would prevent further processing of emotional information.

Hypothesis 2: Participants with higher alexithymia scores will show relatively slower RTs to probes following stimuli describing positive and negative emotional states on a dot-probe task when the emotional information is presented at long exposure duration (1500msec).

Aim 3: To investigate the relationship between alexithymia and attentional biases for emotional information independently of concurrent anxiety and depression.

Hypothesis 3: Associations between alexithymia and attentional biases for emotional information will remain after the effects of concurrent anxiety and depression are taken into consideration.

METHOD

Design

A mixed experimental design was employed. Independent variables were: (1) high and low self-reported alexithymia (between subjects); (2) positive and negative valence of visually presented emotional word stimuli (within subjects); and (3) short and long exposure of emotional stimuli (within subjects). The dependent variable was attentional bias scores (measured in milliseconds) which were calculated from RTs to probes and which are described below in detail.

Participants

A group of 200 undergraduate participants (94 males and 106 females) were recruited at random by the main author from the university campus. Participants varied in age from 18 to 45, with a mean of 20.0 years. Students were selected from a broad range of degree subjects, all were native English speakers, none reported being dyslexic and all either had normal or corrected to normal vision. None of the participants had a self-reported psychiatric history. All participants were paid £3 for their involvement in the study.

Data from 23 participants were lost due to computer failure and one was excluded due to a high error rate (see below for details). Thus there were 176 in the final sample (81 male and 95 female) with a mean age of 19.7 years.

Measures

Alexithymia. This was measured using the Toronto Alexithymia Scale – 20 (TAS-20; Bagby, Parker & Taylor 1994; Bagby, Taylor & Parker, 1994). Items of the TAS-20 (Appendix 1) break down into three main areas: 1) difficulty in identifying feelings (e.g., "I am often confused about what emotion I am feeling"); 2) difficulty describing feelings to others (e.g., "It is difficult for me to reveal my innermost feelings, even to close friends") and 3) external-concrete thinking (e.g., "I prefer talking to people about their daily activities rather than their feelings"). This measure has good internal consistency, test-retest reliability and construct, convergent, discriminant and criterion validity (Bagby, Parker & Taylor, 1994; Bagby, Taylor & Parker, 1994; Taylor, 1994). Responses to all 20 items are scored on a 5-point Likert Scale (from "Strongly agree" to "Strongly disagree"). A sub-scale for each of the 3 factors is derivable from the TAS-20, as well as a global score (ranging from 0 to 100, obtained by summing responses to all items, five of which are reverse scored). The global score was used in this study to separate high and low alexithymia groups. Higher scores indicate increased levels of alexithymia. A cut-off score of 61 can also be used to indicate whether an individual has predominant alexithymic features.

Anxiety was measured using the Beck Anxiety Inventory (BAI; Beck & Steer, 1993; Appendix 2); this is an extensively used, psychometrically reliable and well validated self-report measure of state anxiety (Beck & Steer, 1993). Respondents are asked to rate 21 symptoms of anxiety over the previous seven days on a 4-point Likert-scale. Higher scores indicate greater anxiety (ranging from 0 to 63).

Depression was measured using the Beck Depression Inventory-II (BDI-II; Beck, Steer & Brown, 1996; Appendix 3); this is an extensively used, psychometrically reliable and well validated self-report measure of depression (Beck et al., 1996). Respondents are asked to rate 21 symptoms of depression over the previous two weeks on a 4-point scale. Higher scores indicate greater depression (ranging from 0 to 63, scores).

Screening questionnaire. A screening questionnaire devised for the study (Appendix 4) was used to ascertain participants' age, gender, degree subject and socioeconomic status (measured in terms of the profession of both parents; Office of Population Censuses and Surveys, 1991). This measure also investigated self-reported psychiatric history, native language, whether the participant had dyslexia and whether the participant had normal vision (or were currently wearing glasses).

Stimuli and apparatus

Forty words describing positive and negative emotional states (20 words in each category; Appendix 5) were selected from a pool of over 437 words. Three clinical

psychologists were asked to independently rate the initial list of 437 words in terms of: 1) how much each word described a specific emotional state; 2) whether the emotional state described was negative or positive; and 3) the intensity of the emotional state described. All ratings were carried out on a 5-point Likert scale (from 1 to 5). Only words rated by all three judges as describing a specific emotional state (rated 4 or 5) were chosen, as were words with highest concordance of ratings in terms of their valence and intensity. Positive and negative emotional words were matched in terms of frequency (using Johansson & Hofland, 1989, norms) and word length. Each positive and negative emotional word was then paired with an emotionally neutral word, matched for frequency, length and, where possible, number of syllables.

Words were presented to participants on the dot probe task using a desktop computer (Viglen Contender; 455MHz, Pentium II) and a 15`` colour monitor. The monitor screen refresh rate was 160Hz, with a stimulus presentation accuracy of $\pm$0.5msec. Word stimuli were displayed in white against a black screen.

Dot-probe task

Attentional bias was investigated using a computer-presented dot probe task. In this task an initial fixating point ("X") appeared in the centre of the screen for 500msec preceding the presentation of word pairs. The pair of emotional and neutral words then followed; both appeared in upper-case, one word in the upper part of the screen and the other in the lower section of the screen (both words were equidistant from the initial fixation point:

3.8cm). In the short duration exposure condition words were presented for 100ms, followed immediately after by a visual mask (made of asterisks) for 28ms. A dot probe appeared immediately after, in the position of one of the two words: the participant indicated as quickly as possible whether the probe appeared in the upper or lower section of the screen by pressing one of two buttons on a response box. The probe remained on the screen until the participant's response; the next trial followed 1 second after. The long exposure condition was equal to the short exposure condition: word pairs in the latter, however, were presented for 1500ms and were not followed by a mask, to allow ample exposure to the stimulus. Participants' response times (in msec) were automatically recorded by the computer from the onset of the probe until the participant responded. The computer also recorded the accuracy of the response.

The same 40 emotional and paired 40 neutral words were used for both short and long duration exposure conditions. To counter the influence of practice and word repetition effects, all words (both short and long duration) were presented in randomized order (in no cases, however, were the same words repeated in immediate succession to each other). Twenty pairs of matched neutral words were used as filler items. To avoid possible confounding position biases, emotional words were presented with equal probability in the upper and lower position of the screen. To avoid the possibility of associating emotional words with the following presence of a dot, half of the emotional words were followed by a dot while the other half were not. Each participant was presented with a total of 120 trials (plus 20 practice trials) in newly randomized order.

Procedure

Participants were told they would be involved in a study looking at reaction times: references to the words "emotion" were avoided to prevent this priming their detection of emotional words in the task. Following this they were asked to complete the screening questionnaire to ascertain their suitability for the study. Those agreeing to take part in the study were given an information sheet (Appendix 6) and asked to sign a consent form (Appendix 7). Participants were then taken individually to a sound-proofed room with no window, to avoid outside distraction. They were asked to adjust the height of their chair so as to be at eye level with the centre of the computer monitor. Written instructions (see Appendix 8) for the task then appeared on the screen.

Once the participant had read and understood the instructions s/he was started on 20 practice trials (using neutral word pairs) with the experimenter present, to ensure the participant had understood the procedure and could ask questions. Following the practice trials, the experimenter commenced the participant on the experimental trials and left the room. The task took approximately 4-5 minutes to complete. The experimenter then returned and presented the participant with the TAS-20, the BAI and the BDI-II and left them alone to complete these. The order of presentation of these questionnaires was randomized for each participant and took an average of 10 minutes to complete. On completing the questionnaires all participants were fully debriefed and were paid for their participation.

