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Overview

This thesis is submitted in partial fulfilment of the requirements for the degree of Clinical Psychology Doctorate at the University of Birmingham. It comprises research (Volume 1) and clinical practice (Volume 2) components.

Volume 1 consists of a literature review paper and an empirical paper, both prepared for submission to scientific journals. The research was carried out under the supervision of Dr Oliver Mason (University of Birmingham) and Dr Jason Jones (Reaside Clinic, Birmingham). The review paper critically evaluates the evidence for a neurocognitive basis for the alexithymia construct. The empirical paper presents a study examining the hypothesis that alexithymia is associated with a perceptual sensitivity to affective stimuli.

Volume 2 consists of five clinical practice reports representing work undertaken during clinical placements. They comprise a psychodynamic and cognitive-behavioural formulation of the case of a 20 year old woman referred in order that she might address the impact of negative childhood experiences; a cognitive-behavioural programme for a 14 year old boy experiencing panic attacks; an audit of continuing professional development activity within a psychology service for people with learning disabilities; a case study detailing the neuropsychological assessment of a 65 year old man presenting with memory impairment and an abstract relating to an oral presentation about conducting Time Limited Dynamic Psychotherapy with a 30 year old woman referred with depression.

Dedication

For Michael, Sheila, Christopher and Jonathan

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I would like to acknowledge the help and support of the following people throughout the process of undertaking the work presented in this volume: Dr Oliver Mason, Dr Jason Jones, Ms Mary Tyson, Dr Derrick Watson and Dr Anne Crowley.

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Volume 1

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LITERATURE REVIEW

NEUROCOGNITIVE CORRELATES OF ALEXITHYMIA: A REVIEW

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Abstract

Alexithymia is a construct used to describe a cluster of cognitive and affective characteristics present in individuals in both clinical and non-clinical populations who demonstrate difficulties in processing and regulating affect. Measures of alexithymia have been found to correlate with measures of psychological distress and it is considered to be a risk factor for a range of mental and psychosomatic illnesses. This review considers the evidence for a neurocognitive basis for alexithymia, drawing primarily on studies of cognitive bias, cerebral laterality and neural imaging. There is considerable theoretical and methodological divergence between studies in this area and whilst there has been some progress in recent years, the current state of knowledge does not support a definitive model. The review concludes by highlighting methodological issues raised by past studies and offers some considerations for future research in the area.

Introduction

The alexithymia construct is used to describe a cluster of cognitive and affective characteristics typical of many people with psychosomatic illnesses and mental health problems (Taylor & Taylor, 1997). The term was first introduced by Sifneos (1973) and is derived from Greek, and means having a lack of words for emotion. The construct evolved from earlier clinical observations (e.g. Reusch, 1948) that certain individuals responded poorly to forms of psychotherapy requiring a degree of insight into inner experiences (Taylor & Taylor, 1997). As a personality trait, alexithymia is characterised by a number of salient cognitive and affective features. Notable among these are a decreased ability to identify and communicate feelings, difficulty distinguishing between feelings and the bodily sensations of emotional arousal, a cognitive tendency toward external events or cues, and a paucity of imaginative thought as evidenced by a lack of experience of dreams or fantasy (Roedema & Simons, 1999; Taylor, 2000). In terms of clinical presentation, people scoring highly on measures of alexithymia typically report decreased or flattened emotional experiences and a reduced conception of emotions as part of their awareness. There is also a marked reduction in their performance on measures of emotional recognition, empathy, labelling and behaviour (Frawley & Smith, 2001).

Since its inception the alexithymia construct has attracted an increasing amount of attention from researchers, with the primary focus resting on examining its relationship with medical and psychiatric disorders (Parker, Keightley, Smith & Taylor, 1999). Measurement amongst clinical populations

indicates it to be a correlate of a range of physical, psychosomatic (see Taylor, 2000 for detailed descriptions) and psychiatric conditions (Parker, Taylor & Bagby, 1994). Furthermore, high measures of alexithymia have been associated with predictions both of the onset of illness and disease, and of poor outcomes in terms of psychotherapeutic intervention and prognosis (Taylor & Taylor, 1997; Roedema & Simons, 1999). Whilst some authors advocate a direct causal relationship between alexithymia and illness, notably Martin and Pihl's (1985) stress-alexithymia hypothesis, research findings have yet to demonstrate this with any degree of certainty. As most of the clinical studies have been cross-sectional in design, it is difficult to ascertain whether what is being measured as alexithymia is a stable personality trait or a symptom of the relevant illness.

Whether viewed as a 'primary' personality characteristic or a phenomenon secondary to pathological processes, increasing experimental research has been directed towards neurocognitive foundations of alexithymia. Such study serves the function of gaining a deeper understanding of the construct and informing clinical practice where alexithymia forms part of an individual's presentation. Drawing on the literature relating to experimental research in this field, this review critically evaluates the evidence for a neurocognitive basis for alexithymia. The paper considers evidence from both clinical and non-clinical populations before considering conclusions that can be drawn from the current state of knowledge in the field. An outline of the search strategy undertaken in construction of this review is included in Appendix 1.

Issues of definition and measurement

Before embarking on any examination of the alexithymia construct it is important to consider what is being measured and how measurement is achieved. As a psychological concept, alexithymia shares a degree of similarity with notions such as dissociation or Salovey and Mayer's (1989) emotional intelligence construct, and with diagnostic classifications such as Asperger's Syndrome (American Psychiatric Association, 1994). Whilst an alexithymic presentation may lead to questions about diagnosis (e.g. DeLuca & Daly, 2001), alexithymia is not a diagnosis in itself. As a hypothetical construct useful for characterizing clinical presentations alexithymia has attracted a number of attempts at measurement. A range of observer-rated measures, such as the Beth Israel Hospital Psychosomatic Questionnaire (Sifneos, 1973) and the Alexithymia Provoked Response Questionnaire (Krystal, Giller & Cicchetti, 1986), and self-rated measures including the MMPI Alexithymia Scale (Kleiger & Kinsman, 1980) and the Schalling-Sifneos Personality Scale (Apfel & Slfneos, 1979) have been published over the years. Many of these scales have received criticism related to poor reliability and provide little support for the validity of the alexithymia construct (Taylor, Bagby & Parker, 1997).

The most widely accepted and utilised instrument for measuring alexithymia is The Twenty-Item Toronto Alexithymia Scale (TAS-20). The TAS-20 (Bagby, Taylor & Parker, 1994a; Bagby, Taylor & Parker, 1994b) is a revised version of the earlier 26-item version and consists of 20 self-descriptive statements. The TAS-20 contains three sub-scales that can be scored

separately: (F1) difficulty identifying and distinguishing between feelings and bodily sensations, (F2) difficulty describing feelings to others, and (F3) externally orientated thinking (Taylor, Bagby & Luminet, 2000). The TAS-20 has demonstrated good internal consistency (Cronbach's alpha=0.81) and test-retest reliability (r=0.77) and a three-factor structure theoretically congruent with the alexithymia construct (Taylor et al., 1997). Although the TAS-20 has been criticised for an uneven distribution of items between the factors, a vulnerability to response tendencies due to the imbalance between positively and negatively phrased items and not covering the ability to experience feelings or fantasy within its factorial structure (Bermond, Vorst, Vingerhoets & Gerritsen, 1999), it remains the measure most frequently adopted throughout the literature. Recent findings support the use of the TAS-20 for empirical research although suggest that separate analyses using the subscales may be of limited value (Kooiman, Spinhoven & Trijsburg, 2002). Bermond et al.'s (1999) own measure, the five-factor Amsterdam Alexithymia Scale, has received little support since its publication. Consistent with the established trend in alexithymia research, this review will only include studies that have used the TAS-20, aside from a few exceptions which will be noted in the text

Experimental studies of alexithymia

Historically, evidence for the alexithymia construct came from clinical observations of patients with a range of psychiatric and psychosomatic disorders. These observations formed the basis for a relatively large body of research

correlating measures of alexithymia with various measures of pathology (see Taylor & Taylor, 1997 for an overview). Since the early 1990s, more studies have sought to link alexithymia to proposed deficits in emotional processing through the employment of experimental designs. This has allowed researchers to test predictions about ways in which alexithymic and non-alexithymic individuals might differ (Parker, Taylor & Bagby, 1993a). Montreuil, Jouvent, Carton and Bungener (1991) reported that a comparison of psychosomatic patients and healthy controls on the Parallel Visual Information Processing Test confirmed that alexithymia was characterised by impaired recognition and recall, with alexithymics favouring concrete and non-symbolic tasks. In a study of ability to recognise affect in images of posed facial expressions, Parker, Taylor and Bagby (1993b) reported that alexithymic college students were less accurate in identifying emotions. Mann, Wise, Trinidad & Kohanski (1994) later found that a group of high alexithymic hospital staff performed significantly less well than medium or low groups on a similar task, using the earlier version of the TAS. Both of these studies contradicted the earlier findings of McDonald and Prkachin (1990) who found no relationship between alexithymia and emotion recognition in a non-clinical sample, although the use of a less reliable alexithymia measure and a small sample (n=10) in this study renders these results questionable. Lane, Sechrest, Reidel, Weldon, Kaszniak and Schwartz (1996) examined the ability to match verbal and non-verbal emotional stimuli and responses. On verbal and non-verbal tasks, alexithymic participants matched stimuli less accurately than controls, suggesting impaired emotional processing. In a study using images of facial expressions, Pandey and Mandal (1997) found no differences between alexithymic and non-alexithymic right-handed males on

matching or labelling tasks although they observed that alexithymic participants were less able to verbally describe the stimuli. Using the earlier version of the TAS, Troisi, Delle Chiaie, Russo, Russo, Mosco and Pasini (1996) found a relationship between alexithymia and non-verbal behaviour. They concluded that in comparison to controls, alexithymic participants' poor capacity for processing emotions led to reduced non-verbal expressivity and patterns of behaviour indicative of anxiety in a structured interview situation. In a recent study of emotion situation priming, Suslow & Junghanns (2002) found that high alexithymics from a non-clinical population took longer to name an emotional target word if it was preceded by a prime sentence that was descriptive of an emotionally charged situation. This was viewed as evidence of poor integration of affective–cognitive schemata, reflecting clinical observations that alexithymia is characterised by impairment in linking emotion-eliciting scenarios and emotion concepts.

Whilst there is a degree of variation in findings due in part to differences in sample groups and methodology, these studies provide experimental evidence for clinically observed components of the alexithymia construct. They represent an important step in the identification of a neurocognitive basis for alexithymia in that they provide empirical support for a relationship between the construct and deficits in information processing. However, they do not satisfactorily address underlying mechanisms for such deficits although this has been attempted in other contributions to the field.

Cognitive bias in affective processing

One contribution to understanding the apparent deficits in alexithymia has developed in the form of studies of cognitive bias. These have drawn on a number of general cognitive concepts of information processing including limited capacity models and selective attention (Williams, Watts, MacLeod & Matthews, 1998), and specific theories such as the adaptive advantage of automatic vigilance to undesirable stimuli (Fiske, 1980). Whilst most of the studies reviewed above are concerned with conscious and verbalisable aspects of affective processing, studies of cognitive bias draw on the well-supported notion that emotional stimuli may be processed without conscious awareness (Wells & Mathews, 1994; Pandey, 1995).

Emotional Stroop studies

Based on the theoretical assumption that alexithymia reflects a deficit in the capacity to cognitively process emotions, Parker et al. (1993a) tested the prediction that alexithymic individuals would be less able to attend to a task when presented with an emotionally arousing distracter stimulus. They used a modified Stroop colour-naming task with a non-clinical population and found that the alexithymic group took significantly longer than the non-alexithymic group to colour-name arousal words. As the groups did not differ in their ability to colour-name neutral words or baseline stimuli, the authors concluded that the processing delays in the arousal word condition were caused by the arousal words demanding the allocation of processing resources, making attention to the naming task more difficult (Williams et al., 1988). These results suggested an

attentional bias towards affectively salient words in the alexithymic group and a reduced capacity to modulate their response (Parker et al., 1993a). Parker et al.'s (1993a) findings were later replicated by Pandey (1995), with a non-clinical sample of bi-lingual students using the Hindi version of the TAS-20. A limitation of these two studies was the failure to assess the psychological state of the participants, as anxiety and depression, both common correlates of the TAS-20 (Honkalempi, Hintikka, Tanskanen, Lehtonen & Viinamaeki, 2001; Lundh & Simonsson-Sarnecki, 2002), have been found to contribute to impaired performance on Stroop tasks (Williams et al., 1988). In addition, the method of manually presenting words on cards and recording response times using a stopwatch raises questions about the accuracy of the response time data in both studies. In a computerised Stroop task with a non-clinical population, Sanchez and Serrano (1997) reported the opposite finding, in that alexithymics took *less* time than non-alexithymics to colour-name arousal words. Interestingly, akin to Parker et al. (1993a) they interpreted their results as providing further support for the alexithymia construct, albeit for a different reason, namely that alexithymics seemed less able to recognise emotional stimuli.

