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# New Trends in Alexithymia Research

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## Key Words

Alexithymia · Emotional processing · Research trends · Neural correlates · Psychophysiology · Depression · Attachment · Predictive studies

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## Abstract

Research investigating the alexithymia construct is advancing rapidly and has broadened considerably in recent years as a result of interdisciplinary efforts, new methodologies, and experimental techniques. New developments in the field include a shift from measurement-based validation studies to experimental investigations, which explore the relation between alexithymia and various aspects of emotional processing; the use of functional brain imaging techniques to explore neural activity associated with alexithymia; and experimental studies that measure multiple indices of physiological response to standardized emotion-inducing stimuli. Developmental research and attachment studies are providing ways for investigating potential etiological sources of the construct; and experimental approaches are being used to explore relations between alexithymia and other health-related personality constructs. In addition, longitudinal and treatment studies are clarifying the relation between alexithymia and psychopathology and the extent to which alexithymia predicts treatment outcome. Investigators need to embrace the new methods and techniques for the field of research to further increase understanding of the alexithymia construct and its association with physical and mental illness.

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Three decades have elapsed since Sifneos [1] introduced the concept of alexithymia and linked it with classic psychosomatic diseases and failure to respond to dynamic psychotherapy. During this time, and especially in the last 10 years, there has been an expansion of interest in, and research on, the alexithymia construct. Whereas about 120 articles were published on alexithymia by the mid-1980s, a recent search of the PsycINFO database revealed slightly more than 1,000 journal articles on alexithymia. Several books on alexithymia have also been published in recent years [2–4]. Indeed, there is now considerable empirical support for the validity of the alexithymia construct and for its association with several common medical and psychiatric disorders [2, 5]. Moreover, as the construct becomes more widely known, it is gradually being integrated into the broader field of emotion research; this involves interdisciplinary efforts and studies from diverse perspectives including psychophysiology, neurobiology, cognitive psychology, culture, and developmental psychology.

In this article, we describe and comment on some trends in alexithymia research that have emerged in recent years. We have not undertaken an exhaustive review, but include the development of several new measures of alexithymia; emotional processing studies; brain imaging studies; developmental studies; attachment studies; psychophysiological studies; dream research; investigations of the relation between alexithymia and depression; evaluations of alexithymia as a predictor of treatment outcome; and studies of the relations between alexithymia and other health-related constructs.

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## Measurement of Alexithymia

The development of the self-report Toronto Alexithymia Scale (TAS) [6] and its revised 20-item version (the TAS-20) [7] contributed, in part, to the expansion of research on alexithymia. In particular, the TAS-20 provided a reliable, valid, and common metric to measure alexithymia, which has contributed significantly to a uniform and systematic collection of data that could be compared across studies. There is now evidence that the TAS-20 demonstrates reliability and factorial validity in many different languages and cultures [8], which enables comparisons and a greater generalizability of findings from studies in different countries. As with any construct, however, the quality of future studies will be enhanced if researchers employ a multimethod, multimeasure approach to assessing alexithymia. With this in mind, some researchers have developed some new measures of alexithymia that employ methods other than self-report. These include a set of Rorschach variables [9], and two observer-rated measures – the modified Beth Israel Hospital Psychosomatic Questionnaire (BIQ) [2, 10] and the Observer Alexithymia Scale (OAS) [11]. Another self-report measure has also been developed – the Bermond-Vorst Alexithymia Questionnaire (BVAQ) [12]. There is preliminary evidence that the BVAQ correlates significantly with the TAS-20 [12]; the modified BIQ and the OAS correlate significantly with each other and with the TAS-20 [10, 13–16]; and the Rorschach alexithymia variables can differentiate between high and low scorers on the TAS-20 [9]. As evidence supporting the reliability and validity of these new measures accumulates, alexithymia researchers will be encouraged in future studies to employ at least two measures that use different methods of assessment. Although some researchers have used the Levels of Emotional Awareness Scale to measure alexithymia [17], this scale was not developed for this purpose and it correlates only weakly or non-significantly with the TAS-20 and the OAS [14, 18].