RESULTS

Data analysis

The Kolmogorov-Smirnov test was used to ascertain whether the main variables were normally distributed; the average attentional bias scores (described below) and the TAS-20 were normally distributed. The distribution of the Beck Anxiety and Depression Inventory-II scores, however, was skewed. A logarithmic transformation, to base 10, was thus used to make variation constant; this resulted in BAI showing a uniform distribution and the BDI-II approaching a uniform distribution. Parametric tests were thus carried out on above variables and on the log-transformed BAI and BDI-II scores. For all analyses and planned comparisons a two-tailed alpha significance level of $P<0.05$ was adopted.

Group characteristics

The final sample of 176 participants was divided at the median into two groups, using the TAS-20 global score; those scoring lower than 48 were allocated to the low alexithymia group, while those with a score higher than 48 were allocated to the high alexithymia group. Table 1 shows mean scores and standard deviation for both groups in terms of TAS-20 global scores, anxiety, depression age and years of education.

Insert Table 1 about here

As expected in a student population, the average TAS-20 scores in both groups were below the 61 cut-off. The high alexithymia group, however, had significantly higher TAS-20 scores than the low group. The former group also reported significantly higher levels of anxiety and depression. There were no significant differences between the high and low alexithymia groups in terms of age and years of education. A chi-square test also revealed no significant gender differences between the high (47 male, 42 female) and low (34 male, 53 female) alexithymia groups (χ^2= 3.35; df=1; P>0.05). Moreover the two groups did not differ in socioeconomic status in terms of father's profession (χ^2= 6.71; df=4; P>0.05) or mother's profession (χ^2= 2.96; df=4; P>0.05).

Dot-probe task

Trials with inaccurate responses were not included in the analysis. One participant was excluded due having an error rate of 24% (average error rate of remaining participants was 3%). Response latencies shorter than 100ms and longer than 1000ms were excluded as outliers. From the final sample (n=176) 3.4% of data was lost due to errors, while 0.1% was lost as outliers. The overall mean reaction time was 350msec (SD=37.46msec). Table 2 shows mean reaction times for each condition.

Insert Table 2 about here

To simplify the analyses a bias score was calculated from the reaction times for each word type (positive vs negative) and exposure duration (short vs long). The bias score was obtained by subtracting mean reaction times when the word and probe were in the same position from reaction times where word and probe had been in different positions (as used by Bradley et al., 1998). The bias scores thus sumarized the interaction between the effects of word position and probe position on the RTs to probes. Positive values of the bias score for emotional words reflected faster reaction times when the probe appeared in the same position as the emotional word relative to when the word and probe appeared in different positions (i.e., attention towards emotional words). Conversely, negative bias scores indicated that reaction times were faster when the probe was in a different position from the emotional word than when they were in the same position (i.e., attention away from emotional words). Table 3 shows the mean attentional bias scores across the exposure duration and emotional valence conditions for the high and low alexithymia groups

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Insert Table 3 about here

A three-way mixed ANOVA (2x2x2) of bias scores was then carried out with one between-subjects variable of alexithymia (high vs low) and two within-subject variables: exposure duration (100msec vs 1500ms) and emotional valence of word (negative vs

positive). A significant interaction of alexithymia x exposure was found [$F(1,174)=4.88$; $P<0.05$], that did not interact significantly with emotional valence [$F(1,174)=1.39$; $P>0.05$]. No other main effects or interactions were found.

To clarify the alexithymia x exposure interaction separate analyses were carried out for each exposure condition. A 2x2 ANOVA of bias scores in the short exposure condition (with alexithymia and word valence as independent variables) showed no significant results [$F(1,174)<1.1$; $P>0.05$]. Thus, there was no support for Hypothesis 1, which predicted significant vigilance for negative words in the high alexithymia group in the short exposure condition. Moreover, a specific hypothesis-driven comparison of the two groups on their bias scores, for short-exposure negative words only also, showed no significant result ($t=0.99$; $df=174$; $P>0.05$).

On the other hand, a 2x2 ANOVA for bias scores in the long exposure condition (with alexithymia and word valence as independent variables,) showed a significant main effect of group [$F(1,174)=5.44$; $P<0.05$], with the high alexithymia group showing greater vigilance for long-exposure emotional words (mean bias scores averaged for positive and negative words was 5.25msec) compared with the low alexithymia group (mean bias scores for long-exposure emotional words was –2.30msec). This effect of alexithymia on the long-exposure bias scores did not interact with word valence [$F(1,174)=1.32$; $P>0.05$]. There were no other significant results. These results for the long-exposure condition are opposite to expectation (Hypothesis 2) that the high alexithymia group would be *less* vigilant to emotional words. Additional exploratory analysis for each word

type indicated that the high alexithymia group showed significantly more attentional orientation towards long-exposure negative emotional words than the low alexithymia group (mean bias scores were 5.0msec and –6.4msec respectively; $t=2.35$; $df=174$; $P<0.05$). The negative attentional bias score also suggests a possible trend towards attentional disengagement at long duration exposure in the low alexithymia group. The high alexithymia group also showed a tendency to be more vigilant for long-exposure positive words than the low alexithymia group, although this group difference did not reach significance (mean bias scores were 5.5msec vs 1.8msec respectively; $t=0.81$; $df=174$; $P>0.05$).

An additional aim of the current study (Hypothesis 3) was also to verify whether associations between alexithymia and attentional biases occurred independently of concurrent anxiety and depression. Thus analyses of covariance (ANCOVAs) were used to compare the groups on their mean bias sores for long-exposure emotional words while controlling for the effects of anxiety and depression. The high alexithymia group remained more vigilant for long-exposure emotional words than the low alexithymia group after controlling the effects of log-transformed BAI scores [$F(1,173)=4.45$; $P>0.05$] and log-transformed BDI scores [$F(1,173)=3.89$; $P=0.05$]. They were also more vigilant for specifically long-exposure negative words compared with the low alexithymia group after controlling for anxiety [$F(1,173)=4.87$; $P<0.05$] and depression [$F(1,173)=4.46$; $P<0.05$].

DISCUSSION

The present study aimed to investigate differences in attentional biases between high and low alexithymia individuals. It was predicted that the high alexithymia group would show greater attentional bias towards negative emotional information in the short exposure duration conditions, but show an attentional bias away from emotional information in the long exposure conditions. Significant differences between the two groups were found in the long but not in the short exposure condition. Moreover, differences found in the long exposure condition seemed attributable to greater attentional orientation *towards* emotional information in the high compared with the low alexithymia group, which was opposite to expectation. In terms of information processing models of alexithymia these findings suggest that emotional deficits are not associated with an interruption in the processing of emotional information due to attentional disengagement. On the contrary, the high alexithymia group in this study showed greater sustained attention towards emotional information generally.

The lack of significant group differences in the short duration exposure condition is inconsistent with findings of Suslow (1998), who found significant associations between difficulties describing emotions and processing biases in short stimulus exposure conditions. Differences in methodologies between the two studies, however, may account for this discrepancy. The present study made use of a visual attention task, while Suslow's study used a word-priming task. Both tasks, however, sought to reflect early processing biases, and would therefore be expected to yield comparable results.