Lundh and Simonsson-Sarnecki (2002) attempted to clarify this apparent dichotomy of explanations by comparing Stroop interference effects in response to both illness words and negative emotion words. They hypothesised that in line with Taylor et al.'s (1997) assertion that alexithymia involves an impaired capacity to construct mental representations of emotions and a corresponding tendency to focus on somatic sensations, alexithymics would be slow to colour-name illness words but not negative emotion words. Using a combined Stroop and implicit

memory task with a Swedish translation of the TAS-20, Lundh and Simonsson-Sarnecki (2002) found that compared to their low alexithymia group (TAS-20≤30) the high alexithymia group (TAS-20≥50) were significantly slower to colour-name illness words than negative emotion words. This was consistent with their hypothesis that alexithymia is associated with an attentional bias toward illness-related (but not emotion-related) information. The failure to find a correlation among the whole sample may indicate that the observed effect is only applicable to those scoring highly on the TAS-20. Comparison between this and other Stroop studies is hampered by the use of a community sample containing a mixture of non-clinical participants and those with physical illnesses. After controlling for the effects of somatic anxiety, the observed effect was only marginally significant.

The Stroop studies seem to point to a degree of attentional bias to certain types of information among individuals with high levels of alexithymia, although there is disagreement about the nature of this information and what such results might indicate. Considered within the broader literature pertaining to Stroop methodology, the most widely accepted explanation would be that high alexithymia is characterised by an attentional bias toward affectively relevant stimuli. Processing these stimuli captures attentional resources, making attention to the colour-naming task more difficult (Williams, Mathews & McLeod, 1996). Suslow (1998) interpreted the results of Parker et al.'s (1993a) study as indicating that alexithymic individuals demonstrate a heightened vigilance for emotional stimuli in a similar manner to that for threatening stimuli as observed in

people with generalised anxiety disorder or post-traumatic stress disorder (McNally, Kaspi, Rieman & Zeitlin, 1990; Mogg, Matthews & Weinman, 1989).

Emotion priming studies

This theory has been tested further in a series of studies that have used the emotion priming paradigm developed from the work of Neely (1977). He suggested that the presentation of a lexical prime activated pre-existing associations that would influence the response to the presentation of a subsequent lexical target. In a preliminary study, Suslow, Arolt & Junghans (1998) used a word-word priming task with a non-clinical population, finding a negative correlation between the TAS-20 subscale 'difficulty describing feelings' and a facilitation effect of negative prime words. The authors concluded that negatively-valenced prime words facilitated response times to congruent target words but, contrary to expectation, this effect reduced with alexithymia. In addition to the low TAS-20 scores of the participants, which render any conclusions about alexithymia suspect, Suslow (2002) has since questioned these findings both on methodological and theoretical grounds. Suslow's (1998) subsequent emotion priming study, again with a non-clinical population used a pronunciation task and an evaluation task to further explore the automatic vigilance theory. In accordance with this hypothesis, two TAS-20 subscales were positively correlated with faster responses to affective stimuli. 'Difficulty describing feelings' showed a correlation with affective facilitation based on negative stimuli, and 'externally oriented thinking' and the TAS-20 sum score correlated with affective facilitation based on positive stimuli only. The interpretation of these results was that alexithymia might serve a protective

function in that an individual is able to pre-attentively process the affective valence of the communication of others and avoid communicating their own emotional state for fear of devaluation of the self. A tendency to prioritise positive affective information was interpreted as being advantageous in terms protecting an individual from conflict-laden negative material. As in Suslow et al. (1998) a rationale for selection of the stimulus words was not described and the sample had low TAS-20 scores, falling well within the non-alexithymic range as identified by Taylor et al.'s (1997) cut-off, thereby limiting clinical relevance of the findings.

Automatic vigilance effects have been associated with the adaptive advantage of an organism's ability to quickly and efficiently process threatening cues (Fiske, 1980; Pratto & John, 1991). Whilst this theory may explain affective facilitation in response to negative stimuli it does not explain Suslow's (1998) observation of an association between the TAS-20 and positive affective facilitation effects. Hermans, De Houwer and Eelen's (1996) two stage model of semantic activation was initially offered by Suslow (1998) as an explanation of these findings although these two theories predict differential priming effects. Suslow, Ohrmann and Arolt (2001) sought to examine automatic affective priming effects further in a non-alexithymic population. Their results were consistent with those from the Stroop studies, concluding that only negative primes interfered with processing of subsequent target words, undermining the semantic activation model as an account of priming effects. With the implication from this study that a bias toward evaluating negatively valenced affective stimuli exists independently from alexithymia, Suslow, Junghanns, Donges and Arolt's (2001) revised hypothesis was that automatic vigilance for negative information should

be expected in low alexithymics whilst in high alexithymics the effect should extend to both positive and negative stimuli. This was tested using a non-clinical sample, divided into high and low alexithymia groups and compared on a verbal and pictorial (emotional faces) evaluation task. The results of the verbal task confirmed the hypothesis and indicated that high alexithymics were able to evaluate affective stimuli at an automatic processing level but compared to low alexithymics they showed less processing engagement toward negative stimuli. This is consistent with Sanchez and Serrano's (1997) conclusions and the results are more compelling than previous priming studies as formation of the alexithymia groups was more rigorous and the effects of depression and anxiety were controlled for.

All the above studies of cognitive bias have used reaction times to stimuli as the dependent variable. In a recent study of a non-clinical population, Bennett (2003) extended the analysis of the emotion priming paradigm to include the effects of emotion priming on response errors as well as response times in a word evaluation task. The results of the automatic processing conditions indicated that in addition to showing slower responses to affective and neutral primes, high alexithymics made more classification errors than low alexithymics. The error rate of both groups was reduced by positive prime-target congruence and this effect also applied to negative prime-target congruence in the high alexithymic group. Whilst from the perspective of response times, the findings from this study are inconsistent with those of Suslow, Junghanns, Donges and Arolt (2001) as little evidence for an automatic priming effect was found, the

response error data offers further evidence for their notion of impaired engagement to affective stimuli at a strategic processing level.

Inconsistencies between findings in studies of cognitive bias are likely to be a function of methodology as each of the priming studies listed above have differed in terms of sample group characteristics, stimuli and the precise nature of the task completed by participants. Consequently, direct comparisons are difficult to make and more replication studies with a greater degree of methodological standardisation are required before firm conclusions can be drawn. The methodological improvements in recent studies of affective priming are encouraging although theoretical divergence in interpreting the results of different studies remains a barrier to progress.

The role of cerebral laterality in affective processing

A further group of studies has sought to locate the deficits observed in alexithymia within specific structures of the brain. There is a growing body of evidence that an alexithymic cognitive style may reflect poor integration of the information processing of the two cerebral hemispheres (Parker et al., 1999). This research stemmed from the observation that individuals with right hemisphere damage have difficulties in processing affective information, such as images of posed facial expressions (Bowers, Bauer, Coslett & Heilman, 1985) and the consequent theory that the right hemisphere is superior to the left in processing a range of emotional stimuli (Berenbaum & Prince, 1994). A variety

of theorists have attempted to explain the differential involvement of the cerebral hemispheres in emotion recognition and regulation and experimental studies of alexithymia have formed part of this enquiry. It should be noted that on the basis of evidence pointing to a lesser degree of cerebral lateralisation in left-handed individuals, many studies have chosen to exclude this group when identifying participants (Dewaraja & Sasaki, 1990; Parker et al., 1999). Parker, Taylor and Bagby (1992) reported an association between high alexithymia and a bias toward higher levels of left hemisphere arousal during ongoing cognitive processing in a study of conjugate lateral eye movements. These findings were supported by Berenbaum and Prince (1994) using a chimeric face task with a non-clinical population, although only when individuals with extreme difficulties in identifying and communicating their emotions were compared to others. On analysis of the whole sample, alexithymia was not found to correlate with hemispheric bias. Jessimer and Markham (1997) studied the relationship between alexithymia and leftward perceptual bias on chimeric tasks involving pictures of faces among a non-clinical population. They hypothesised that individuals with high alexithymia would show less leftward bias (indicative of reduced right hemisphere arousal) for affective information, as had been suggested in previous studies. They confirmed the hypothesis although the trends they reported were not specific to emotional stimuli and were more suggestive of a general association between alexithymia and reduced right hemisphere activity. Neither Berenbaum and Prince (1994) or Jessimer and Markham (1997) presented TAS-20 scores for their high and low alexithymia groups and some questions remain over the levels of significance that were accepted in the latter study.

Taylor et al. (1997) reported a shift in cerebral laterality theory and research away from a concern with cerebral asymmetry toward a view that emotional processing relies on the integration of functions provided by both hemispheres. This has led to the strengthening of an interhemispheric transfer deficit model of alexithymia, first mooted following the observation that patients with epilepsy who had undergone cerebral commissurotomies (Hoppe & Bogen, 1977; TenHouten, Warren, Hoppe, Bogen, & Walter, 1985) and a patient with agenesis of the corpus callosum (Buchanan, Waterhouse & West, 1980) exhibited alexithymic characteristics. Further support for the model came from a series of studies that used experimental tasks to examine the efficiency of interhemispheric communication. Zeitlin, Lane, O'Leary & Schrift (1989) studied combat veterans with post-traumatic stress disorder (PTSD), concluding that alexithymic veterans' performance on a tactile finger localisation task indicated a bidirectional interhemispheric transfer deficit. The attribution of this result to alexithymia is questionable given Spivak, Segal, Mester and Weizman's (1998) finding that PTSD itself is associated with a hemispheric imbalance. Zeitlin et al.'s (1989) findings were followed by Dejawara and Sasaki's (1990) study of a non-clinical population, which concluded that the results of linguistic and non-linguistic lateralised visual matching tasks demonstrated an association between alexithymia and reduced transfer of non-linguistic information. None of the afore-mentioned interhemispheric transfer studies used the TAS-20 as the measure of alexithymia, thereby raising questions about the validity of their conclusions and whether the same phenomena were being measured. However, Parker et al. (1999) sought to replicate Zeitlin et al.'s (1989) findings with a non-clinical

population using the TAS-20. Their findings were consistent with the previous study and suggested that the deficits found among the alexithymic participants were bidirectional and not located in one particular hemisphere, although the possibility of right hemisphere information processing dysfunction was not entirely excluded. The tactile finger localisation paradigm measures the transfer of sensorimotor information only, so care should be taken in generalising the results to affective stimuli (Parker et al., 1999).

Whilst right hemisphere and interhemispheric transfer deficit models are often studied and presented separately, Taylor et al. (1997) suggested that as there is much that remains to be understood concerning the function and integration of both cerebral hemispheres, it is possible that the same neurological factors may underpin the evidence that has been provided for both models. For example, they suggest that alexithymia could result from a right hemisphere dysfunction that subsequently affects interhemispheric communication. Lumley & Sielky (2000), using the tactile finger localization task and a short-term memory task with a non-clinical sample, found support for both models among male participants. Issues of generalisibility and measurement limit the strength of the conclusions that can be drawn from experimental studies of cerebral laterality, particularly about the degree to which any deficit can be seen as specific to the processing of emotions. Further replication studies are needed using the TAS-20 among both clinical and non-clinical populations, with a focus on the processing and transfer of affect-laden information.

Physiological evidence for processing deficits in alexithymia

More precise evidence for the role of specific cerebral structures in alexithymia has been offered by studies that have employed a physiological focus in their design. Lane, Reiman, Axelrod, Lang-Sheng, Holmes and Schwartz (1998) found a relationship between the Levels of Emotional Awareness Scale, known to correlate inversely with the TAS-20 (Lane & Reidel, 1998), and increased activity in the anterior cingulate cortex (ACC) using positron topography imaging. Consequently, Lane, Ahern, Schwartz and Kaszniak (1997) suggested a link between alexithymia and reduced ACC activity during emotional arousal, drawing a comparison with the phenomena of blindsight, whereby individuals are able to respond to visual stimuli without conscious awareness that they are doing so. The authors also contended that the role of the ACC in orchestrating autonomic, neuroendocrine and behavioural responses to emotional stimuli provided a basis for explaining the observed features of alexithymia, such as a tendency to focus on somatic symptoms. This theory was supported by the findings of an fMRI study by Berthoz, Artiges, Van De Moortele, Poline, Rouquette, Consoli and Martinot (2002) which showed differential ACC activity in response to positively and negatively valenced emotional stimuli. In an analysis of EEG power and coherence among high and low alexithymics from a non-clinical population, Houtveen, Bermond and Elton (1997) found that alexithymia was characterised by reduced coherence between the right frontal lobe and the left hemisphere. They suggested that their results were consistent with previous findings concerning interhemispheric transfer deficit (e.g. Zeitlin et al., 1989) and that the reduced coherence reflected reduced structural

connectivity and corpus callosal function between the right and left hemispheres. This formulation of alexithymia echoes Bermond's (1995) conception of certain manifestations of alexithymia where individuals may have emotional experiences (a predominantly right hemisphere phenomenon) but lack the accompanying cognitions (a predominantly left hemisphere phenomenon). This study used the Amsterdam Alexithymia Scale as opposed to the TAS-20. Physiological studies of brain structure and function offer a useful adjunct to experimental analogs of affective processing although they are limited by the small sample sizes employed. More studies are needed if the preliminary findings noted above are to be generalised further.