## Emotional Processing Studies

Much of the empirical support for the validity of the alexithymia construct is based on correlational and measurement-based research [2]. In recent years, there has been a trend toward conducting investigations that employ experimental designs, some of which examine the relations between alexithymia and various aspects of emotional processing. These studies use methodologies

and techniques from contemporary cognitive psychology to evaluate directly a fundamental assumption underlying the alexithymia construct, namely, that the features of the construct reflect a deficit in the cognitive processing of emotion. In one study, high alexithymia individuals showed a delay in making lexical decisions to emotion words after being ‘primed’ by related emotion situations [19]. This negative priming effect is compatible with the theoretical view that the elements comprising emotion schemas are not well-integrated in alexithymia. In another study, no difference in recall was found between high and low alexithymia individuals at a ‘shallow’ level of processing of emotion and non-emotion (neutral) words in which the focus is on the physical attributes (e.g., size, colour) of the word stimuli. At a ‘deep’ level of processing, however, in which thinking about the meaning of the word stimuli is central, high alexithymia individuals evidenced lower recall of emotion words than low alexithymia individuals [O. Luminet, unpubl. data]. A third study used a combined Stroop and implicit memory task; high alexithymia individuals were significantly slower on colour-naming unmasked illness words than unmasked negative emotion words, in comparison with low alexithymia individuals [20]. This finding suggests that high alexithymia individuals experience illness-related words as more emotionally arousing than negative emotion words. Their attentional bias toward illness-related words is consistent with our proposal that the emotions of high alexithymia individuals are not well represented mentally, with a resulting tendency to focus on the somatic sensations that accompany emotional arousal, and to misinterpret these as signs of illness [2].

Whereas the designs of the above studies involve assessing the responses of alexithymic individuals to emotional stimuli, another approach is to evaluate emotion schemas directly using a method developed by Bucci et al. [21]. According to Bucci’s [22] multiple code theory of emotional processing emotion schemas are comprised of patterns of sensory, visceral and kinesthetic sensations (subsymbolic representations) as well as images and words (nonverbal and verbal symbolic representations); these elements are linked with one another by ‘referential connections.’ The quality of the linkages can be evaluated by rating thematic units of a narrative protocol along four linguistic dimensions using referential activity scales. In a recent pilot study, the narrative protocols were a series of dream reports collected from high and low alexithymia individuals when they were awakened in a sleep laboratory during REM sleep; high alexithymia individuals had a significantly lower mean referential activity score than

low alexithymia individuals [23]. This finding is consistent with the view that alexithymia involves a deficit in symbolization in which the somatic sensations associated with states of emotional arousal are not strongly linked with images and words. It will be of interest for future studies to assess the relationship between alexithymia and referential activity in patients with somatization disorders or undifferentiated somatoform disorders.

### Neurobiological Studies

Ever since the alexithymia construct was formulated there has been an interest in identifying neural correlates that might contribute to an understanding of the deficit in cognitive emotional processing. Most of the early research involved observations of split-brain patients or the use of a tactile finger localization task to assess the efficiency of interhemispheric transfer in individuals with intact brains. The findings supported Hoppe and Bogen's [24] hypothesis that alexithymia is associated with reduced coordination and integration of the specialized activities of the two cerebral hemispheres. As has occurred in the broad field of general psychiatry, an emerging trend is the use of functional brain imaging techniques that directly map neuronal activity in the functioning brain. Whereas conclusions from the interhemispheric transfer studies were based on the transfer of sensorimotor information, the brain imaging studies employ emotion-inducing stimuli such as autobiographic recall of emotional events, or the viewing of facial emotional expressions or pictures that evoke emotion. Functional brain imaging studies can therefore determine whether alexithymia is associated with differences in brain activation during emotional responding.

On the basis of a positron emission tomography (PET) study showing that emotional awareness correlated with increased blood flow in the right dorsal anterior cingulate cortex (ACC), Lane et al. [25] speculated that alexithymia might involve a deficit in activity in the ACC during emotional arousal. There is evidence from other studies that the ACC and surrounding medial prefrontal cortex are involved in the ability to reflect on one's own and other's mental and emotional states [26]. The hypothesis of Lane et al. is supported in part by a study in France, which used functional magnetic resonance imaging (fMRI) to assess brain activation during the passive viewing of emotion-inducing pictures [27]. Alexithymia was associated with differences in activity in the anterior cingulate and mediofrontal cortices, but the differences were dependent on

the emotional valence of the stimuli. There is possibly additional support for the hypothesis from a recent PET study with a group of healthy university graduates in which TAS-20 total scores correlated with the size of the normalized surface area of the right ACC after controlling for age, gender, and depression [28]. The findings from a PET study comparing alexithymic patients with somatoform disorders with normal adults, however, suggest that the neural correlates of alexithymia involve reduced activation in the corpus callosum as well as in the cingulate cortex and other areas [29]. Findings from a PET study in Japan also support the hypotheses of a failure of cooperation between the hemispheres and a dysfunction in the emotion processing system of the right hemisphere [30].