A potentially important methodological difference with regard to Suslow may be the use in the present study of a shorter exposure duration and the presence of a visual mask. Both these factors limit the time the participant would have to view the stimulus. The absence of associations between attentional biases and alexithymia under these more limited exposure conditions may indicate that group differences in attentional allocation may not be present at the very early attentional stages. Another possibility that cannot be ruled out entirely was that the present conditions were so restricted that they did not allow sufficient processing to reveal attentional effects. Thus, interpretation of the null results from the short exposure condition should be cautious, as they may be due to methodological factors.

The pattern of results, however, suggests that attentional biases in alexithymia may become increasingly evident during later stages of attentional deployment. This would be compatible with the present finding that differences between high and low alexithymia groups began to emerge in the longer exposure duration condition. Within these conditions the high alexithymia group was found to show greater attentional orientation, relative to the low alexithymia group, towards emotional information, including negative words, which was compatible with previous findings (Parker, Taylor and Bagby, 1993). It is of theoretical interest to note that the effect of alexithymia was significant for attentional bias scores for negative words analyzed separately, where there seemed to be a trend for the low alexithymia group to disengage their attention and for the high alexithymia group to maintain attention at long duration exposure. However, the fact that

there was no significant interaction involving word type means that one cannot conclude that high alexithymia is associated specifically with greater sustained vigilance for negative information only, as there was a similar trend for positive words. The results suggest that higher alexithymia is associated with a tendency to maintain attention towards emotional information in general, including negative stimuli.

Sustained attention towards emotional stimuli may reflect greater cognitive efforts during the attentional phase to process incoming affective information. Sustained attention to negatively valenced stimuli in particular might help explain why alexithymia is associated with increased adverse affect (Taylor et al.; 1992, 1997; Wise & Mann, 1994). This finding was confirmed in the present study in terms of higher self-reported anxiety and depression in the high alexithymia group. Moreover, the covariance analyses carried out in the present study further suggested that differences in attentional bias between the high and low alexithymia groups towards negative emotional information remained after the effects of concurrent anxiety and depression had been taken into consideration. This finding suggests that group differences in attentional bias were not attributable solely to concomitant emotional distress, but may instead reflect an information processing pattern specific to alexithymia. This would be consistent with the literature suggesting that alexithymia is not simply a by-product of, concurrent anxiety and depression (Haviland et al., 1988; Martinez-Sanchez et al., 1998; Wise et al., 1995).

Sustained attention to emotional information, particularly negative stimuli, can therefore help explain how adverse emotional states are maintained. As already mentioned,

however, the finding of sustained attention to emotional stimuli in the high alexithymia group was in the opposite direction to that initially predicted. How this pattern may relate to emotional processing deficits found in alexithymia (Lane et al, 1995; 1996; Roedema & Simons, 1999) is uncertain. One possible explanation, mentioned earlier, is that sustained attention reflects greater cognitive effort in processing emotional information. It is thus feasible that sustained attention reflects a failure to adequately process incoming information. Successful processing would, in fact, allow the individual to habituate and subsequently to disengage their attention from information pertaining to their emotional states (Rachman, 1980). The use of the dot-probe task in this study only enabled the investigation of attentional processes, without being able to draw conclusions about any additional cognitive factors that may be involved in the processing of incoming emotional information. Future research will need to ascertain whether alexithymic individuals differ also in additional cognitive aspects in the processing of emotional information.

The externally oriented cognitive style associated with alexithymia may, for example, be associated with difficulties in deeper level processing of emotions (e.g. including rational appraisal and semantic processing) that would facilitate the differentiation, articulation, understanding and modulation of ongoing emotional experiences (Beck and Clark, 1997). Failures in cognitive elaboration of incoming emotional information could thus lead to adverse emotional states remaining poorly processed and therefore inadequately modulated and persistent (Friedlander, Lumley, Farchione and Doyal, 1997; Rachman, 1980; Taylor et al., 1997). One way of exploring this hypothesis from an information

processing perspective would be to investigate free-recall of emotional information. Similar studies have been used in research into depression, where more elaborate and extensive levels of processing of negatively valenced information have been argued to facilitate the active retrieval of such information during free recall (Williams et al., 1997). One might thus predict that higher alexithymia would be associated with poorer recall of emotionally salient information.

In terms of clinical implications, the current findings suggest that higher alexithymia is associated with an information processing pattern in which the individual's attention is more likely to be maintained towards emotional information at least for periods of one and a half seconds. In terms of negative emotional information this processing pattern may maintain negative affective states. The findings also suggest that this sustained attentional orientation seems associated with alexithymia and is not solely as a by-product of concurrent anxiety and depression. Therapeutic endeavors may thus need to focus separately on addressing alexithymia as an additional vulnerability factor for increased emotional distress. Potential deficits in further processing of these emotions may leave the alexithymic individual unable to identify, differentiate and modulate these (Friedlander et al., 1997; Taylor et al., 1997). Interventions may thus need to specifically address this deficit as a primary therapeutic goal.

This conclusion seems compatible with research which has shown that successful therapeutic interventions with alexithymia have focussed specifically on building the individual's ability to label, articulate and understand ongoing emotional experiences

(Beresnevaite, 2000; Fukunishi, Ichikawa, Ichikawa & Matsukawa, 1994; Smith & Frawley, 1999; Swiller, 1988). Ultimately, the development of these skills would facilitate the individual in further stages of therapeutic work in terms of using emotional experiences as a means of developing greater psychological understanding (Greenberg & Pascual-Leone, 1997).

In terms of the limitations of the current study it is important to point out that the sample consisted entirely of a student population. This is likely to have resulted in lower levels of concomitant anxiety and depression than might be expected in a clinical sample. Although the high and low alexithymia groups differed significantly their average anxiety and depression scores remained within the mild range in both groups. Similarly, alexithymia scores in the present sample were lower than one might expect in a clinical population (Bagby, Taylor & Parker, 1992). It is possible that alexithymia interacts in different ways within clinical populations, where TAS-20 scores, anxiety and depression are expected to be higher. A replication of this study would therefore be necessary, using a clinical sample (e.g. a general psychiatric outpatient group), to allow greater confidence in stating that differences in attentional biases between high and low alexithymia groups occur independently of concurrent anxiety and depression.

Another limitation of this study was the use of words as stimuli, which are likely to have a mild emotional impact. It would be important to ascertain whether the above differences in attentional bias between high and low alexithymia groups remain when incoming stimuli are less mild. It is possible, for example, that the patterns of attentional

allocation in the two groups differ when emotional stimuli are more intense and require greater processing resources. Bradley et al. (1998) suggested the use of facial expressions of emotion as a more powerful affectively laden non-verbal stimulus. In this respect, the present study also failed to gauge the participant's own reactions to the stimuli. It would be helpful to measure the individual's reactions to such information. Future studies could investigate this by asking participants to rate the intensity of the stimuli themselves after having been exposed to these. Alternatively the individual's physiological arousal responses during the task could be measured.

Notwithstanding these limitations, the current study provides evidence of differences between high and low alexithymic individuals in terms of more sustained attention towards emotional stimuli (including negative emotional information) in the high alexithymia group.

REFERENCES

- Amir, N., Foa, E.B. & Coles, M.E. (1998). Automatic activation and strategic avoidance of threat-related information in social phobia. Journal of Abnormal Psychology, 107, 285-290.