A small number of studies have examined the association between alexithymia and autonomic activity using emotion arousing stimuli. Two studies of non-clinical populations found that alexithymics indicated hypoarousal on measures such as blood pressure, heart rate (Linden, Lenz & Stossel, 1996) and skin conductance (Roedema & Simons, 1999), although Infrasca (1997) found higher skin conductance among alexithymic participants who viewed an emotional film. Inconsistency in the findings between studies may be attributed to variation in the stimuli used (Taylor, 2000). Researchers have also examined alexithymia in the context of variations in rapid eye movement (REM) density noted during sleep. Bauermann, Parker & Smith (1999) suggested that reductions in REM density as observed in alexithymic individuals imply a reduced capacity to process emotional information through dreams. Such findings have been criticised by De Gennaro, Ferrara, Curcio, Cristiani, Lombardo and Bertini (2002) as being a function of the 'first night effect', whereby adaptation to a sleep

laboratory disturbs the patterns of normal sleep. In a study that controlled for this effect, De Gennaro et al. (2002) found no association between alexithymia and poor sleep quality.

Towards an integrated neurocognitive model of alexithymia: considerations for future research

Since Taylor (2000) included a brief resume of neurobiological studies in his review of research developments in alexithymia there have been a number of further contributions across each of the areas outlined above. Whilst these have built upon previous findings and in some cases strengthened theoretical arguments, as with Houtveen et al. (1997) and the interhemispheric transfer deficit model, the case for a single definitive model of alexithymia has advanced little. The current literature is characterised by a degree of theoretical and methodological divergence that limits meaningful comparisons between many studies. However, certain themes are recurrent, notably the idea that alexithymic individuals are not 'a-emotional' but rather their experience of emotion lacks conceptual elaboration (Kreitler, 2002) and the suggestion that observed processing deficits are not necessarily specific to emotions. Both of these points relate to the notion of dissociation or de-coupling between cerebral structures responsible for the generation of affect, such as components of the limbic system, and cortical areas that modulate emotions through cognitive processes. Empirical studies designed to test predictions based on this concept would seem a profitable area for future research. Differing emphasis between authors on

certain theoretical models and the precise structures involved (e.g. Zeitlin et al., 1988; Houtveen et al., 1997; Lane et al., 1997: Suslow, Junghanns, Donges & Arolt, 2001) may reflect limitations in current knowledge with reference to the broader context of neurological science.

Another issue pertinent to future research concerns participant populations. With the ongoing debate over whether alexithymia is a primary personality trait or a state phenomenon secondary to other forms of psychological distress, many previous studies have chosen to study non-clinical populations although not all have taken care in controlling for the possible influence of psychological distress. Questions remain as to whether 'clinical' and 'non-clinical' alexithymia are the same phenomenon although there are obvious difficulties in interpreting data from clinical populations (e.g. Zeitlin et al., 1989). Findings suggesting that processing differences are more likely to be found only in non-clinical participants recording high TAS-20 scores (e.g. Berenbaum & Prince, 1994; Lundh and Simonsson-Sarnecki, 2002) reflect the importance of care in constituting experimental groups. The recruitment of participants for prospective studies is needed in future as current data comes almost exclusively from cross-sectional designs among adult populations. Such studies could allow further development of speculative theories linking alexithymia to attachment style (Taylor, Parker & Bagby, 1999) and the early formation of cognitive schema (Glucksman, 2000). It would seem that there is more to be discovered about how early emotional experiences influence subsequent neurocognitive development.

Experimental studies of alexithymia have typically involved measuring responses to affective stimuli. In its broadest sense, this basic paradigm is likely to underpin forthcoming enquiry although future researchers face the challenge of identifying which tasks or situations best illustrate alexithymic characteristics. Face recognition is a task that would seem to have high ecological validity but one cannot be certain that observed responses are specific to affect recognition rather than other processes that may occur concurrently. It can be seen from past research that variation in stimuli is at least in part responsible for differential findings (e.g. Suslow, Junghanns, Donges & Arolt, 2001) and future studies would benefit from a degree of methodological standardisation in this regard.

The theoretical and methodological variation among the studies reviewed here reflects the different levels of explanation that can be applied to the alexithymia construct. Single theories (e.g. Taylor et al., 1997; Lane et al., 1997) should perhaps be considered as preliminary in the light of limited supporting empirical evidence. Frawley and Smith's (2001) processing model represents an attempt to draw elements of existing theory and research together toward a logical overarching account of alexithymia, suggesting that it may represent failure at interfaces between a range of components within the emotional processing structures of the brain. As with other complex emotional presentations, new models and perspectives offer additional opportunities for theorising and hypothesis testing. However, akin to theories that have preceded it, further empirical testing is required before more weight can be added to Frawley and Smith's (2001) ideas. The absence of a clear, empirically supported understanding of a basis for alexithymia limits the advice that can be offered at

present to those involved in the clinical management of individuals with an alexithymic presentation. This issue has received a little attention from authors (e.g. Taylor et al., 1999; Glucksman, 2000) although further work needs to be done before firm recommendations can be made.

Conclusion

The past decade has seen a proliferation of research into alexithymia, stimulated in part by the development and widespread acceptance of a reliable tool for measurement, in the form of the TAS-20. Authors have developed an increasing interest in examining neurocognitive bases for the construct and evidence has been put forward for a number of theories that seek to explain clinical observations that alexithymic individuals seem to possess a range of deficits in processing and regulating affect. Chief amongst these are hypotheses concerning the influences of attention and cognitive bias at different levels of awareness, right hemisphere dysfunction and interhemispheric transfer deficit. Physiological theories implicating particular brain structures and differential levels of autonomic arousal are also receiving increasing attention. Whilst these research threads offer new opportunities for exploring the alexithymia construct, the divergence in theoretical starting points, models, methodology and participant populations raises some difficulties. The various theoretical developments are not necessarily mutually exclusive, although it is often not easy to meaningfully compare different studies. Consequently the current state of knowledge in the field cannot support a definitive model of the processes underlying an alexithymic

presentation. In addition, the ongoing debate over primary versus secondary alexithymia raises questions about conclusions from studies of clinical populations. In terms of informing clinical practice there is a need to understand more about the developmental history and function of alexithymia where it forms part of an individual's presentation. Despite these difficulties, neurocognitive lines of enquiry have contributed greatly to the knowledge base of the alexithymia construct and further developments seem probable as methodology improves and studies are replicated. As has been the case with the study of other affective disorders, further research evidence in this area has the potential to translate into more effective strategies for therapeutic intervention.

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Appendix 1

Search strategies.

Date	Database	Keywords / phrases	Returned[1]	
14.11.2002	PsycINFO	"Alexithymia"	1191	
		+"Neuropsychology"	5	(5)
		+"Cognitive Processes"	86	(35)
		"Suslow"	20	(5)
06.12.2002	Science Direct	"Alexithymia"	138	(12)
20.03.2003	BIDS	"Alexithymia"	5	(2)
23.04.2003	PsycINFO	"Alexithymia"	2525	
	EMBASE	+"interhemispheric"	45	(25)
	MEDLINE			
	Journals@OVID			
23.04.2003	PsycINFO	"Alexithymia"	2525	
	EMBASE	+"lateral dominance"	14	(3)
	MEDLINE			
	Journals@OVID			
23.04.2003	PsycINFO	"Alexithymia"	2525	
	EMBASE	+"controlled"		
	MEDLINE	+"processing"	50	(4)
	Journals@OVID			

[1] Numbers in brackets indicate papers that were retained for consideration in this review.

Previously retained papers found in subsequent searches were not retained again.

23.04.2003	PsycINFO	"Alexithymia"	2525	
	EMBASE	+"automatic"		
	MEDLINE	+"processing"	20	(0)
	Journals@OVID			

Further papers were obtained from reference lists of those papers that had been returned in electronic searches.

Appendix 2

Instructions for authors.

Journal of Psychosomatic Research

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Guide for Authors

Papers must be written in English. They will be acknowledged on receipt, and then reviewed. The decision on acceptance will usually be conveyed to the authors within two months.

Full Length Papers. Full length research papers will not normally be more than 4000 words in length and will preferably be shorter. Submission of a paper to the **Journal of Psychosomatic Research** will be held to imply that it represents original research not previously published (except in the form of an abstract or preliminary report), that it is not being considered for publication elsewhere, and that if accepted by the **Journal of Psychosomatic Research** it will not be published elsewhere in the same form in any language without the consent of the Publisher. Major papers of topical content will be given priority in publication.

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Letters to the Editors. These normally refer to articles previously published in the Journal. The Editors are also willing to consider letters on subjects of direct relevance to the Journal's interest.

Book Reviews. These are normally submitted by the Book Review Editors, but they welcome suggestions of books for review.

Other Papers. The Editors welcome suggestions for other types of papers, such as conference reports, accounts of major research in progress and interviews with senior research workers. These should not be submitted without prior consultation.

Manuscript Requirements

Manuscripts should conform to the uniform requirements known as the 'Vancouver style' (International Committee of Medical Journal Editors. Uniform requirements for manuscripts submitted to biomedical journals. N Engl J Med 1997; 336:309-315). *The Editors and Referees attach considerable importance to a succinct and lucid prose style and well organized tables. Authors whose native language is not English are advised to seek help before submission. Statistical procedures should be clearly explained.*

Manuscripts should be typed with wide margins, double-spaced on one side of standard A4 or 8.5" x 11" paper. The format should be as follows:

Title page. This should contain (a) the **title** of the article; (b) a short **running head;** (c) name of **department** where the work was conducted; (d) **names of the each author** with highest academic degree; (e) name, address, phone and fax of **author responsible for correspondence** and to whom requests for reprints should be addressed; (f) up to six **keywords** should be listed in alphabetical order after the abstract. These terms should optimally characterize the paper.

Abstract. This should be subdivided under the headings *Objective, Methods, Results, Conclusion* and should not exceed 150 words.

Text. This should be divided into sections with main headings: Introduction, Method, Results and Discussion. Accepted papers will usually be between 2000 and 4000 words in length.

Acknowledgments. These must include mention of any source of funding outside the basic funding of the host institution.

References. These should be numbered consecutively in the text in the order in which they are first mentioned and be so denoted in the list. Their form should be that adopted by the US National Library of Medicine, as used in the Index Medicus and as recognized in Uniform Requirements:

1. Ingham JC, Miller P McC. Self-referral to primary care: symptoms and social factors. J Psychosomatic Res 1986;30:49-56.

2. Berkenbosch F. Corticotrophin-releasing factor and catecholamines: a study on their role in stress-induced immunomodulation. In: Schneiderman N, McCabe P, Baum, A, eds. Perspectives in behavioral medicine. Hillsdale, New Jersey: Erlbaum 1992:73-91.

Tables. Each should be on a separate sheet, numbered consecutively in Roman numerals.

Figures A glossy photograph or clear ink drawing of each should be sent. Each figure should be numbered on the back and the top should be marked. A photocopy should be attached to each copy of the manuscript. Captions should be on a separate sheet. The number of illustrations should be kept to a minimum. Color illustrations are not normally acceptable. Authors may be asked to support the costs of color reproduction.

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EMPIRICAL PAPER

IS ALEXITHYMIA ASSOCIATED WITH A PERCEPTUAL SENSITIVITY TO AFFECTIVE STIMULI?

Prepared for submission to:

Psychotherapy and Psychosomatics

Abstract

The relationship between alexithymia, measured using the 20-Item Toronto Alexithymia Scale (TAS-20), and cognitive processing of affective stimuli was studied in a non-clinical population. An emotion priming task was used to investigate Suslow's (1998) proposal that alexithymia is associated with an increased sensitivity to the negative valence of stimuli at a pre-attentive level. High and low alexithymia groups were formed from a sample of 75 university students and compared on a situation-word sequential emotion priming task, the Beck Depression Inventory (BDI) and the Symptom Checklist (SCL90-R). The high-alexithymia group were slower to respond to affective target words and made more errors in their classification than the low-alexithymia group, underlining the notion that alexithymia is characterised by a deficit in cognitive processing of emotions. No support was found for an association between alexithymia and enhanced sensitivity to affective stimuli. The limitations and implications of the study are discussed.

Introduction

Alexithymia is a construct used to describe certain cognitive and affective characteristics associated with psychosomatic illnesses and mental health problems (Taylor & Taylor, 1997). As a personality trait, alexithymia is characterised by a number of salient features. These include a decreased ability to identify and communicate feelings, difficulty distinguishing between feelings and the bodily sensations of emotional arousal, a cognitive tendency toward external events or cues, and a paucity of imaginative thought as evidenced by a lack of experience of dreams or fantasy (Roedema & Simons, 1999; Taylor, 2000).

Over the past 20 years alexithymia has attracted increasing attention from researchers, with the primary focus resting on examining its relationship with medical and psychiatric disorders (Parker, Keightley, Smith & Taylor, 1999). Among clinical populations alexithymia has been found to correlate with a range of physical, psychosomatic and psychiatric conditions (see Taylor, 2000 for a review). Furthermore, high measures of alexithymia have been associated with the prediction of the onset of illness and disease, and of poor outcomes in terms of the success of psychotherapeutic intervention (Taylor & Taylor, 1997; Roedema & Simons, 1999). The nature of the relationship between alexithymia and illness is unclear and as most of the clinical studies have been cross-sectional in design, it is difficult to ascertain whether what is being measured as alexithymia is a stable personality trait or a state phenomenon symptomatic of the illness (Taylor, 2000). In the absence of large-scale prospective studies,

many researchers have attempted to avoid the confounds presented in clinical populations by directing their attention towards non-clinical groups, although even in this population, a number of confounding variables have been identified, notably depression (Honkalempi, Hintikka, Tanskanen, Lehtonen and Viinamaeki, 2001) and anxiety disorders (Lundh & Simonsson-Sarnecki, 2002).