An experimental paradigm involving fMRI that could be employed in future alexithymia research is one from a study by Hariri et al. [31], who demonstrated how the labeling of affect can exert a modulating influence on the emotional processing that occurs at subcortical levels of the brain. The paradigm required subjects either to match the affective expression of one or two faces to that of a simultaneously presented target face (a perceptual task) or to identify the affective expression of a target face by choosing one of two simultaneously presented linguistic labels (a cognitive task). Whereas matching angry or frightened expressions was associated with increased activity in the left and right amygdala, labeling these same expressions was associated with a reduction of activity in the amygdalae and a simultaneous increase of activity in the right prefrontal cortex (PFC). Since the PFC has neural connections to the amygdalae, the study seemed to identify a functional neural system that allows humans to employ cognitive processes such as reasoning and labeling to control and modulate effectively their instinctive emotional responses. Although the participants in this study were not assessed for alexithymia, one might predict that individuals with high alexithymia, who have difficulty interpreting and labeling emotional stimuli, would be less able to attenuate the responses of their amygdalae than low alexithymia individuals. Such a finding would represent a pathway by which alexithymia could affect physiological functions and potentially have an adverse effect on health. The study of Hariri et al. [31] suggests also that the modulation of emotional responses by higher cortical systems involves an integration of the specialized functions of the two hemispheres, the verbal capacity of the left with the appraisal and regulating capacity of the right. The symptoms and concerns of somatizing and hypochondriacal patients might be explained partly by an alexithymic tendency to mislabel somatic sensations with a conse-

quent failure of the prefrontal cortex to down-regulate amygdaloid responses to emotional stimuli; the continuing physiological arousal would likely perpetuate and amplify the somatic sensations, and these could be misinterpreted by the left hemisphere, which tends to infer causal meanings that may be incorrect if it is missing information normally processed by the right hemisphere [32]. Future studies might explore and evaluate these speculations.

Another new and interesting approach to exploring emotional processing and alexithymia is the use of EEG recordings during the presentation of emotional stimuli. This method was employed recently by a group of Russian researchers [33], who presented neutral, pleasant, and unpleasant pictures to high and low alexithymia individuals and had them subjectively rate them after each presentation. The event-related synchronization (ERS) to these stimuli was assessed in the theta-1 and theta-2 frequency bands. The ratings of the pleasantness and unpleasantness of the pictures were similar in the high alexithymia and low alexithymia groups. The high alexithymia individuals, however, evidenced decreased frontal synchronization in response to both pleasant and unpleasant pictures in the left hemisphere at 0–200 ms after stimulus onset, and excessive ERS in response to unpleasant pictures in the right hemisphere at 200–600 ms after stimulus onset. Although the findings are preliminary, they suggest that alexithymia is associated with a dysregulation over anterior cortical regions during the appraisal of emotional stimuli, i.e., at the early phases of emotional processing. The investigators proposed that this dysregulation might underlie the emerging vague emotional feelings in alexithymia that cannot be differentiated at verbal and nonverbal levels.

As has been suggested for other fields of psychiatric research [34], a future trend of interest will be the development of multimodal imaging techniques whereby PET, fMRI and EEG, for example, might be used in combination in experimental studies to investigate specific questions about alexithymia and brain activity.