- Bagby, R.M., Parker, J.D.A. & Taylor, G.J. (1994). The twenty-item Toronto Alexithymia Scale: I. item selection and cross validation of the factor structure. Journal of Psychosomatic Research, 38, 23-32.

- Bagby, R.M., Taylor, G.J. & Parker, J.D.A. (1992). Reliability and Validity of the Twenty-Item Toronto Alexithymia Scale. Presented at the 50th Anniversary Meeting of the American Psychosomatic Society, New York.

- Bagby, R.M., Taylor, G.J. & Parker, J.D.A. (1994). The twenty-item Toronto Alexithymia Scale: II convergent, discriminant, and concurrent validity. Journal of Psychosomatic Research, 38, 33-40.

- Beck, A.T. and Clark, D.A. (1997). An information processing model of anxiety: automatic and strategic processes. Behaviour Research and Therapy, 35, 49-58.

- Beck, A.T. & Steer, R.A. (1993). Beck Anxiety Inventory: Manual. New York: The Psychological Corporation, Harcourt Brace and Company.

- Beck, A.T., Steer, R.A. & Brown, G.K. (1996). Beck Depression Inventory – II: Manual. San Antonio: The Psychological Corporation, Harcourt Brace and Company.

- Beresnevaite, M. (2000). Exploring the benefits of group psychotherapy in reducing alexithymia in coronary heart disease patients: a preliminary study. Psychotherapy and Psychosomatics, 69, 117-122.

- Bradley, B.P., Mogg, K., Falla, S.J. & Hamilton, L.R. (1998). Attentional bias for threatening facial expressions in anxiety: manipulation of stimulus duration. Cognition and Emotion, 12, 737-753.

- Friedlander, L., Lumley, M.A., Farchione, T. & Doyal, G. (1997). Testing the alexithymia hypothesis: physiological and subjective responses during relaxation and stress. The Journal of Nervous and Mental Disease, 185, 233-239.

- Fukunishi, I., Ichikawa, M., Ichikawa, T. & Matsukawa, K. (1994). Effect of family group psychotherapy on alcoholic families. Psychological Reports, 74, 568-570.

- Greenberg, L.S. & Pascual-Leone, J. (1997). Emotion in the creation of personal meaning. In M. Power, & C.R. Brewin [Eds]. The Transformation of Meaning in Psychological Therapies: Integrating Theory and Practice, (pp. 157-173). New York: Wiley.

- Haviland, M.G., Shaw, D.G., Cummings, M.A. & MacMurray, J.P. (1988). Alexithymia: subscales and relationships to depression. Psychotherapy and Psychosomatics, 50, 164-170.

- Hendryx, M.S., Haviland, M.G. & Shaw, D.G. (1991). Dimensions of alexithymia and their relationships to anxiety and depression. Journal of Personality Assessment, 56, 227-237.

- Johansson, S. & Hofland, K. (1989). Frequency Analysis of English Vocabulary and Grammar. Vol I. Oxford: Clarendon Press.

- LaBerge, D. (1995). Attentional Processing. Cambridge, MA: Harvard University Press.

- Lane, R.D., Sechrest, L., Reidel, R., Brown, V., Kaszniak, A. and Schwartz, G. (1995). Alexithymia and nonverbal emotion information processing deficits. Psychosomatic Medicine, 57, 84.

- Lane, R.D., Sechrest, L., Reidel, R., Weldon, V. Kaszniak, A. and Schwartz, G.E. (1996). Impaired verbal and nonverbal emotion recognition in alexithymia. Psychosomatic Medicine, 58, 203-210.

- Lesser, I.M. & Lesser, B.Z. (1983). Alexithymia: examining the development of a psychological concept. American Journal of Psychiatry, 140, 1305-1308.

- MacLeod, C.M. (1991). Half a century of research on the Stroop effect: an integrative review. Psychological Bulletin, 109, 163-203.

- Martinez-Sanchez, F., Alto-Garcia, M., Adam, E.C., Medina, T.B.H. & Espana, J.J.S. (1998). Stability in alexithymia levels: a longitudinal analysis on various emotional answers. Personality and Individual Differences, 24, 767-772.

- Mathews, A. (1997). Information-processing biases in emotional disorders. In D.M. Clark & C.G. Fairburn [Eds.]. Science and Practice of Cognitive Behaviour Therapy, (pp. 47-66). Oxford: Oxford University Press.

- Mathews, A., Ridgeway, V. & Williamson, D.A. (1996). Evidence for attention to threatening stimuli in depression. Behaviour Research and Therapy, 34, 695-705.

- Mogg, K., Bradley, B.P., de Bono, J. & Painter, M. (1997). Time course of attentional bias for threat information in non-clinical anxiety. Behaviour Research and Therapy, 35, 297-303.

- Mogg, K., Bradley, B.P. & Williams, R. (1995). Attentional bias in anxiety and depression: the role of awareness. British Journal of Clinical Psycholgy, 34, 17-36.

- Office of Population Censuses and Surveys (1991). Standard Occupational Classification, Vol 3. Social Classifications and Coding Methodology. London: HMSO.

- Parker, J.D.A., Taylor, G.J. & Bagby, R.M. (1989). The alexithymia construct: relationship with sociodemographic variables and intelligence. Comprehensive Psychiatry, 30, 434-441.

- Parker, J.D.A., Taylor, G.J. & Bagby, R.M. (1993). Alexithymia and the processing of emotional stimuli: an experimental study. New Trends in Experimental and Clinical Psychiatry, 9, 9-14.

- Parker, J.D.A., Taylor, G.J., Bagby, R.M. & Acklin, M.W. (1993). Alexithymia in panic disorder and simple phobia: a comparative study. American Journal of Psychiatry, 150, 1105-1107.

- Posner, M.I. & Petersen, S.E. (1990). The attention system of the human brain. Annual Review of Neuroscience, 13, 25-42.

- Rachman, S. (1980). Emotional processing. Behaviour Research and Therapy, 18, 51-60.

- Roedema, T.M. & Simons, R.F. (1999). Emotion-processing deficits in alexithymia. Psychophysiology, 36, 379-386.

- Saarijarvi, S., Salminen, J.K., Tamminen, T. & Aarela, E. (1993). Alexithymia in psychiatric consultation-liaison patients. General Hospital Psychiatry, 15, 330-333.

- Salminen, J.K., Saarijaervi, S. & Aarela, E. (1995). Two decades of alexithymia. Journal of Psychosomatic Research, 39, 803-807.

- Salminen, J.K., Saarijarvi, S., Aarela, E., Toika, T. & Kauhanen, J. (1999). Prevalence of alexithymia and its association with sociodemographic variables in the general population of Finland. Journal of Psychosomatic Research, 46, 75-82.

- Sifneos, P.E. (1972). Short-term Psychotherapy and Emotional Crisis. Cambridge: Harvard University Press.

- Smith, R.N. & Frawley, W.J. (1999). Alex: a computer aid for treating alexithymia. Multiple Approaches to Intelligent Systems, Proceedings, 1611, 362-371.

- Suslow, T. (1998). Alexithymia and automatic affective processing. European Journal of Personality, 12, 433-443.

- Swiller, H.I. (1988). Alexithymia: treatment utilizing combined individual and group psychotherapy. International Journal of Group Psychotherapy, 38, 47-61.

- Taylor, G.J. (1994). The alexithymia construct: conceptualization, validation and relationship with basic dimensions of personality. New Trends in Experimental Psychiatry, 10, 61-74.