Without prospective trials, the study of alexithymic characteristics in the general population cannot seek to identify alexithymia as a precursor of psychiatric or psychosomatic conditions. However, it can further establish the validity of alexithymia as a personality trait independent of aetiology (Taylor, Bagby & Parker, 1997), and thereby strengthen the evidence base of the construct. Much of the research into alexithymia amongst non-clinical populations has addressed the idea that alexithymia reflects a deficit in the cognitive processing and regulation of affect (Taylor & Taylor, 1997). The association between alexithymia and impaired verbal and non-verbal recognition of affective information has been identified in a number of studies using a range of different tasks. Several studies have concluded that alexithymic individuals demonstrate a limited ability to identify and describe emotional states based on the presentation of posed facial expressions (Parker, Taylor & Bagby, 1993a; Mann, Wise, Trinidad & Kohanski, 1994; Pandey & Mandal, 1997). In addition, Lane, Sechrest, Reidel, Weldon, Kaszniak and Schwartz (1996) noted that individuals scoring highly on measures of alexithymia performed less well when matching verbal and non-verbal affective stimuli and responses.

With regard to seeking an understanding of affective processing in alexithymia and an explanation of impaired recognition shown in the above experimental studies, a small number of studies have looked at the role of automatic or involuntary processing of emotional stimuli (Suslow, 1998). Parker, Taylor and Bagby (1993b) examined involuntary processing using a modified Stroop colour-naming task. This method assumes that if the meaning of the word is salient to an individual, attention will be attracted primarily to processing this meaning, despite efforts to attend to the colour of the word. University students were divided into alexithymic and non-alexithymic groups on the basis of cut-off scores (alexithymic ≥ 61; non-alexithymic ≤ 51 (Taylor et al., 1997)) on the 20-Item Toronto Alexithymia Scale (TAS-20) and required to name the colour of the ink in which affective words were written. The alexithymic group took significantly longer than the non-alexithymic group to complete the task. As the groups did not differ in their ability to colour-name neutral words, the results suggested an attentional bias towards affectively salient words in the alexithymic group. This is consistent with the notion that affective information may be extracted pre-attentively (Wells & Matthews, 1994). Parker et al.'s (1993b) findings were later replicated by Pandey (1995) although both studies failed to control for participants' psychological state.

Suslow (1998) interpreted the results of Parker et al.'s (1993b) study as indicating a 'perceptual sensitivity' hypothesis of alexithymia; that alexithymic individuals demonstrate a heightened vigilance for emotional stimuli in a similar manner to that for threatening stimuli as observed in people with anxiety disorders (McNally, Kaspi, Rieman & Zeitlin, 1990; Mogg, Matthews & Weinman,

1989). This argument implies that the alexithymic personality trait may serve the function of assisting individuals to cope with or defend against 'threatening' emotional material. Few experimental studies have examined this idea although there is some support for an association of alexithymia and a more general notion of defensiveness (Myers, 1995; Taylor et al., 1997).

Suslow (1998) sought to test the perceptual sensitivity hypothesis using sequential priming methodology evolved from the work of Neely (1977) who suggested that the presentation of a lexical prime activated pre-existing associations that would influence the response to the presentation of a subsequent lexical target. Neely (1977) manipulated the interval, known as stimulus onset asynchrony (SOA), between the prime and the target to separate automatic and controlled modes of cognitive activation. SOAs of 250ms produced automatic facilitatory effects, reflecting over-learned and well-established associations in participants' memory structures. Longer SOAs of 2000ms allowed the development of conscious expectancies, and differential facilitatory and inhibitory effects were observed. Suslow (1998) hypothesised that if the perceptual sensitivity theory were accurate then high alexithymia would predict affective facilitation on two computerised sequential priming tasks. On a pronunciation and evaluation task response latency was used as the dependent variable. In accordance with the hypothesis, alexithymia (measured using the TAS-20) was positively correlated with affective facilitation effects, supporting Parker et al.'s (1993b) findings and suggesting enhanced automatic processing of affective information. The TAS-20 sub-scale 'difficulties describing feelings' showed a correlation with affective facilitation based on negative stimuli. The

author suggested that the 'difficulties describing feelings' scale tapped aspects of social anxiety or shyness in respect of a difficulty communicating emotions to others, and that a pre-attentive sensitivity to affectively negative stimuli served a defensive function. According to this notion, an individual is able to pre-attentively process the affective valence of the communication of others and avoid communicating their own emotional state for fear of devaluation of the self (Suslow, 1998). The sub-scale 'Externally Oriented Thinking' and the TAS-20 sum score correlated with affective facilitation based on positive stimuli only. A tendency to prioritise positive affective information was interpreted as being advantageous in terms protecting an individual from negative material and contributing to a pragmatic and utilitarian cognitive style.

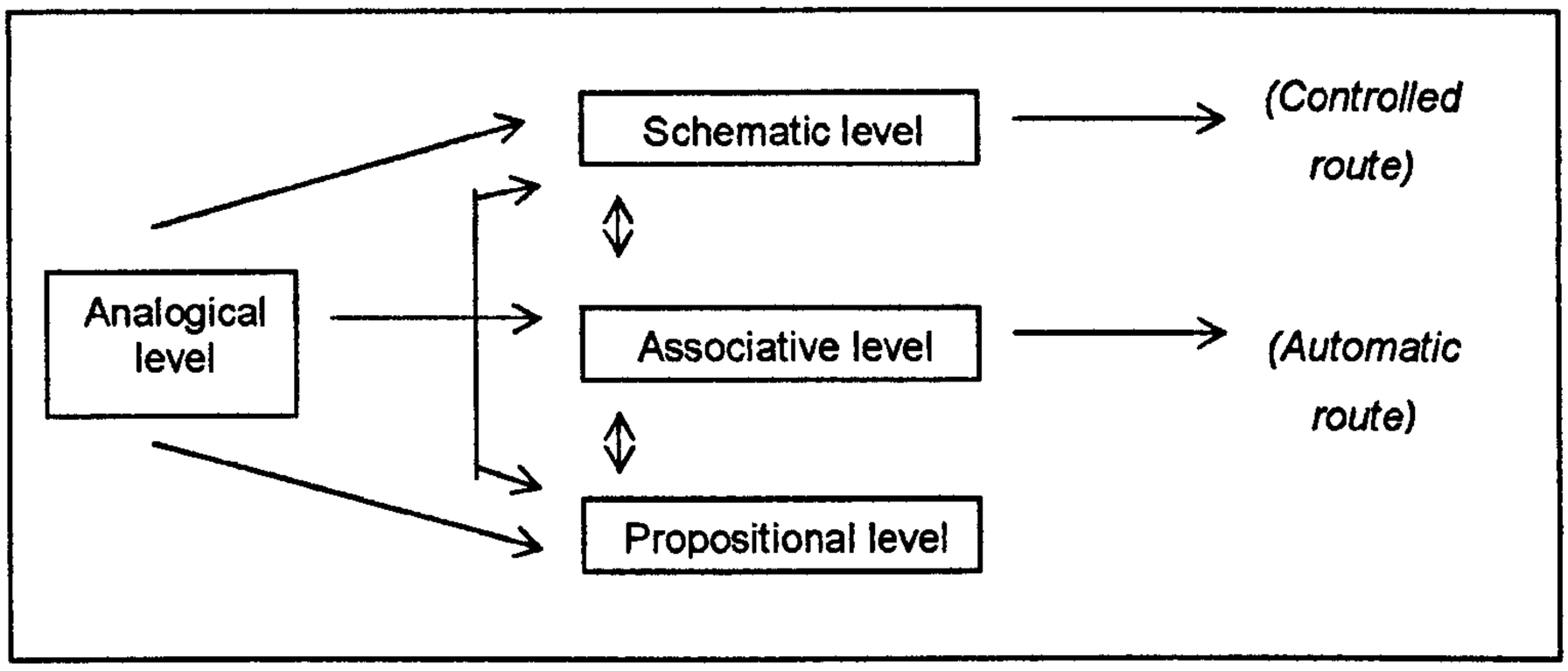
The two papers outlined above appear to provide some credence to the notion that alexithymic individuals may possess an attentional bias to affectively salient information. The idea that a pre-attentive cognitive defence mechanism may be in operation, similar to that observed in anxiety disorders, seeks to explain this apparent paradox, existing as it does within a group of individuals with a supposed *impairment* in identifying and describing emotions. However, there are a number of theoretical and methodological issues that suggest the issue demands further attention. An equivalent study employing the Stroop methodology (Sanchez & Serrano, 1997) failed to replicate Parker et al.'s (1993) findings. Their results indicated an opposite effect in that the alexithymic group were quicker to colour-name arousal words and therefore seemed less able to recognise emotional stimuli. In addition, Lundh and Simonsson-Sarnecki (2002) found that compared to a low alexithymia group, high alexithymics were

significantly slower to colour-name illness words but not negative emotion words in a Stroop study that controlled for the effects of anxiety.

With regard to the effects of affective priming, Suslow, Arolt and Junghans (1998) conducted a preliminary study in which the findings were inconsistent with those reported by Suslow (1998), finding a negative correlation between alexithymia and automatic facilitation effects. Another factor relevant to the strength of Suslow's (1998) findings relates to the construct validity of the groups in the sample. In addition to the limitations of the relatively small sample size, a median split was used to form the alexithymic and non-alexithymic groups based on scores on the TAS-20. Without means and standard deviations for the two groups it is difficult to ascertain with confidence that the groups were sufficiently different from each other in terms of alexithymia, or that the alexithymic group could really be seen to be alexithymic. Suslow (1998) did include TAS-20 data for the *whole* sample (mean=38.9, s.d.=9.9), which falls well within the non-alexithymic range as identified by Taylor et al.'s (1997) cut-off scores. Given the low TAS-20 scores and the results of a subsequent study suggesting that a bias toward evaluating negatively valenced affective stimuli exists independently from alexithymia Suslow, Ohrmann and Arolt (2001), the attribution of Suslow's (1998) is questionable.

Existing findings in support of an automatic perceptual bias toward affective stimuli should perhaps be considered as preliminary in the light of conflicting results and methodological limitations. However, the use of evaluation tasks within an emotion priming paradigm would seem to provide a robust

Figure 1. The SPAARS model of emotions.



platform from which to examine the issue further. The employment of this methodology is also consistent with a recent model of emotion that is based on an extensive review of the existing cognitive models of emotion. The Schematic, Propositional, Analogical and Associative Representation Systems (SPAARS) model (Power & Dalgleish, 1997) identifies different routes by which stimuli may be processed and represented within the cognitive system (see Figure 1).

The model describes how information is processed initially by the senses at the analogical level and passed to one of three parallel representation systems: the associative, the propositional and the schematic. Events can be represented in different ways at each of these levels. For example, if someone were to receive a verbal insult, they would firstly experience this via their auditory and visual sensory systems (the analogical level). This may then be interpreted by a language based mental representation such as, "that person insulted me" (the propositional level). A cycle of appraisals may then occur such as, "other people are harsh and cruel" or, "if that person thinks poorly of me then I must be

worthless" (the schematic level). The SPAARS model proposes that there are two routes to emotional expression. Events may be represented at the propositional level but they need to be appraised at either the schematic or associative level in order for an emotion to be generated. This is considered as the controlled processing route. Power and Dalgleish (1997, p179) also propose that, "emotions can be generated without this appraisal process occurring at the time of the event's occurrence". This can occur after many repetitions of similar events whereby the generation of emotions via the schematic level becomes automatised. Thus a faster, direct or automatic route to the generation of emotions is also proposed.

The notion of a perceptual sensitivity in alexithymia seems congruent with the SPAARS model's proposition of automatic processing. Applying the SPAARS model to the perceptual sensitivity hypothesis in alexithymia, affective facilitation effects may be explained in terms of alexithymic individuals having developed an automatised hyper-vigilance to affective events as a means of defence. The aetiology of such a mechanism is open to question although the role of early experiences or relationships in influencing the subsequent development of cognitive processing and regulation of emotions has been stressed (Taylor, Parker & Bagby, 1999; Glucksman, 2000).

A number of studies have used emotional priming tasks to differentiate between automatic and controlled processing of emotions, notably Power and Brewin's (1990) study of self-esteem regulation and Dalgleish, Cameron, Power and Bond's (1995) study of anxiety. Dalgleish et al.'s (1995) conclusion that

voluntary affect regulation processes present in a control group were absent in the anxious group supported Beck, Emery and Greenberg's (1985) proposition that anxious individuals have a bias towards threat-related material at both a pre-attentive (automatic) *and* a controlled processing level. Comparable findings were reported by Jones (2000) using a similar emotion priming task to study cognitive processes in anger arousal. The present study aimed to replicate the methodology used by Dalgleish et al. (1995) and Jones (2000), with relevant adaptations, in order to test the hypothesis that alexithymic individuals demonstrate an automatic attentional bias toward affective stimuli. The design also enabled an examination of potential qualitative differences in affect processing between alexithymic and non-alexithymic individuals. Theoretically, the aim was to apply the SPAARS model of emotional processing proposed by Power and Dalgleish (1997) to the alexithymia construct with a view to evaluating the role of automatic and controlled routes to emotion.