### **Contributions from Developmental Research**

The findings from the neurobiological studies provide some insight into variations in patterns of neural activity associated with alexithymia but give little information about the source of these variations. Determining the relative contribution and interaction of neurobiological abnormalities, childhood environment, and cultural factors

in the etiology of alexithymia is obviously a complex task and requires prospective investigations. One area of research that could contribute information regarding the etiology of alexithymia is the field of developmental traumatology. This area of study is of particular relevance as it relates to Krystal's [35] proposal that alexithymia may be a consequence of psychic trauma occurring early in life that has interfered with neuroanatomical as well as psychological aspects of affect development. There is now evidence, for example, that maltreated children with post-traumatic stress disorder (PTSD) have smaller cerebral and prefrontal cortex volumes than non-maltreated children, and also show underdevelopment of middle portions of the corpus callosum [36, 37]. These differences are presumed to be a consequence of the effects of stress hormones on the developing brain, which are elevated in maltreated children with PTSD [38]. Although the findings are from cross-sectional investigations, prospective longitudinal studies will help clarify the relations between maltreatment in childhood and alexithymia in adulthood.

A few studies have assessed alexithymia among adults who report histories of childhood physical or sexual abuse [39–41]. The findings are inconsistent and are likely influenced by the age of the children at the time of the abuse, the duration of the abuse, and whether or not the children developed PTSD. Moreover, as Kooiman et al. [41] demonstrated in a recent study that measured adult patients' perceived parenting style of each of their parents, optimal parenting by one parent may protect against the development of alexithymia when there is abuse by the other parent.

Another area of research that is yielding some interesting developmental findings is the prospective Northern Finland Birth Cohort Project in which comprehensive data (beginning at the antenatal phase) was collected on over 12,000 children born during 1966. As part of this study, the TAS-20 was administered to almost 6,000 individuals at a 31-year follow-up. The study found that alexithymia in adulthood was associated with being an unwanted child, being born into a family with many children, and particularly strongly with a rural upbringing [42]. In addition, alexithymia was associated with the ability to speak words at one-year of age, the mean TAS-20 score of the adults being lowest among early speakers [43]. These results suggest that social factors in childhood as well as individual differences in early linguistic development may play a role in the etiology of alexithymia.

## Attachment Studies

The field of attachment research provides researchers additional ways of investigating potential etiological sources of alexithymia. Aside from studies of the impact of neglect and abuse on brain development, there is accumulating evidence that the morphological development of the orbitofrontal cortex (and perhaps other parts of the brain involved in emotional awareness and emotion regulation) is influenced by the quality of the emotional interactions between infants and their caregivers [44]. Attachment experiences in early childhood also influence the development of emotion schemas, imagination, and other cognitive skills involved in affect regulation [45, 46]. Given that a creative imagination and effective emotion-regulating skills are more likely to emerge in the context of secure attachment relationships, one would expect alexithymia to be associated with insecure patterns of attachment, although other personality traits and types of psychopathology are also associated with insecure attachments. There are no longitudinal studies of alexithymia following children into adulthood; however, findings from several studies of adults have found that alexithymia is associated with insecure attachment, either an avoidant/dismissing style or a preoccupied or fearful style [47–49]. These insecure attachment styles may account for the low level of social support that has been found among alexithymic individuals [50–52]. Since strongly supportive relationships have a beneficial impact on health [53–55], the insecure attachment patterns of alexithymic individuals may be another pathway by which alexithymia might influence illness behaviour or the course of a disease [56, 57]. A limitation of most of these studies, however, is the use of self-report measures for classifying current attachment patterns; one study used the Adult Attachment Interview (AAI) Q-sort [48]. Since the AAI assesses the mental representations of attachment that reflect prevailing modes of affect regulation that have been internalized during childhood, it is hoped that future studies will use this method and Main and Goldwyn's comprehensive coding system (unpublished manuscript) to further explore the developmental underpinnings of alexithymia.

## Psychophysiological Studies

To explore whether alexithymia contributes to the development of disease or is merely a correlate of certain illnesses, several investigators have attempted to identify a pathway of hyper- or sustained physiological arousal

that could potentially alter autonomic, endocrine, and/or immune systems. The findings from various experimental studies have been inconsistent. This may be attributed in part to the use of different emotion-inducing stimuli (e.g. viewing emotional scenes in slides, performing mental arithmetic, or talking about an upsetting experience) and to the monitoring of different physiological variables (heart rate, blood pressure, skin conductance, or muscle tension). The various tasks performed in the studies are not comparable as different emotional stimuli elicit different patterns of cardiac response [58–60]. Moreover, the pattern of responding among different physiological measures is highly variable [61]. For instance, under a specific situation the pattern might include an increase in skin conductance and muscle tension while heart rate is decreasing. To surmount some of these difficulties, some researchers have used viewing an emotional film as the stimulus, and simultaneously measured multiple indices of physiological response [60, 62, 63]. Films involve a longer exposure than some of the other stimuli and are more likely to engage the participants emotionally. Philippot [64] has collected a series of movies that have been shown to induce one main basic emotion (i.e., sadness, anger, fear, disgust, or joy) with other emotions remaining at a low level of intensity. There are reliable and valid scales for rating affective responses to films, and evidence that gender differences need to be considered [65].