- Taylor, G.J., Bagby, R.M. & Parker, J.D.A. (1997). Disorders of Affect Regulation: Alexithymia in Medical and Psychiatric Illnesses. New York: Cambridge University Press.

- Taylor, G.J., Parker, J.D.A., Bagby, R.M. & Acklin, M.W. (1992). Alexithymia and somatic complaints in psychiatric outpatients. Journal of Psychosomatic Research, 36, 417-424.

- Todarello, O., Taylor, G.J., Parker, J.D.A. & Fanelli, M. (1995). Alexithymia in essential hypertensive and psychiatric outpatients: a comparative study. Journal of Psychosomatic Research, 39, 987-994.

- Weinryb, R.M. (1995). Alexithymia: old wine in new bottles? Psychoanalysis and Contemporary Thought, 18, 159-195.

- Wells, A. & Matthews, G. (1994). Attention and Emotion: A Clinical Perspective. Hove: Psychology Press.

- Williams, J.M.G., Stiles, W.B. & Shapiro, D.A. (1999). Cognitive mechanisms in the avoidance of painful and dangerous thoughts: elaborating the assimilation model. Cognitive Therapy and Research, 23, 285-306.

- Williams, J.M.G., Watts, F.N., MacLeod, C. & Mathews, A. (1997). Cognitive Psychology and Emotional Disorders, 2nd Ed. Chichester: Wiley.

- Wise, T.N. & Mann, L.S. (1994). The relationship between somatosensory amplification, alexithymia and neuroticism. Journal of Psychosomatic Research, 38, 515-521.

- Wise, T.N., Mann, L.S. & Hill, B. (1990). Alexithymia and depressed mood in the psychiatric patient. Psychotherapy and Psychosomatics, 54, 26-31.

- Wise, T.N., Mann, L.S. & Randell, P. (1995). The stability of alexithymia in depressed patients. Psychopathology, 28, 173-176.

TABLE 1

Mean TAS-20, BAI and BDI-II scores and average age and years of education in the high and low alexithymia groups

	Low alexithymia (N=87)		High alexithymia (N=89)		t (df=174)	p
	Mean	(SD)	Mean	(SD)		
TAS-20	39.15	(6.05)	57.34	(6.31)	19.52	<0.001
BAI	7.29	(5.53)	10.18	(7.83)	2.63	<0.01
BDI-II	6.84	(5.86)	10.83	(8.05)	3.94	<0.001
Age	19.75	(1.32)	20.15	(2.93)	1.16	n.s.
Years of education	14.86	(1.10)	15.03	(1.01)	1.11	n.s.

TABLE 2

Mean response latencies to probes by each condition (in milliseconds)

Word Valence	Exposure Duration	Word Location	Probe Location	Low Alexithymia (N= 87)		High Alexithymia (N= 89)	
				Mean	(SD)	Mean	(SD)
Negative	100msec	Upper	Upper	336.5	(42.1)	348.0	(54.3)
		Upper	Lower	343.1	(45.3)	345.9	(44.4)
		Lower	Lower	338.6	(39.4)	345.9	(47.9)
		Lower	Upper	343.0	(44.6)	349.3	(59.1)
	1500msec	Upper	Upper	373.6	(53.8)	365.7	(51.1)
		Upper	Lower	338.5	(38.6)	348.6	(56.2)
		Lower	Lower	342.7	(42.6)	342.2	(52.7)
		Lower	Upper	364.9	(48.6)	369.3	(46.1)
Positive	100msec	Upper	Upper	345.4	(44.5)	352.4	(57.1)
		Upper	Lower	337.3	(43.2)	345.2	(50.6)
		Lower	Lower	337.8	(38.2)	343.4	(52.6)
		Lower	Upper	346.6	(48.2)	348.8	(53.1)
	1500msec	Upper	Upper	369.4	(47.7)	366.4	(46.5)
		Upper	Lower	349.4	(43.0)	348.5	(54.7)
		Lower	Lower	340.3	(45.5)	340.7	(50.0)
		Lower	Upper	364.0	(45.0)	369.5	(56.5)

TABLE 3

Mean attentional bias scores across the exposure duration and emotional valence conditions for the high and low alexithymia groups

	Low Alexithymia (N=87)				High Alexithymia (N=89)			
	Negative words		Positive words		Negative words		Positive words	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Short exposure	5.52	(29.02)	.32	(31.41)	.67	(35.59)	-.92	(28.99)
Long exposure	-6.44	(29.80)	1.84	(28.06)	5.00	(34.52)	5.49	(31.50)

LIST OF APPENDICES

APPENDIX 1

The Toronto Alexithymia Scale – 20

Sex: M / F Age: Date: ID #:

T A S - 20

Using the scale provided as a guide, indicate how much you agree or disagree with each of the following statements by circling the corresponding number. Give only one answer for each statement.

Circle 1 if you STRONGLY DISAGREE
Circle 2 if you MODERATELY DISAGREE
Circle 3 if you NEITHER DISAGREE NOR AGREE
Circle 4 if you MODERATELY AGREE
Circle 5 if you STRONGLY AGREE

	Strongly Disagree	Moderately Disagree	Neither Disagree Nor Agree	Moderately Agree	Strongly Agree
1. I am often confused about what emotion I am feeling.	1	2	3	4	5
2. It is difficult for me to find the right words for my feelings.	1	2	3	4	5
3. I have physical sensations that even doctors don't understand.	1	2	3	4	5
4. I am able to describe my feelings easily.	1	2	3	4	5
5. I prefer to analyze problems rather than just describe them.	1	2	3	4	5
6. When I am upset, I don't know if I am sad, frightened, or angry.	1	2	3	4	5
7. I am often puzzled by sensations in my body.	1	2	3	4	5
8. I prefer to just let things happen rather than to understand why they turned out that way.	1	2	3	4	5
9. I have feelings that I can't quite identify.	1	2	3	4	5
10. Being in touch with emotions is essential.	1	2	3	4	5

	Strongly Disagree	Moderately Disagree	Neither Disagree Nor Agree	Moderately Agree	Strongly Agree
11. I find it hard to describe how I feel about people.	1	2	3	4	5
12. People tell me to describe my feelings more.	1	2	3	4	5
13. I don't know what's going on inside me.	1	2	3	4	5
14. I often don't know why I am angry.	1	2	3	4	5
15. I prefer talking to people about their daily activities rather than their feelings.	1	2	3	4	5
16. I prefer to watch "light" entertainment shows rather than psychological dramas.	1	2	3	4	5
17. It is difficult for me to reveal my innermost feelings, even to close friends.	1	2	3	4	5
18. I can feel close to someone, even in moments of silence.	1	2	3	4	5
19. I find examination of my feelings useful in solving personal problems.	1	2	3	4	5
20. Looking for hidden meanings in movies or plays distracts from their enjoyment.	1	2	3	4	5

APPENDIX 2

Beck Anxiety Inventory

BAI®

NAME _____ DATE _____

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by each symptom during the PAST WEEK, INCLUDING TODAY, by placing an X in the corresponding space in the column next to each symptom.