Method

Design

A mixed within-between subjects design was employed. The between-subjects independent variable was group (high/low alexithymia as measured by the TAS-20). The within-subjects independent variables were type of prime (positively valenced, negatively valenced or neutral), SOA of the primes (250ms or 2000ms) and target adjective (positively or negatively valenced emotional word or non-emotional word). The dependent variables were responses in

classifying target adjectives as emotional or non-emotional words and response times.

Participants

Participants were 75 university students who responded to an advertisement inviting participation in a study of emotion recognition and reaction times to lexical stimuli. All participants attested to being right-handed, native speakers of English, not currently seeking professional help for reasons of mental health, able to read words from a computer screen and over the age of 18. They were offered either research credits or cash in return for their participation. The high- (HA) and low-alexithymia (LA) groups were formed on the basis of scores on the TAS-20. A tercile split was performed on the whole sample, with the upper and lower thirds forming the HA and LA groups respectively.

Apparatus

The emotion priming task was presented using a computer program written specifically for this study, running in MS-DOS on an IBM-compatible personal computer. The computer was powered with Pentium (75 MHz) processor and equipped with 4MB video memory, 16 MB RAM, 1 GB hard disk, a 15" colour monitor and a standard QWERTY keyboard.

Stimulus materials

The primes consisted of 30 sentences describing life events. The sentences were either emotional (positively valenced or negatively valenced) or neutral. Prime sentences were generated for this study and submitted to 10

independent raters (all clinical psychologists rated as non-alexithymic using the TAS-20) who were asked to rate them for their emotional content on a five-point Likert-type scale. Ten sentences were selected for each of the conditions (positive, negative and neutral), matched for word length (F (2,29)=0.716, p>0.05).

The targets consisted of single adjectives of which 20 were descriptive of emotions and 20 were non-emotional. The 20 emotion-related adjectives consisted of 10 positively and 10 negatively valenced words. The conditions were matched for word length (F (2,39)=0.254, p>0.05) and none of the target words were present in the prime sentences. These adjectives were selected for the study using the same procedure as for the primes. Lists of prime and target stimuli are included in Appendix 2.

All the characters presented on-screen were approximately 8mm in height, with prime sentences presented in white and target adjectives presented in yellow, both against a black background.

Measures

In addition to the emotion priming task, participants completed a battery of psychometric measures (see Appendix 3). The purpose of these measures was firstly to ensure accurate assignment to each of the experimental groups, and secondly to minimise the impact of possible confounding variables.

Structured Interview

A brief structured interview was designed for this study to ensure that participants met the inclusion criteria and to collect background demographic information. This information included gender, age, academic subject studied and relevant medical history. Participants were also asked if they had any concerns with regard to completing the psychological questionnaires. The structured interview took 1-2 minutes to complete.

The Twenty-Item Toronto Alexithymia Scale (TAS-20)

The TAS-20 (Bagby, Taylor & Parker, 1994a; Bagby, Taylor & Parker, 1994b) is a revised version of the earlier 26-item version and consists of 20 self-descriptive statements to which respondents indicate the extent to which they agree or disagree on a five-point Likert-type scale. Responses are summed to provide an overall measure of alexithymia. In addition the TAS-20 contains three subscales that can be scored separately. These are: (F1) difficulty identifying and distinguishing between feelings and bodily sensations, (F2) difficulty describing feelings to others, and (F3) extemally orientated thinking (Taylor, Bagby & Luminet, 2000). The TAS-20 has demonstrated good internal consistency (Cronbach's alpha=0.81) and test-retest reliability (r=0.77) and a three-factor structure theoretically congruent with the alexithymia construct (Taylor et al., 1997). Recent findings support the use of the TAS-20 for empirical research although suggest that separate analyses using the subscales may be of limited value (Kooiman, Spinhoven & Trijsburg, 2002). The scale takes approximately 5-10 minutes to complete.

The Beck Depression Inventory (BDI)

The BDI (Beck, Ward, Mendelson, Mock & Erbaugh, 1961) consists of 21 items that assess symptoms corresponding to criteria for diagnosing depressive disorder. It is a self-rating questionnaire with each of the items containing several self-descriptive statements ranked in order of severity and scored on a four-point scale (0-3) accordingly. The respondent is instructed to choose the statement in each group that best describes how they have been feeling over the last two weeks. The BDI is scored by summing the scores for each of the 21 items, and the summed score yields an estimated level of depression. The scale has been used extensively both clinically and for research purposes (see Beck, Steer & Garbin (1988) for a review). The split-half reliability of the BDI is approximately 0.95 and its test-retest reliability is approximately 0.73 (Lindsay & Powell, 1994). The BDI takes approximately 5-10 minutes to complete.

The Symptom Checklist (SCL90-R)

The SCL90-R (Derogatis, 1977) is a self-report questionnaire consisting of 90 items that cover a range of psychiatric and medical symptoms. Each of the items details a symptom and respondents are required to rate each one on a five-point Likert-type scale (0-4) indicating their level of distress at experiencing this symptom. The 90 items contain nine primary symptom sub-scales (somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism) and three global indices of distress (global severity index, positive symptom distress index and positive symptom total). Test-retest reliability co-efficients range from 0.8 to 0.9

(Derogatis, 1977). The SCL90-R takes approximately 10-15 minutes to complete.

Procedure

All testing was conducted in a small room, purpose-built for computer-based psychological research and free from auditory or visual distractions. Participants were asked to participate in a study of emotion recognition and its effects on responses to lexical stimuli. They were informed that the study entailed participation in a short computer task, completion of psychological questionnaires and the collection of background demographic information (see Appendix 4). They were asked to sign a form indicating their consent to participate (see Appendix 5). After the brief structured interview, written instructions for the emotion priming task were read aloud to participants (see Appendix 6). These indicated that prior to seeing the target word on screen they would see a short sentence describing a life event, and that they should read this sentence without responding to it. They would then be presented with the target word and make a decision about whether the word was emotion-related or not. The instructions stated that they should respond as quickly as possible, indicating their response by pressing one of two keys (Y for 'yes' and N for 'no') with their index fingers. In order to control for the possibility of response facilitation due to hand dominance, the instructions regarding which index fingers (right or left) were poised over the Y and N keys were reversed after each participant.

Participants then completed the emotion priming task, beginning with nine practice trials followed by the 240 experimental trials. All display presentations

were synchronised with the vertical retrace of the computer monitor. The program presented the prime stimulus (e.g. "You make a new friend") for either 250ms or 2000ms. In order to limit a possible anticipatory effect, the short and long SOA presentations were randomised by the program. A 20ms pattern mask, consisting of a row of random characters, overwrote this display in order to wipe iconic memory. The target adjective subsequently appeared and remained on screen until the participant pressed one of the two keys, at which point their response time was recorded, accurate to within 1ms. There was a 500ms delay before the next trial was presented. The 240 trials were presented in four blocks with the opportunity for a rest in between each block. The computer program recorded responses and response times in a data file along with the nature of the primes and targets and the SOA for each trial.

Subsequent to the emotion priming task, participants completed the psychometric questionnaires. Following completion of these, participants were given the opportunity to raise any questions or concerns and debriefed accordingly. A brief check on mental state was made before each participant left the room. The entire experimental session lasted for approximately 45 minutes.

Results

Descriptive statistics

The high- (HA) and low-alexithymia (LA) groups were formed by dividing the sample into three on the basis of their TAS-20 scores, selecting the highest and lowest scoring thirds to form the two groups. The characteristics of both groups are shown in Table 1. Comparisons of the two groups were made using an independent samples t-test. This revealed significant differences between the groups on their TAS-20 scores, consistent with the planned design. The mean TAS-20 score (59.24) of the HA group fell just short of the alexithymic cut-off score of 61 recommended by Taylor et al. (1997). However, they were distinctly different from the LA group, whose mean TAS-20 score of 33.24 was well below Taylor et al's (1997) non-alexithymic cut-off score of 51.

Table 1. Descriptive statistics for the experimental groups.

	High Alexithymia Group		Low Alexithymia Group		t (df=48)	p
Gender (M/F)	12/13		2/23			
	Mean	**S.D.**	**Mean**	**S.D.**		
Age	21.72	5.06	25.20	5.61	-2.30	0.026
TAS-20	59.24	8.19	33.24	3.59	14.52	0.000
BDI	12.24	11.35	4.32	4.17	3.27	0.003
SCL90-R GSI	72.32	73.83	27.36	30.30	2.82	0.008

The analysis also revealed significant differences between the groups in terms of age, BDI and the Global Severity Index (GSI) of the SCL90-R, with the HA group being younger, more depressed and exhibiting higher levels of psychological distress. A chi-square analysis also revealed a significant difference in relation to distribution of gender between the groups (χ^2(df=1)=9.921, p<0.01). The potential confounding influence presented by the differences is discussed below.

Emotion priming task data

Overview

The software controlling the emotion priming computer task was designed to output the following data for each of the 240 trials completed by participants: SOA of the prime (250ms or 2000ms), type of prime (positive, neutral or negative), type of target adjective (positively/negatively valenced emotional word or non-emotional word), type of response ('yes' or 'no') and response time in ms. The dependent variables were the type of responses made (e.g., whether or not participants indicated emotional adjectives to be such) and the time taken to make a response. The analysis of the emotion priming task data is presented in two main stages, with response and response time addressed separately.

Prior to analyses of both responses and response times, potential covariates (age, BDI score and GSI score) were checked for correlation with each of the nine (SOA(2) x prime (3) x target(3)) dependent variables in relation to both responses and response times. No significant correlations were found and therefore they were not included as covariates in the main analysis.

Analysis of response times

Similar to results reported in previous emotion priming studies (Dalgleish et al., 1995; Jones, 2000; Crowley, 2002), a Kolmogorov-Smirnov test revealed that the distributions of the response time data were positively skewed. In order to approximate a normal distribution the data were transformed for analysis using a natural log transformation. Consistent with previous studies of emotional priming, exceptionally long (>5000ms) response times and those too short (<200ms) to reflect a genuine response to the stimulus were excluded prior to transformation to reduce the influence of outliers (<0.2%). For ease of reference the raw response times are presented here. The mean times taken for participants to correctly identify target adjectives as emotional or non-emotional are presented in Table 2. A further issue with the response time data relates to 'empty cells', whereby a small number of participants (n=4) did not make any correct classifications within a given condition. In two cases a within-subject mean for response times following the relevant SOA of prime was substituted. In a further two cases, where the number of empty cells exceeded three per SOA of prime, the data were excluded from the analysis. This was deemed to be the best compromise between preserving the integrity of the response time data and maintaining the numbers of participants within each group.

Table 2. Mean response times for both groups across all conditions (ms).

		SOA of prime = 250ms			SOA of prime = 2000ms		
	Target*	Pos	N-E	Neg	Pos	N-E	Neg
Group	Prime	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
HA	Positive	842.5 (187.4)	925.8 (201.0)	922.2 (267.4)	773.0 (147.0)	875.8 (182.5)	897.8 (356.3)
	Neutral	821.9 (208.1)	929.9 (225.8)	890.6 (233.2)	854.4 (284.3)	885.3 (227.9)	880.9 (288.1)
	Negative	908.4 (304.4)	927.1 (264.9)	899.1 (258.8)	821.7 (244.1)	871.9 (169.7)	880.1 (192.2)
LA	Positive	771.1 (171.3)	898.5 (241.4)	835.5 (237.3)	762.5 (151.0)	902.5 (266.5)	931.9 (266.5)
	Neutral	758.0 (172.3)	822.6 (209.0)	838.9 (192.3)	775.9 (172.1)	870.7 (173.5)	822.5 (151.4)
	Negative	774.4 (177.9)	881.0 (228.0)	830.0 (193.5)	784.6 (163.0)	917.4 (279.2)	830.1 (166.9)

*Valence of target adjective: pos=positive, N-E=non-emotional, neg=negative

A 2(group) x 2(SOA) x 3(prime) x 3(target) mixed ANOVA was conducted on the response time data. A main effect for target, $F(2,45)=16.48$, $p<0.001$), was shown, indicating that both groups responded faster following presentation of a positively-valenced emotional adjective, compared to negatively-valenced or non-emotional adjectives. Additionally, a significant SOA x group interaction, $F(1, 46)=10.10$, $p<0.005$), showed that across all conditions the HA group were slower than the LA group to respond following presentations of primes at the

short SOA, whereas there was no difference between the groups at the long SOA. No other significant effects were found.

As group was not found to interact with prime or target valence, to test the specific predictions of the perceptual sensitivity hypothesis, a series of independent samples t-tests were conducted to examine whether the HA group responded faster to emotional target adjectives following emotional primes at both SOAs. When a positively valenced target adjective was presented following a negative prime at an SOA of 250ms, the HA group was significantly *slower* to respond (t (df=47) =2.29, p<0.05). No other significant differences between the groups were found and contrary to the prediction of the perceptual sensitivity hypothesis, alexithymia was not found to be associated with any facilitation effects in prime-target valence-congruent conditions.