	NOT AT ALL	MILDLY It did not bother me much.	MODERATELY It was very unpleasant, but I could stand it.	SEVERELY I could barely stand it.
1. Numbness or tingling.				
2. Feeling hot.				
3. Wobbliness in legs.				
4. Unable to relax.				
5. Fear of the worst happening.				
6. Dizzy or lightheaded.				
7. Heart pounding or racing.				
8. Unsteady.				
9. Terrified.				
10. Nervous.				
11. Feelings of choking.				
12. Hands trembling.				
13. Shaky.				
14. Fear of losing control.				
15. Difficulty breathing.				
16. Fear of dying.				
17. Scared.				
18. Indigestion or discomfort in abdomen.				
19. Faint.				
20. Face flushed.				
21. Sweating (not due to heat).				

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APPENDIX 3

Beck Depression Inventory-II

BDI®-II

Date:

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

_____ Subtotal Page 1

Continued on Back

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11. Agitation

0 I am no more restless or wound up than usual.

1 I feel more restless or wound up than usual.

2 I am so restless or agitated that it's hard to stay still.

3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.

1 I am less interested in other people or things than before.

2 I have lost most of my interest in other people or things.

3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.

1 I find it more difficult to make decisions than usual.

2 I have much greater difficulty in making decisions than I used to.

3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.

1 I don't consider myself as worthwhile and useful as I used to.

2 I feel more worthless as compared to other people.

3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.

1 I have less energy than I used to have.

2 I don't have enough energy to do very much.

3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.

1a I sleep somewhat more than usual.

1b I sleep somewhat less than usual.

2a I sleep a lot more than usual.

2b I sleep a lot less than usual.

3a I sleep most of the day.

3b I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.

1 I am more irritable than usual.

2 I am much more irritable than usual.

3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.

1a My appetite is somewhat less than usual.

1b My appetite is somewhat greater than usual.

2a My appetite is much less than before.

2b My appetite is much greater than usual.

3a I have no appetite at all.

3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.

1 I can't concentrate as well as usual.

2 It's hard to keep my mind on anything for very long.

3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.

1 I get more tired or fatigued more easily than usual.

2 I am too tired or fatigued to do a lot of the things I used to do.

3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.

1 I am less interested in sex than I used to be.

2 I am much less interested in sex now.

3 I have lost interest in sex completely.

7 8 9 10 11 12 A B C D E

_____ Subtotal Page 2

_____ Subtotal Page 1

_____ Total Score

APPENDIX 4

Participant Screening Questionnaire

APPENDIX 4: PARTICIPANT SCREENING QUESTIONNAIRE

BACKGROUND INFORMATION

This questionnaire covers a number of questions about yourself and your background. Please give your answers by either ticking the appropriate boxes or writing in the answers where asked to do so. If you have any queries, want clarifications or would like to discuss any of these questions, please ask the person who gave you this questionnaire.

1) Please state your gender by ticking the appropriate box:

Male ☐

Female ☐

2) Please state your age in years:_____

3) Please state which subject you are studying:_____

4) Please indicate which year you are in by ticking the appropriate box:

1st Year Undergraduate ☐

2nd Year Undergraduate ☐

3rd Year Undergraduate ☐

Msc Student ☐

PhD student ☐

If you are an Msc or PhD student, please indicate what year you are in:_____

Other, please specify:_____

5) Please state how many years of education have you had overall:_____

6) Please state the profession of your mother:_____

7) Please state the profession of your father:_____

8) Is your native language English?

Yes ☐

No ☐

9) Do you require glasses to see properly?

Yes ☐

No ☐

If yes, are you now wearing glasses?

Yes ☐

No ☐

10) Do you suffer from dyslexia?

Yes ☐

No ☐

11) Have you ever required professional help for any psychiatric difficulties?

Yes ☐

No ☐

APPENDIX 5

List of Negative and Positive Emotional and Neutral Dot Probe Words

APPENDIX 5
LIST OF POSITIVE AND NEGATIVE EMOTIONAL AND NEUTRAL WORDS USED IN THE DOT PROBE TASK

How words were obtained

The author examined all words of the LOB Corpus (with relevant frequency data; Johansson and Hofland, 1989) to generate possible emotionally relevant words. A pool of 437 potential words were selected and presented to 3 qualified clinical psychologists (two females and one male). Raters were asked to rate how much each word described a specific internal emotional state (0 "Definitely no" to 5 "Definitely yes"), whether the word described a positive or negative emotional state (1 "Definitely negative to 5 "Definitely positive") and how intense the emotion described was (1 "Not at all intensely" to 5 "Very intensely").

Only those words rated by all three judges as "emotional" or "definitely emotional" were selected. Moreover only those words described as "definitely negative" and "negative" or "definitely positive" and "positive" were selected (all word rated as of "uncertain" emotional valence by any of the three judges were immediately excluded). Thus after this initial selection all three judges rated had rated the remaining words as emotionally relevant and unanimously agreed that they reflected either a negative or a positive emotional state. In a second stage of selection those words with higher levels of inter-rater agreement were selected; words with significant disagreements between raters were rejected. Finally, pairs of positive and negative words with generally higher word frequency and higher levels of inter-rater agreement were created of equal word length and as closely matched on word frequency and intensity of arousal as possible. Twenty positive and negative emotional word pairs were thus finally generated: no words were longer than 10 letters, all were of three syllables or less.

Interpretation grid

Word	Emotional rating(a)	Valence rating (b)	Intensity Rating
Negative emotional word - (word frequency, word legnth)	Rater1, Rater2, Rater3	Rater1,Rater2, Rater3	Rater1, Rater2, Rater3
Positive emotional word + (word frequency, word length)	" "	" "	" "

a) 1= "Definitely no"; 2="No"; 3= "Unsure"; 4= "Yes"; 5= "Definitely yes"
b) 1= "Definitely negative"; 2= "Negative"; 3= "Unsure"; 4= "Yes"; 5= "Definitely yes"
c) 1= "Not at all intense"; 2= "A little"; 3= "Moderately"; 4= "Intensely"; 5= "Very intensely"

Word to be rated	**Emotional Word? (1-5)**	**Positive or Negative? (1-5)**	**How intense? (1-5)**
Angry - (42, 5)	5,5,5	1,2,1	5,4,4
Chest (42, 5)			
Happy + (121, 5)	5,5,5	5,5,5	3,4,4
Parts (122,5)			
Upset - (21, 5)	5,5,5	1,1,1	3,4,4
Acted (21,5)			
Merry + (7, 5)	5,5,5	5,5,5	4,3,4
Misty (7,5)			
Grief - (15, 5)	5,5,5	1,1,1	4,5,4
Gauge (15,5)			
Jolly + (6, 5)	5,4,5	5,5,5	2,4,4
Lever (6,5)			
Guilty - (39, 6)	5,5,5	1,1,1	3,5,4
Senior (39,6)			
Secure + (39, 6)	5,5,5	5,5,5	3,4,3
Sample (39,6)			
Scared - (17, 6)	5,5,5	1,1,1	3,4,4
Seized (17, 6)			
Loving + (16, 6)	5,5,5	5,5,5	3,5,4
Permit (16,6)			
Raging - (3, 6)	5,5,5	1,1,1	4,5,4
Regain (3,6)			
Serene + (4, 6)	5,4,5	5,5,5	3,3,4
Sawing (4,6)			
Gutted - (2, 6)	5,5,5	1,1,1	4,5,4
Goggle (2,6)			
Joyful + (1, 6)	5,5,5	5,5,5	3,5,4
Jigsaw (1,6)			

Anxious - (55, 7)	5,5,5	1,2,1	4,4,4
Assumed (57,7)			
Devoted + (49, 7)	5,5,5	4,5,5	3,4,4
Theatre (49, 7)			
Unhappy - (20, 7)	5,5,5	1,1,1	2,3,4
Vehicle (20,7)			
Excited + (25, 7)	5,4,5	5,4,5	4,4,4
Horizon (25,7)			
Furious - (16, 7)	5,5,5	1,1,1	4,5,4
Fossils (16,7)			
Hopeful + (7, 7)	5,4,5	5,4,5	2,4,4
Holster (7,7)			
Fearful - (13, 7)	5,5,5	1,1,1	3,5,4
Heading (13,7)			
Exalted + (6, 7)	5,4,5	5,5,5	4,4,4
Emitted (6,7)			
Wretched - (15, 8)	5,4,5	1,1,1	3,4,5
Conclude (15,8)			
Cheerful + (12, 8)	5,5,5	5,5,5	4,4,4
Channels (12,8)			
Hopeless - (12, 8)	5,5,5	1,1,1	3,5,4
Sideways (12,8)			
Terrific + (10, 8)	5,5,5	5,5,5	4,4,5
Silently (10,8)			
Revolted - (4, 8)	5,5,5	1,1,1	4,5,5
Radiator (4,8)			
Thrilled + (4, 8)	5,4,5	5,5,5	4,4,4
Tailored (4,8)			
Desperate - (29, 9)	5,5,5	1,1,1	5,4,4
Paragraph (28,9)			
Delighted + (32, 9)	5,5,5	5,5,5	5,4,5
Directors (32,9)			

Terrified - (13, 9)	5,5,5	1,1,1	4,5,5
Teenagers (13,9)			
Cherished + (9, 9)	4,5,5	5,5,5	4,5,4
Countless (9,9)			
Disgusted - (4, 9)	5,5,5	1,1,1	5,5,5
Declaring (4,9)			
Comforted + (5, 9)	5,5,5	5,4,5	3,4,4
Carpenter (5,9)			
Petrified - (2, 9)	5,5,5	1,1,1	5,5,5
Paperback (2,9)			
Overjoyed + (1, 9)	5,5,5	5,5,5	4,4,4
Opposites (1,9)			
Frightened - (27, 10)	5,5,5	1,1,1	3,4,4
Possession (26, 10)			
Passionate + (14, 10)	5,5,5	5,5,5	4,5,4
Procedures (14,10)			
Frustrated - (12, 10)	5,5,5	1,1,1	4,4,4
Stretching (11, 10)			
Triumphant + (8, 10)	5,5,5	5,5,5	4,4,5
Consultant (8,10)			

INSTRUCTIONS TO RATERS

Please rate each of the words below on the following three scales:

1) Does this word describe a specific internal emotional state?

1	2	3	4	5
Definitely no	No	Unsure	Yes	Definitely yes

2) If this word describes an emotional state, does it describe a negative emotional state or a positive emotional state?

1	2	3	4	5
Definitely negative	Negative	Unsure	Positive	Definitely positive

3) How intensely does this word describe the emotional state:

1	2	3	4	5
Not at all intense	A little	Moderately	Intensely	Very intensely

APPENDIX 6

Information Sheet

APPENDIX 6
INFORMATION SHEET

Title of study: Word recognition and reaction times

Explanation of study

I am undertaking a final year dissertation for the Doctoral Course in Clinical Psychology at the University of Southampton. This study investigates reaction times to different kinds of words. I would be grateful if you would agree to take part in this research, the findings of which will help further understand how people differ in their psychological experiences and reactions to different types of word.

Confidentiality

All information gathered from this study will be stored securely and will be completely confidential, a numbering system will also ensure anonymity. Any written reports or publications arising from this research will not identify any participant by name or otherwise.

Participation in the study

If you agree to take part, you will be asked to carry out a detection task on a computer (taking 10-15 minutes). After this you will be asked to complete 4 brief questionnaires (taking additionally approximately 10-15 minutes to complete). If you are willing to participate in this study, please sign the attached consent form. You do not have to take part in the study and are free to decline or change your mind about taking part at any stage of the study.

Further information

Please feel free to contact me on the above number if you have any later queries. If you wish to know about the results of this study, please contact me at the completion of the study at the above address in April 2001.

Thank-you for considering taking part in this study.

Edward Bloomfield
Pre-Registration Clinical Psychologist

APPENDIX 7

Consent Form

APPENDIX 7

CONSENT FORM: **Word recognition and reaction times**

Participant's full name: .....

Please complete the following:

Have you read the information sheet given you? Yes/No

Have you had the opportunity to ask questions about the study? Yes/No

Have you received satisfactory answers to all your questions? Yes/No

Have you received enough information about the study? Yes/No

Do you understand that you are free to withdraw from the study:

At any time

Without having to give a reason Yes/No

Do you agree to take part in the study? Yes/No

I, ..., hereby consent to participate in the study named above, about which I have received written information.

Signed..... Date.....

APPENDIX 8

Written Instructions for the Dot Probe Task

APPENDIX 8

WRITTEN INSTRUCTIONS FOR THE DOT-PROBE TASK

In this task you will be asked to look at the computer monitor. You will briefly see an X appear at the centre of the screen: please fix your glance on this X until it disappears. You will then see a couple of words. Immediately after you will see a single dot appearing either above or below the original X you saw.

Your task is simply to indicate as quickly as possible whether you saw the dot appearing in the top half or the bottom half of the screen. Please give your response by pressing the upper button (if you saw the dot appearing at the top half of the screen) or the lower button (if you saw the dot appearing in the bottom half of the screen). Please respond as quickly but as accurately as you can.

After you have pressed one of these two buttons the screen will become blank. Another X will shortly after appear in the centre of the screen, followed again by a dot either above or below it: this cycle will repeat itself a number of times. Please repeat the routine as above until the computer informs you that you have completed the task.

To ensure you have understood these instructions you will be given some practice trials with the experimenter present: please ask questions if anything is unclear. When you are ready let the experimenter know and place a finger on each button, using both hands.

APPENDIX 9

Application for Ethical Approval

DEPARTMENT OF PSYCHOLOGY

OUTLINE OF PROPOSED RESEARCH TO BE SUBMITTED FOR ETHICAL APPROVAL

PLEASE NOTE: You will need to discuss this form with your Supervisor. In particular, you should ask him/her for any departmental guidelines relating to this area of research which you must read and understand. You should also read and understand the Ethical Principles for Conducting Research with Human Participants published by the British Psychological Society. ***You must not begin your study until ethical approval has been obtained. Failure to comply with this policy will affect the viability of your research***

To obtain ethical approval it may take up to one week for undergraduates and up to two weeks for staff and postgraduates.

1. Name(s): *Edward Bloomfield (Pre-Registration Clinical Psychologist)*

   Supervisor: *Dr Anne Waters (Senior Lecturer in Clinical Psychology)*

2. How may you be contacted?
   Address: Room 20 Block B, Nurse's Campus, Basildon Hospital, Basildon, Essex, SS16 5NL. Tel. Work (01268) 593846 / (01375) 402 276. Mobile: (0777) 3128730
3. Into which category does your research fall?