Analysis of responses

The mean percentage rate of response errors for both groups across each type of SOA, prime and target condition is shown in Table 3. A 2(group) x 2(SOA) x 3(prime) x 3(target) mixed analysis of variance (ANOVA) was conducted on the response data. Main effects were explored using pairwise comparisons. This showed main effects for group (F (1,48)=5.85, p<0.05), with the HA group making significantly more errors overall (p<0.05), and type of prime (F (2,48)=4.82, p<0.01), with significantly less errors being made following presentation of neutral primes (p<0.05). In addition, there were significant

Table 3. Mean percentage rate of response errors for both groups across all conditions.

		SOA of prime = 250ms			SOA of prime = 2000ms		
	Target*	Pos	N-E	Neg	Pos	N-E	Neg
Group	Prime	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
HA	Positive	17.20 (19.26)	26.20 (24.55)	37.60 (34.56)	16.40 (16.80)	23.60 (21.78)	42.40 (39.72)
	Neutral	29.60 (31.82)	26.80 (20.15)	34.40 (36.18)	34.80 (35.25)	19.60 (19.63)	39.20 (36.16)
	Negative	36.40 (37.18)	20.60 (20.58)	22.80 (22.08)	43.20 (38.05)	15.40 (17.19)	19.20 (15.5)
LA	Positive	6.80 (9.00)	21.00 (28.54)	21.60 (24.95)	6.80 (9.88)	21.00 (29.33)	21.20 (27.43)
	Neutral	11.20 (24.47)	22.00 (30.96)	19.60 (27.46)	13.20 (23.76)	20.80 (27.75)	22.00 (29.58)
	Negative	16.00 (24.32)	21.40 (29.28)	14.40 (15.57)	11.60 (23.22)	18.80 (29.45)	14.40 (13.87)

*Valence of target adjective: pos=positive, N-E=non-emotional, neg=negative.

interactions for SOA x target (F (2,48)=5.71, p<0.005), SOA x target x group (F (2,48)=3.62, p<0.05), target x prime (F (4,48)=13.05, p<0.001) and target x prime x group (F (4,48)=3.45, p<0.01).

To explore the interactions listed above, a series of sub-ANOVAs (Jones, 2000) were performed for each of the groups separately at each SOA of prime.

Main effects were explored using pairwise comparisons. For the HA group at an SOA of 250ms, the main effects of target and prime were not significant although the target x prime interaction was significant (F (4,23)=6.11, p<0.001). Each type of target adjective was then analysed separately using further ANOVAs. For positively-valenced emotional targets there was a significant effect of prime (F (2,23)=7.52, p<0.001). Pairwise comparisons revealed that the HA group correctly identified significantly more positively-valenced target adjectives when they were preceded by a positive prime, compared to a neutral prime (p<0.05) or a negatively-valenced emotional prime (p<0.005). Thus, for the HA group at an SOA of 250ms, a prime-target congruence effect was observed for positive emotional stimuli, with congruence producing fewer errors. For non-emotional targets, there was also a significant effect of prime (F (2,23)=3.76, p<0.05). The HA group correctly identified significantly more non-emotional targets when they were preceded by a negative prime (p<0.01). For negatively-valenced emotional targets, there was again a significant effect of prime (F (2,23)=3.85, p<0.05). The HA group correctly identified significantly more negatively-valenced emotional targets when they were preceded by a negative prime compared to a positive prime (p<0.05). Again, prime-target congruence reduced errors.

For the HA group at an SOA of 2000ms there were significant main effects of target (F (2,23)=3.29, p<0.05) and prime (F (2,23)=3.45, p<0.05) and the target x prime interaction was also significant (F (4,23)=13.623, p<0.001). The increased difference in mean error rate following negatively-valenced as opposed to non-emotional targets just failed to reach significance (p>0.05) although significantly more errors were made following neutral primes when

compared to negative primes (p<0.05). For positively-valenced emotional targets there was a significant effect of prime (F (2,23)=14.39, p<0.001) with responses following each type of prime differing significantly from all the others. The fewest errors were made following positive (congruent) primes and this differed significantly from neutral primes (p<0.01) and negative primes (p<0.001). The most errors were made following negative primes, these differing significantly from neutral (p<0.05) and positive (p<0.001). For non-emotional targets there was also a significant effect of prime (F (2,23)=5.54, p<0.01) with significantly more errors made following presentation of negative primes than positive (p<0.01). The same prime effect was again observed in relation to negatively-valenced emotional targets (F (2,23)=10.33, p<0.001), with significantly fewer errors made following negative (congruent) primes, compared to positive (p<0.01) or neutral (p<0.01).

For the LA group at an SOA of 250ms there was no effect of target or prime although the target x prime interaction was significant (F (4,23)=3.05, p<0.05). For the positively-valenced targets, there was a main effect of prime (F (2,23)=3.88, p<0.05) with significantly fewer errors being made following positive (congruent) primes as opposed to negative (p<0.05). For non-emotional or negatively-valenced emotional targets, type of prime did not have a significant effect on error rates. For the LA group at an SOA of 2000ms no significant main effects or interactions were observed although errors in responses to positively-valenced emotional targets were significantly reduced when targets were preceded by positive (congruent) primes rather than negative (p<0.001).

Error rates of both groups were reduced by congruence in prime-target valence, similar to the endorsement effects noted by Power et al. (1996) and Crowley (2002). The effect was more pronounced in the HA group where it extended to negative as well as positive emotional congruence. For the HA group, prime-target congruence reduced response errors, irrespective of SOA of prime, although in comparison to an SOA of 250ms the longer SOA of 2000ms had the effect of reducing errors in response to non-emotional targets and increasing errors in response to both types of emotional target. For the LA group, SOA made no difference to responses.

Post-hoc analysis

Given the depth of literature correlating alexithymia with other measures of psychological distress, the data were re-examined to further explore the potential confounding influence of co-existing psychological pathology. A mixed ANOVA was conducted with BDI score as the group variable, with the whole sample divided into two groups using a score of 10 as the cut-off point for caseness (Williams, 1992). Analysis of responses indicated that the main effect of group was not significant (F (1,73)=0.13, p>0.05) and there were no significant interactions between group and other variables. Group was also not significant in analysis of response times (F (1,70)=0.15, p>0.05) and did not interact significantly with other variables. This process was repeated with SCL-90 GSI score as the group variable and a score of 77 for females and 81 for males as the cut-off for caseness (Derogatis, 1977) dividing the two groups. Again, the main effect of group was not significant in relation to either responses (F (1,73)=0.01, p>0.05) or response times (F (1,70)=0.28, p>0.05). Group did not interact

significantly with other variables in relation to responses or response times. In summary, BDI and GSI scores did not predict differential responses to the dependent variables of response errors and response times. This finding is reassuring and strengthens the assertion that the results from the main analyses are a function of alexithymia and not psychological distress.

Discussion

This study aimed to investigate Suslow's (1998) perceptual sensitivity hypothesis by applying the emotion priming paradigm to the alexithymia construct. In order to support the notion that individuals scoring highly on measures of alexithymia have an increased sensitivity to emotional stimuli at a pre-attentive level, the study attempted to discover whether the HA group's response times to affective stimuli were facilitated by the presentation of affective primes at an SOA of 250ms, in comparison to the LA group. Additionally, the study sought to widen the application of emotion priming to alexithymia and build on previous research in this area (e.g. Suslow et al., 1998; Suslow, 1998; Suslow, Ohrmann and Arolt (2001); Suslow & Junghanns, 2002) through methodological refinements, most notably by recording and analysing the *types* of responses made to the word evaluation task as well as the response times.

The study found no clear evidence to support the notion that alexithymia is associated with enhanced automatic processing of affective stimuli as the response times of the HA group following affective primes at an SOA of 250ms

did not differ with those of the LA group, with the exception of the negative prime-positive target condition. Contrary to the prediction of the perceptual sensitivity hypothesis, the HA group were *slower* to respond in all conditions at the short SOA. Negative primes were found to significantly *inhibit* response times to positive targets, also at the short SOA, a result that may have been an artefact of the previously reported inhibitory effect of negative primes at an automatic level. This has been said to stem from an involuntary allocation of attentional resources to negative information, which from an evolutionary perspective, has been said to serve an adaptive, protective function (Fiske, 1980). Although some facilitation was observed among responses to positively valenced target adjectives, this effect applied to participants in both groups and alexithymia was not found to be a determining factor. Given that the groups did not differ in response times at the long SOA, the finding that the HA group were slower to respond at the short SOA seems more suggestive of high alexithymia being associated with poorly developed automatic processing capabilities rather than enhanced sensitivity. If Power and Dalgleish's (1997) assertion of an automatic route to emotional processing is accepted, the slower responses of the HA group, taken together with the *faster* response times of the LA group at the short SOA, in the context of both groups' performance at the long SOA, is interesting. One interpretation of the data could be that such an automatised route is present in non-alexithymic individuals but is impaired in those who are alexithymic. Additional studies, employing larger and more rigorously controlled samples would be needed to explore this possibility further. In relation to the possibility of perceptual sensitivity in alexithymia, the discrepancy between the findings of the present study and those of Suslow (1998) may in part be explained by the fact that the

participants in that study had relatively low alexithymia scores (mean=38.9, S.D.=9.9) and were more akin to the LA group than the HA group in the present study. Thus, the affective facilitation effects that were observed in both studies (e.g. faster response times following positive stimuli), and were attributed to alexithymia in the former, may indeed be common irrespective of this factor, as suggested by Suslow, Ohrmann and Arolt (2001).

As well as having slower response times than the LA group at the short SOA, the HA group also made more errors in classifying emotional target adjectives. This is perhaps not surprising, given the traditional view of alexithymia as characterised by impairment in emotional recognition and an inverse correlation with emotional intelligence (Parker, Taylor & Bagby, 2001). The present findings seem to support this view, although the differential pattern of errors raises a number of points of interest. Firstly, both groups made more errors following emotional primes, suggesting that the presentation of affective information interfered with the subsequent classification task. This might be construed as further evidence for an affective 'vigilance effect' whereby attention is automatically allocated to emotionally-laden stimuli (Fiske, 1982), although the effect seemed to apply irrespective of direction of valence and group. The tendency for both groups to make fewer errors in prime-target congruent conditions may also support this idea, as it suggests prior processing of a prime facilitates processing of subsequent affectively-related material (Hermans, de Houwer & Eelen, 1994). The observation that this congruence effect was much more pronounced in the HA group than the LA group, extending to negative-negative, as well as positive-positive, prime-target valence congruent conditions

might suggest that alexithymic individuals demonstrate more rigidity in processing affective information. This might predict that they could experience more difficulty in processing elements of situations that are emotionally complex or ambiguous due to a simplified or more dichotomous appraisal. Such a deficit could have consequences for social interaction and self-esteem regulation

Another notable feature of the pattern of errors among the HA group was that whilst prime-target congruence reduced errors at both the short and the long SOA, the longer SOA had the effect of reducing errors in response to non-emotional targets and increasing errors in response to positively and negatively valenced targets. Thus, the increased presentation time my have allowed conscious expectancies to develop, which, irrespective of the type of prime, seemed to impair the HA group's processing of affective stimuli. This finding is curious as, according to Neely (1977), exposure to longer SOAs should enable both automatic and controlled processing to occur and therefore processing capabilities observed following a short SOA should also be observed following a longer SOA. One possible explanation is that for more alexithymic individuals, longer exposure to primes demands an increased allocation of attentional resources and makes identification of subsequently presented affective stimuli, a task at which they may be naturally more error-prone, even more difficult. From the perspective of the SPAARS model, presentations at the longer SOA tap the controlled emotional processing route where inputs are appraised at the schematic level (Power & Dalgleish, 1999). It has been suggested that alexithymia reflects a difficulty in the cognitive appraisal and modulation of emotional experiences (Kreitler, 2002) and neurobiological explanations for this

have been forwarded (LeDoux, 1996; Taylor et al., 1999). In the current study, the observed rigidity of responses in the HA group and the increase in errors following emotional targets at the long SOA may provide further support for this conceptualisation of alexithymia. The HA group may be demonstrating less processing engagement toward affective stimuli due to poorly developed cognitive representations at the schematic level and they subsequently respond more quickly but less accurately than they do following presentations at the short SOA, which tap automatic processing capabilities. In this respect, the findings of the current study echo the notion of a de-coupling between emotional perception and cognitive appraisal suggested by previous authors including Bermond (1995) and Houtveen, Bermond and Elton (1997).

It is also possible that the tendency of the HA group to respond faster but less accurately at the long SOA in comparison with the short SOA was the reflection of a speed-accuracy trade off effect. However, across both SOAs, the HA group were slower and made more errors than the LA group. Therefore, one should consider the conclusion that not only do alexithymic individuals need longer to process information and formulate a response, but their responses to affective stimuli are more likely to be compromised.

Whilst the findings of the present study are consistent in many respects with previous work on emotion priming, there are also some notable contrasts with the limited number of studies that have used the paradigm to study alexithymia. This study introduced a number of methodological refinements upon previous work in the area, combining the inclusion of more stringent criteria for

group selection, simultaneous examination of automatic and controlled processing, the inclusion of neutral target conditions, the use of situation primes, controlling for the effects of psychological distress and analysing responses as well as response times. These factors may have contributed to differences between the results of this and previous studies and there is a need for greater methodological standardisation in order that different studies may be compared more meaningfully.

The results of the present study should be in considered in the context of certain limitations of the design. The generalisibility of the findings may be restricted as the sample consisted of university students and the study was concerned solely with a non-clinical population. Participants were young adults and whilst there has been no research to suggest age is a determining factor in alexithymia, the findings are not necessarily applicable across the age range. The HA group contained a high proportion of males and the observed effects may not be relevant to a group of highly alexithymic females. Comparative population studies in a range of countries are needed to find out whether there are any differences in the nature and prevalence of alexithymia between males and females (Salminen et al., 1999). It is also possible that among a group perhaps unused to mental health assessment measures, a desire to appear healthy may have influenced questionnaire responses. Further studies with a wider range of populations would be helpful in clarifying these issues.

The limitations of the emotion priming task in terms of approximating the manner in which affective information might be processed in a more natural

setting must also be considered. Pictorial stimuli, such as posed facial expressions, rather than verbal stimuli would provide an alternative medium for studying the relevant processes although a previous priming study using emotional faces found no differences related to alexithymia (Suslow, Junghanns, Donges & Arolt, 2001). There may have been a degree of habituation to negatively-valenced stimuli as they were seen repeatedly throughout the block of testing (McKenna & Scharma, 1995). With reference to Fiske's (1980) theory of affective vigilance, the large number of trials may have served to reduce the 'threatening' impact of negative valence and therefore reduced the ecological validity of the resultant effects upon cognitive processing.

From a statistical perspective, psychiatric symptomatology did not prove to be a significant confound in the present study, although the inter-relationship between alexithymia and psychological distress, as evidenced by the high correlations found between the TAS-20 and measures such as the BDI and SCL-90R, is worthy of note. Specific priming effects have been noted in relation to depression (Crowley, 2002) and anxiety (Dalgleish et al., 1995) and this may influence studies of alexithymia, even among non-clinical populations. The correlation also raises questions about the direction of the relationship and the more fundamental issue of the validity of the alexithymia construct as an independent phenomenon. It is not certain whether alexithymia as observed as a variation in emotional intelligence among the non-clinical population has the same basis as in someone presenting with an identifiable psychiatric or physical illness and/or a past history of emotional trauma. Prospective studies are needed to examine this relationship further and studies of alexithymic individuals

scoring below caseness on measures of psychiatric symptomatology would be a useful addition to the evidence base.

Power and Dalgleish (1999) highlighted the need for clinicians to be aware of different routes in the processing and generation of emotions in that therapeutic techniques for working with emotional disorders may vary according to the primary route involved. Cognitive research into alexithymia is at a relatively early stage in its development and firm recommendations for therapeutic intervention would be premature. However, it has long been suggested that insight-orientated psychotherapies are unlikely to be successful (Taylor et al., 1999). If alexithymia reflects a deficit in processing at a schematic level it may be possible to mediate processing capabilities through certain forms of cognitive therapy and the learning of compensatory strategies. If alexithymia is primarily an automatic processing phenomenon it is likely to be far more resistant to therapeutic intervention.

Conclusion

The results of the present experimental study applying the emotion priming paradigm to the alexithymia construct appear to confirm clinical observations that alexithymia is characterised by an impairment of emotion recognition. Alexithymic participants were slower to respond to target adjectives and made more classification errors. Some support was found for the theoretical assumption that the processing deficit associated with alexithymia occurs in the

cognitive appraisal of emotional stimuli. No clear support was found for the notion that alexithymic individuals possess a heightened pre-attentive sensitivity to affective stimuli although more experimental studies are needed to produce more definitive conclusions. Whilst the findings of the study are subject to a number of limitations, the emotion priming paradigm is forwarded as a useful method for experimental research in this area. The current evidence base of alexithymia does not allow for firm recommendations for therapeutic intervention although cognitive approaches may be indicated if certain cognitive models of alexithymia continue to receive empirical support.

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Appendix 1

Statement of ethical approval.

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JO/DT

6 March 2002

Richard Bennett
Clinical Psychology Trainee
School of Psychology
University of Birmingham

Dear Richard,

Is alexithymia associated with a perceptual sensitivity to affective stimuli

Your proposal has now been looked at by members of the ethics committee, and I am pleased to say that the view is that it meets BPS criteria. One detail that we suggest you add to the consent form, is the guarantee to participants that they can require that their data is destroyed should they choose to leave the study. You can take this letter as signifying our approval to proceed, but if you could let me have a slightly revised consent form for our files as soon as you are able, that would be helpful

Good luck with your research.

Yours sincerely.

Jim Orford
Chair: School Human Research Ethics Committee

copy to Dr Oliver Mason

Appendix 2

List of prime and target stimuli.

PRIME SENTENCES

POSITIVE

1. An ill friend recovers
2. Things go well with your partner
3. You get on well with your family
4. You get a good job
5. You pass an important test
6. You achieve a lifelong goal
7. You get married
8. You win the lottery
9. You have a good holiday
10. You enjoy a night out

NEUTRAL

1. You walk down the stairs
2. You sit on a chair
3. You walk past someone
4. You put the kettle on
5. You open the door
6. You have a quiet day
7. Your friend watches television
8. Your watch needs winding

9. You drive a car
10. You fill out a form

NEGATIVE

1. Your best friend dies
2. Your loved one leaves you
3. Your best friend commits suicide
4. Your loved one gets cancer
5. You are sacked
6. You fail an interview
7. You are assaulted
8. You have a serious accident
9. You become seriously ill
10. Your life is in danger

TARGET WORDS

EMOTIONAL

1. Tense
2. Elated
3. Affectionate
4. Thoughtful
5. Overjoyed
6. Nervous
7. Pleased

8. Warm-hearted
9. Loving
10. Joyful
11. Afraid
12. Disappointed
13. Sad
14. Remorseful
15. Disgusted
16. Contemptuous
17. Angry
18. Aggressive
19. Optimistic
20. Happy

NON-EMOTIONAL

1. Muscular
2. Trainee
3. Handsome
4. Stout
5. Spotless
6. Unreliable
7. Remarkable
8. Punctual
9. Diligent
10. Reputable

11. Practical

12. Academic

13. Diplomatic

14. Logical

15. Depraved

16. Prejudiced

17. Obedient

18. Blunt

19. Thorough

20. Veteran

Appendix 3

Measures used in the study.

STRUCTURED INTERVIEW

1. Gender Male Female
2. Age ☐
3. Is English your first language? Yes No
4. Are you right-handed? Yes No
5. Highest level of academic qualification ☐
6. Subject currently studying ☐
7. Have you ever suffered a head injury e.g. been knocked unconscious?

   Yes No
8. Do you have any medical condition that would affect your ability to look at the computer screen e.g. epilepsy? Yes No
9. Are you currently seeing a health care professional for reasons of mental health?

   Yes No
10. Are you currently on any psychiatric medication? Yes No
11. Some of the measures used in this study are routinely used by clinical psychologists to assess the state of people's mental health. Do you have any concerns about being asked to complete them? Yes No

M / F Age: Date: ID #:

TAS – 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 analyse 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

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, 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 usu
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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	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

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.

_____ Subtotal Page 2

_____ Subtotal Page 1

_____ Total Score

SCL-90-R

Name: _____ Sex: M F

Date: _____ Date of Birth: _____

Marital Status: Married Separated Divorced Widowed Single

INSTRUCTIONS:

Below is a list of problems people sometimes have. Please read each one carefully, and circle the number to the right that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY. Circle only one number for each problem and do not skip any items.

If you change your mind, erase your first mark carefully. Read the example below before beginning, and if you have any questions please ask about them.

Example:	Not at all	A little bit	Moderately	Quite a bit	Extremely
	0	1	2	3	4

How much were you distressed by

Bodyaches		0	1	2	3	4

HOW MUCH WERE YOU DISTRESSED BY:

1. Headaches	1	0	1	2	3	4
2. Nervousness or shakiness inside	2	0	1	2	3	4
3. Repeated unpleasant thoughts that won't leave your mind	3	0	1	2	3	4
4. Faintness or dizziness	4	0	1	2	3	4
5. Loss of sexual interest or pleasure	5	0	1	2	3	4
6. Feeling critical of others	6	0	1	2	3	4
7. The idea that someone else can control your thoughts	7	0	1	2	3	4
8. Feeling others are to blame for most of your troubles	8	0	1	2	3	4
9. Trouble remembering things	9	0	1	2	3	4
10. Worried about sloppiness or carelessness	10	0	1	2	3	4
11. Feeling easily annoyed or irritated	11	0	1	2	3	4
12. Pains in heart or chest	12	0	1	2	3	4
13. Feeling afraid in open spaces	13	0	1	2	3	4
14. Feeling low in energy or slowed down	14	0	1	2	3	4
15. Thoughts of ending your life	15	0	1	2	3	4
16. Hearing voices that other people do not hear	16	0	1	2	3	4
17.Trembling	17	0	1	2	3	4
18. Feeling that most people cannot be trusted	18	0	1	2	3	4
19. Poor appetite	19	0	1	2	3	4
20. Crying easily	20	0	1	2	3	4
21. Feeling shy or uneasy with the opposite sex	21	0	1	2	3	4
22. Feelings of being trapped or caught	22	0	1	2	3	4
23. Suddenly scared for no reason	23	0	1	2	3	4
24. Temper outbursts that you could not control	24	0	1	3	3	4
25. Feeling afraid to go out of the house alone	25	0	1	2	3	4
26. Blaming yourself for things	26	0	1	2	3	4
27 Pains in the lower back	27	0	1	2	3	4
28. Feeling blocked in getting things done	28	0	1	2	3	4
29. Feeling lonely	29	0	1	2	3	4
30. Feeling blue	30	0	1	2	3	4
31. Worrying too much about things	31	0	1	2	3	4
32. Feeling no interest in things	32	0	1	2	3	4
33. Feeling fearful	33	0	1	2	3	4

34. Your feelings being easily hurt	34	0	1	2	3	4
35. Other people being aware of your private thoughts	35	0	1	2	3	4
36. Feeling others do not understand you or are unsympathetic	36	0	1	2	3	4
37. Feeling that people are unfriendly or dislike you	37	0	1	2	3	4
38. Having to do things slowly to ensure correctness	38	0	1	2	3	4
39. Heart pounding or racing	39	0	1	2	3	4
40. Nausea or upset stomach	40	0	1	2	3	4
41. Feeling inferior to others	41	0	1	2	3	4
42. Soreness of your muscles	42	0	1	2	3	4
43. Feeling that you are watched or being talked about by others	43	0	1	2	3	4
44. Trouble falling asleep	44	0	1	2	3	4
45. Having to check and double check what you do	45	0	1	2	3	4
46. Difficulty making decisions	46	0	1	2	3	4
47. Feeling afraid to travel on buses, the underground, or trains	47	0	1	2	3	4
48. Trouble getting your breath	48	0	1	2	3	4
49. Hot or cold spells	49	0	1	2	3	4
50. Having to avoid certain places, or activities because they frighten you	50	0	1	2	3	4
5. Your mind going blank	51	0	1	2	3	4
52. Numbness or tingling in parts of your body	52	0	1	2	3	4
53. A lump in your throat	53	0	1	2	3	4
54. Feeling hopeless about the future	54	0	1	2	3	4
55. Trouble concentrating	55	0	1	2	3	4
56. Feeling weak in parts of your body	56	0	1	2	3	4
57. Feeling tense or keyed up	57	0	1	2	3	4
58. Heavy feelings in your arms or legs	58	0	1	2	3	4
59. Thoughts of death or dying	59	0	1	2	3	4
60. Overeating	60	0	1	2	3	4
61. Feeling uneasy when people are watching or talking about you	61	0	1	2	3	4
62. Having thoughts that are not your own	62	0	1	2	3	4
63. Having urges to hit, injure or harm someone	63	0	1	2	3	4
64. Awakening early in the morning	64	0	1	2	3	4
65. Having to repeat the same actions such as touching,counting,washing	65	0	1	2	3	4
66. Sleep that is restless or disturbed	66	0	1	2	3	4
67. Having urges to break or smash things	67	0	1	2	3	4
68. Having ideas or beliefs that others do not share	68	0	1	2	3	4
69. Feeling very self-conscious with others	69	0	1	2	3	4
70. Feeling uneasy in crowds, such as shopping or at the cinema	70	0	1	2	3	4
71. Feeling everything is an effort	71	0	1	2	3	4
72. Spells of terror or panic	72	0	1	2	3	4
73. Feeling uncomfortable about eating or drinking in public	73	0	1	2	3	4
74. Getting into frequent arguments	74	0	1	2	3	4
75. Feeling nervous when you are left alone	75	0	1	2	3	4
76. Others not giving you proper credit for your achievements	76	0	1	2	3	4
77. Feeling lonely even when you are with people	77	0	1	2	3	4
78. Feeling so restless you couldn't sit still	78	0	1	2	3	4
79. Feelings of worthlessness	79	0	1	2	3	4
80. The feeling that something bad is going to happen to you	80	0	1	2	3	4
81. Shouting or throwing things	81	0	1	2	3	4
82. Feeling afraid you will faint in public	82	0	1	2	3	4
83. Feeling that people will take advantage of you if you let them	83	0	1	2	3	4
84. Having thoughts about sex that bother you a lot	84	0	1	2	3	4
85. The idea that you should be punished for your sins	85	0	1	2	3	4
86. Thoughts and images of a frightening nature	86	0	1	2	3	4
87. The idea that something serious is wrong with your body	87	0	1	2	3	4
88. Never feeling close to another person	88	0	1	2	3	4
89. Feelings of guilt	89	0	1	2	3	4
90. The idea that something is wrong with your mind	90	0	1	2	3	4

Appendix 4

Information sheet.