Year 1 Practical	
Year 2 Practical	
Year 3 Project	
Intercalated Medical	
MSc Ed Psy	
MSc/Diploma Health	
DClin Psychol	X
PhD Research	
Intercalated Medical Student	
Staff Research	

4. Provisional Title of Project:

   Attentional bias and cognitive avoidance in alexithymia

5. ANSWER THE FOLLOWING QUESTIONS.
Give full details where necessary.

a) What are the aims, hypotheses or research questions of this project?

This study aims to apply an information processing approach to understanding alexithymia (difficulty identifying and communicating emotions to others). In particular it is suggested that alexithymic individuals may have an initial automatic attentional bias to attending to negative emotional stimuli, but at a later stage avoid these same stimuli.

b) What measurement procedures will be employed?
(If a questionnaire/test protocol/structured interview is to be used, a copy should be attached).

Attentional bias and cognitive avoidance will be assessed using a dot-probe task. Pairs of words (emotional words paired with non-emotional words; Appendix 1) will be presented simultaneously to the participant. Reaction times to detecting subsequent stimuli after the presentation of these words will ascertain whether the participant's visual attention was allocated to the emotional stimulus or the non-emotional stimulus. The words will be presented at 100milliseconds (to investigate pre-attentional biases) and at 1500ms (to investigate subsequent cognitive avoidance). Alexithymia will be measured with the Toronto Alexithymia Scale-20 (Appendix 2). Anxiety will be measured by the Beck Anxiety Inventory (Appendix 3). Depression will be investigated using the Beck Depression Inventory (Appendix 4). A Screening Scale devised for the study will also be used (Appendix 5).

If a standard questionnaire is to be used, have you obtained permission to duplicate this questionnaire or purchased sufficient copies?" Yes ✓Yes/~~No~~

c) Who are the participants?

University undergraduates.

d) How will they be recruited?

Students will be approached prior to attending lectures and will be asked whether they wish to participate in the study (relevant lecturers have given their consent). Student will also be recruited outside the Student Union Building. All participants will be offered £3 for their participation.

e) If participants are under the responsibility of others (such as teachers, nurses or medical staff) have you obtained permission for the participants to take part in the study? ~~YES/NO~~

Not Applicable

f) Is there reason to believe participant will experience discomfort during your study?

I do not envisage that any of the procedures proposed will cause discomfort

g) How will you obtain the consent of participants?

Each participant will be given an information sheet (Appendix 6) explaining the rationale of the study followed by a consent sheet (Appendix 7).

h) How will it be made clear to participants that they may withdraw consent to participate at any time?

This is explained in the information and consent sheets (Appendices 6 and 7).

i) Will the procedure involve deception of any sort? ~~YES~~/NO ✓

If YES, what is your justification?
Not Applicable

J) Do you propose to debrief participants and/or provide them with information about the findings of your study?

YES ✓YES/~~NO~~

If YES, how will this be done?

All participants will be fully debriefed verbally at the end of the test. Participants will also be given ample opportunity to ask questions from the experimenter. Participants are also told in the information sheet that they may contact me for a synopsis of the results of the study (see Appendix 6).

If NO, why is there no debriefing?

Not Applicable

k) How will information obtained from or about participants be protected?

A coding system for the questionnaire has been devised to ensure confidentiality of the information obtained. This is explained in the information sheet (see Appendix 6). Raw data will be kept in a locked filing cabinet. Data used for statistical analysis will be held on computer, in an anonymous format.

l) Experimental apparatus employed must be approved for safety by Martin Hall or Bryan Newman. Has this approval been given?

Martin Hall is currently involved in writing the computerized version of the dot-probe task.

m) Do you intend to make a submission to the medical ethical committee?
(Certain projects may need medical ethical approval, please check with your supervisor)

~~Yes~~/No ✓ N/A.

6. Outline any other information you feel relevant to this submission.

It is highly unlikely that the dot-probe task or any of the other measures will cause psychological distress (see Appendices 1 to 5).

I endorse the following statement: "I confirm that I have a copy of, have read and understand the Ethical Principles for Conducting Research with Human Participants published by the British Psychological Society.

Signature(s) ..... Date 18.4.2002

If you have received additional written guidelines from you supervisor please endorse the statement; "I have received, read and understood departmental ethical guidelines issued to me by my Supervisor relating to this work"

Signature(s) ..... Date 18.4.2002

7. To be completed by the Supervisor

Do you foresee any ethical problems with this research? YES/NO

If YES, please detail.

Signature of supervisor ..... Date 19/4/00

8. Ethical Authorisation given by

Name(s) Lewis Bro

Signature(s) Lewis Bro

Date 27/4/2000

9. If not Authorised, give reason for transmission to Full Ethics Committee

10. Decision of Full Ethics Committee

11. Points to be noted at the end of year meeting of the Ethics Committee

When full approval has been given, please pass this form to the Ethics Committee Secretary in the Psychology Department General Office (room 4041).

APPENDIX 10

Ethical Approval Letter

University of Southampton

Department of Psychology

University of Southampton
Highfield
Southampton
SO17 1BJ
United Kingdom

Telephone +44 (0)23 8059 5000
Fax +44 (0)23 8059 4597
Email

28th April 2000

FAO Edward Bloomfield
Clinical Psychology Department
University of Southampton
Highfield
Southampton

Dear Edward,

I am writing to confirm you that your ethical application titled "Attentional bias and cognitive avoidance in alexithymia", has been given approval by the department.

Should you require any further information, please do not hesitate in contacting me on (023) 80 593995.

Yours sincerely,

KMSmith

Kathryn Smith
Ethical Secretary

APPENDIX 11

Instructions to Authors: Cognition and Emotion

COGNITION AND EMOTION

Aims and Scope *of Cognition and Emotion*

Cognition and Emotion is devoted to the study of emotion, especially to those aspects of emotion related to mental processes. The Journal aims to bring together work on emotion undertaken by researchers in cognitive, social, clinical, and developmental psychology, neuropsychology, and cognitive science; it also welcomes psychologically orientated submissions from those in philosophy, the humanities, anthropology, sociology, and other social sciences. Examples of topics appropriate for the Journal include emotional appraisals; effects of emotion or mood on cognition and motivation; the nature of emotional experience; self-regulation of emotion or mood; social, historical, or cultural aspects of emotion; and the nature of particular emotions or emotionality in general. *Cognition and Emotion* publishes theoretical papers, original research reports, literature reviews, and extended reviews of selected books. Submissions can be considered for expedited publication as brief reports. The Journal also publishes critical abstracts of recent books.

Submission of manuscripts. Manuscripts should be prepared in APA format. Five copies should be submitted to the Editor Dr C. Smith, Department of Psychology & Human Development, Vanderbilt University, Box 512, Peabody College, Nashville TN 37203, USA.

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These prices are inclusive of postage and packing. Application to mail at second class postage rate is paid at Jamaica, NY 11431, USA. US Postmasters: send address changes to *Cognition & Emotion*, Publications Expediting Inc, 200 Meacham Avenue, Elmont, NY 11003, USA. Air freight and mailing in the USA by Publications Expediting Inc.

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APPENDIX 12

Written Permission to use the Toronto Alexithymia Scale - 20

MOUNT SINAI HOSPITAL

600 UNIVERSITY AVENUE – TORONTO, ONTARIO M5G 1X5

FAX NUMBER (416) 586-8654

DEPARTMENT OF PSYCHIATR

Dear Colleague:

Thank you for your interest in the TAS-20 and for your payment of the $35 copyright fee.

Yours sincerely,

Graeme Taylor, M.D., F.R.C.P.(C)

GT/bf