IS ALEXITHYMIA ASSOCIATED WITH A PERCEPTUAL SENSITIVITY TO AFFECTIVE STIMULI?

Thank you for considering participating in this study.

I am studying for a Doctorate in Clinical Psychology at the University of Birmingham. As part of this course I am conducting a research study under the academic supervision of Dr Oliver Mason.

The study is concerned with the way that people experience emotions. In particular it is concerned with the thought processes that occur when people receive and interpret emotional stimuli. The information gained from the study will help improve our understanding of how emotional stimuli are processed and how best to help people who find it difficult to understand and explain how they or others are feeling.

If you decide to participate in this study you will be asked to complete several short questionnaires. These questionnaires are often used by clinical psychologists both in research and in health care to collect psychological information. You will also be asked to complete a computer task that is designed to test reaction times to written stimuli. The task involves looking at words on a screen and making decisions about what sort of words they are.

All the information that is gathered about participants will be confidential, in that it will not be possible to identify individuals from the data or from the final research report. Participation is voluntary and you will be asked to sign a consent form indicating your willingness to take part.

From October 2003 a copy of the research report will be made available for reference from the Clinical Psychology office at the University of Birmingham. If you decide to participate and you would like details of the findings of the study please let me know and I will send you the executive summary. If you have any further questions, please contact me via the Clinical Psychology office on 0121 414 4915.

Richard Bennett
Clinical Psychologist in Training
University of Birmingham

One in four people may have mental health problems during their lifetime (*source: www.mind.org.uk).* If you experience emotional/psychological distress or symptoms of mental illness there are a number of places where you can access help and support. They include the following:

- **The Student Support and Counselling Service (SSCS)**

  Health Centre
  Elms Road
  The University of Birmingham
  Edgbaston
  Birmingham
  B15 2TT
  United Kingdom
  Tel: 0121 414 5130.

  The service is open Monday – Friday, 9am - 5pm although some evening appointments are also available on request. Students may 'self refer' by filling in a brief self referral form at the SSCS reception. Students may also be referred by their tutor or GP.

- **Your local GP**

- **The Samaritans**

  13 Bow Street
  Birmingham
  B1 1DW
  Tel. 0121 666 6644

  The Samaritans also have a 24-hour helpline which is 08457 90 90 90.

Appendix 5

Consent form.

CONFIDENTIAL

CONSENT FORM

IS ALEXITHYMIA ASSOCIATED WITH A PERCEPTUAL SENSITIVITY TO AFFECTIVE STIMULI?

If you agree to participate in this study please read the points below and indicate your consent by signing your name.

- I have read the information sheet that explains the aims of the study.
- My participation is voluntary.
- The study involves completing several questionnaires and I will be providing some personal information about myself.
- Any information that I give will be stored confidentially and I will not be able to be identified if and when the results of the study are published.
- I can withdraw from the study at any time prior to publication of its findings.
- Should I choose to withdraw from the study, I have the right to require that all data relating to my participation be destroyed.
- I understand that if I have any questions relating to my participation in this research I can contact Richard Bennett via the Clinical Psychology office at the University of Birmingham on 0121 414 4915.

Signature of participant: _____

Name of participant: _____

Date: _____

Appendix 6

Instructions for the emotion priming task.

INSTRUCTIONS FOR COMPUTER TASK

1. Place the index finger of your left hand on the Y key and the index finger of your right hand on the N key.
2. Please look at the computer screen.
3. When you begin you will see a white cross in the centre of the screen.
4. This will be replaced by a sentence that will appear for a short time. Please read this sentence.
5. The sentence will be replaced by a yellow word. This word will be an adjective that might be used to describe someone in some way. Please read this word and think about whether it is a word that could be used to describe the way that someone feels, in terms of a mood or emotion.
6. If you think the yellow word is a word that *could* be used to describe the way someone feels, press the Y key, indicating yes. If you think the yellow word is *not* a word that could be used to describe the way someone feels, press the N key, indicating no.
7. There are 240 words, presented in four blocks of 60. After each block, you may take a short break.
8. Before you begin, there will be a few practice trials.

Appendix 7

Instructions for authors.

Psychotherapy and Psychosomatics

Guidelines for Authors

Introduction

'Psychotherapy and Psychosomatics' publishes research articles, reviews (special articles), clinical notes and letters to the editor on psychotherapy and/or psychosomatic research.

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Viale Berti Pichat 5
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Arrangement

Title page: The first page of each paper should indicate the title, the authorsr' names, and the institute where the work was conducted. A short title for use as running head as well as the full address of the author to whom correspondence should be sent are also required.

Full address: The exact postal address complete with postal code must be given at the bottom of the title page. Please also supply phone and fax numbers, as well as your e-mail address.

Key words: For indexing purposes, a list of 4–10 key words in English is essential. Whenever possible, use key words such as found in the headings of Index Medicus.

Abstract: Abstracts should be no longer than 250 words for regular articles, and no longer than 150 words for clinical notes. They should include the following information:

Background: the problem that prompted the study and the purpose of the study;
Methods: data sources, subjects, design, measurements, data analysis;
Results: most important findings; Conclusions: implications, future directions.

Abstracts for Special Articles should not be structured.

Small type: Paragraphs which can or must be set in smaller type (case histories, test methods, etc.) should be indicated with a 'p' (petit) in the margin on the left-hand side.

Footnotes: Avoid footnotes. When essential, they are numbered consecutively and typed at the foot of the appropriate page.

Tables and Illustrations: Tables and illustrations (both numbered in Arabic numerals) should be prepared on separate sheets. Tables require a heading and figures a legend, also prepared on a separate sheet. For the reproduction of illustrations, only good drawings and original photographs can be accepted; negatives or photocopies cannot be used. Due to technical reasons, figures with a screen background should not be submitted. When possible, group several illustrations on one block for reproduction (max. size 181 x 223 mm) or provide crop marks. On the back of each illustration, indicate its

number, the author's name, and 'top' with a soft pencil.

Data analysis: Adequate description of statistical analysis should be provided, including the types of statistical tests and whether they were one- or two-tailed. Standard deviations, instead of standard errors of the mean, are preferred. All significant results must include the test value, degree(s) of freedom, and probability level.

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In the text identify references by Arabic numerals [in square brackets]. Material submitted for publication but not yet accepted should be noted as 'unpublished data' and not be included in the reference list. The list of references should include only those publications which are cited in the text. Do not alphabetize; number references in the order in which they are first mentioned in the text. The surnames of the authors followed by initials should be given. There should be no punctuation other than a comma to separate the authors. Cite all authors, 'et al.' is not sufficient. Abbreviate journal names according to the Index Medicus system. (Also see International Committee of Medical Journal Editors: Uniform requirements for manuscripts submitted to biomedical journals. N Engl J Med 1997;336:309–315.)

(a) Papers published in periodicals: Sun J, Koto H, Chung KF: Interaction of ozone and allergen challenges on bronchial responsiveness and inflammation in sensitised guinea pigs. Int Arch Allergy Immunol 1997;112:191–195.

(b) Monographs: Matthews DE, Farewell VT: Using and Understanding Medical Statistics, ed 3, revised. Basel, Karger, 1996.

(c) Edited books: Parren PWHI, Burton DR: Anti-bodies against HIV-1 from phage display libraries: Mapping of an immune response and progress towards antiviral immunotherapy; in Capra JD (ed): Antibody Engineering. Chem Immunol. Basel, Karger, 1997, vol 65, pp 18–56.

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Public Domain Briefing Paper

Is alexithymia associated with a perceptual sensitivity to affective stimuli?

Richard Bennett
Clinical Psychologist in Training
University of Birmingham

Outline

The relationship between alexithymia, measured using the 20-Item Toronto Alexithymia Scale (TAS-20), and cognitive processing of affective stimuli was studied in a non-clinical population. An emotion priming task was used to investigate the proposal that alexithymia might be associated with an increased sensitivity to the negative valence of stimuli at a pre-attentive level. High and low alexithymia groups were formed from a sample of 75 university students and compared on a situation-word sequential emotion priming task, the Beck Depression Inventory (BDI) and the Symptom Checklist (SCL90-R). The high-alexithymia group were slower to respond to affective target words and made more errors in their classification than the low-alexithymia group, underlining the notion that alexithymia is characterised by a deficit in cognitive processing of emotions. No support was found for an association between alexithymia and enhanced sensitivity to affective stimuli.

Background

Alexithymia is a construct used to describe certain cognitive and affective characteristics associated with psychosomatic illnesses and mental health problems. It is characterised by a decreased ability to identify and communicate feelings, difficulty distinguishing between feelings and the bodily sensations of emotional arousal, a cognitive tendency toward external events or cues, and a paucity of imaginative thought as evidenced by a lack of experience of dreams or fantasy. Over the past 20 years alexithymia has attracted increasing attention from researchers, with the primary focus resting on examining its relationship with

medical and psychiatric disorders. Among clinical populations alexithymia has been found to correlate with a range of physical, psychosomatic and psychiatric conditions. High measures of alexithymia have been associated with the prediction of the onset of illness and disease, and of poor outcomes in terms of the success of psychotherapeutic intervention although the nature and direction of the relationship between alexithymia and illness is unclear.

Much of the research into alexithymia has addressed the idea that it reflects a deficit in the cognitive processing and regulation of affect. The association between alexithymia and impaired verbal and non-verbal recognition of affective information has been identified in a number of studies using a range of different tasks. A number of theories have been presented to account for the apparent emotional processing deficits observed in alexithymic individuals, notably concerning issues of cerebral laterality and cognitive bias. Results from a small number of studies of cognitive bias have led to the suggestion that, rather than being a deficit, alexithymia might be the product of a heightened vigilance for emotional information and serve a protective function, defending individuals from 'threatening' emotional stimuli in a similar manner to processes thought to occur in people with anxiety disorders.

Given the strong links between alexithymic personality characteristics and pathology, it seems important to understand more about the processes that underpin the presentation. The theoretical and methodological divergence in the alexithymia literature offers little to clinicians regarding recommendations for management or intervention, suggesting that further research is required.

Aims

The present study aimed to employ emotion priming methodology to test the hypothesis that alexithymic individuals demonstrate an automatic heightened vigilance for affective stimuli. The design also enabled an examination of potential qualitative differences in affect processing between alexithymic and non-alexithymic individuals.

Method

Participants were 75 university students who responded to an advertisement inviting participation in a study of emotion recognition and reaction times to lexical stimuli. High- and low-alexithymia groups were formed on the basis of scores on the Twenty Item Toronto Alexithymia Scale (TAS-20). A tercile split was performed on the whole sample, with the upper and lower thirds forming the high and low groups respectively. Participants completed a short structured interview and were compared on a computerised situation-word sequential emotion priming task. In this task, a target adjective was presented following a prime sentence describing a life event. Participants were required to indicate whether the adjective was descriptive of an emotional state. In order to control for the effects of psychological distress the Beck Depression Inventory (BDI) and the Symptom Checklist (SCL90-R) were also administered.

Results

The results of the study appear to confirm clinical observations that alexithymia is characterised by an impairment of emotion recognition. Alexithymic participants were slower to respond to target adjectives and made more classification errors. Some support was found for the theoretical assumption that the processing deficit associated with alexithymia occurs in the cognitive appraisal of emotional stimuli. No clear support was found for the notion that alexithymic individuals possess a heightened pre-attentive sensitivity to affective stimuli. Whilst the groups differed in terms of their scores on the BDI and SCL-90R, statistical analysis suggested that the results could be attributed to alexithymia rather than psychological distress

Implications

The finding that the high alexithymia group were slower to respond and were less accurate when classifying emotional adjectives seems to support the traditional view of alexithymia as an emotional processing deficit. Patterns of responses in the study suggest that alexithymic individuals demonstrate more rigidity in processing affective information. This might predict that they could

experience more difficulty in processing elements of situations that are emotionally complex or ambiguous due to a simplified or more dichotomous cognitive appraisal. Such a deficit could have consequences for social interaction and self-esteem regulation. The findings of the study echo the notion of a de-coupling between emotional perception and cognitive appraisal suggested by previous authors.

Whilst the findings of the study are subject to a number of limitations, the emotion priming paradigm is forwarded as a useful method for experimental research in this area. The current evidence base of alexithymia does not allow for firm recommendations for therapeutic intervention although cognitive approaches may be indicated if the de-coupling model of alexithymia continues to receive empirical support. More experimental studies are needed to produce more definitive conclusions.

Further Information

The study and a review of related literature are reported in detail in the following papers, copies of which are held at the Department of Clinical Psychology, School of Psychology, The University of Birmingham, Edgbaston, Birmingham, B15 2TT.

Bennett, R.G. (2003). Is alexithymia associated with a perceptual sensitivity to affective stimuli? Clin.Psy.D. Volume 1. University of Birmingham.

Bennett, R.G. (2003). Neurocognitive correlates of alexithymia: a review. Clin.Psy.D. Volume 1. University of Birmingham.