Whereas almost all of the studies on alexithymia and physiological activity have focused on changes in sympathetic activity, there is evidence that vagal tone also contributes to individual differences in the expression (i.e., autonomic and behavioral reactivity) and regulation of affect [66]. Vagal tone reflects the influence of the parasympathetic nervous system on the heart. Since an increase in sympathetic activity is initially due primarily to the withdrawal of the antagonistic vagal tone, individuals with high vagal tone have the capacity for their autonomic nervous system to react and return rapidly to homeostasis. Moreover, there is evidence of substantial differences in personality characteristics depending on the levels of sympathetic and parasympathetic tone [67]. In a preliminary study, Byrne et al. [68] found that vagal tone was low for high alexithymia men and high for low alexithymia men, especially while viewing emotion-inducing film clips. Although women generally show higher vagal tone than men, in this study vagal tone was lower in low alexithymia women than it was in high alexithymia women. Future investigations of the physiological correlates of alexithymia should include the measurement of vagal tone and examine for possible gender differences.

## Dream Research

Consistent with the reduced fantasy and externally oriented thinking facets of the alexithymia construct, early clinical observations suggested that alexithymia is associated with low dream recall and/or dreams that lack imagination. Researchers have begun to investigate dream content and dream recall frequency. To date, however, the results have differed depending on the procedure used for collecting dream reports. For example, in a study in which participants were awakened during REM sleep periods, high and low alexithymia students showed no significant differences in the number, length and emotional valence of dreams, but the fantasy ratings of the dreams were significantly lower in the high alexithymia students [69]. In contrast, in a study that used dream diaries and tape-recordings of dreams on awakening, the dream length and frequency of recall was significantly lower in high alexithymia students, but there were no differences in emotional valence, bizarreness, and vividness of the dreams of high alexithymia and low alexithymia students [70]. More studies are required as clinicians continue to report cases of alexithymic patients who seem to have a limited ability to recall dreams and the dreams that are reported lack imagination [71].

## Alexithymia and Depression

For many years alexithymia researchers have debated whether alexithymia is a stable personality trait or a state-dependent phenomenon. This issue is not limited to alexithymia, but applies to almost all personality traits that are thought to play a role in the onset of medical or psychiatric disorders. Although some longitudinal studies have shown no significant change in alexithymia scores even when levels of emotional distress change [72, 73], others have found significant reductions in alexithymia scores especially when levels of depression decrease [74]. During the past decade, several studies have shown that alexithymia is associated strongly with depression in both general and clinical populations [75–77]. Moreover, based on the finding that TAS-20 total scores or some of the factor scale scores decrease as the level of depression declines in patients with major depression [76–78], some researchers suggest that alexithymia is a state-dependent phenomenon in depressed people [74, 76]. They fail to mention findings from other research, however, that scores on measures of other personality traits, such as neuroticism and extraversion, also change as the level of depression

changes [79]. And they overlook the important distinction that personality researchers make between *absolute stability* and *relative stability* [80]. When this distinction is considered, there is evidence that even though the alexithymia scores of patients with major depression may change in the presence of large changes in the severity of depressive symptoms (i.e., a lack of absolute stability), the relative differences in alexithymia scores among the patients remain the same (i.e. relative stability) [81]. The relative stability of alexithymia has been demonstrated also in a prospective study of patients with functional gastrointestinal disorders [82]. Future longitudinal studies of alexithymia and depression should assess both absolute and relative stability of alexithymia, and also the degree to which the relative stability in alexithymia scores is related to the severity of depressive symptoms.

## Alexithymia as a Predictor Variable

Evidence supporting the relative stability of alexithymia allows researchers to evaluate whether or not the construct is a useful predictor of treatment outcome. The findings from the few studies to date are encouraging. For example, in a study of Vietnam combat veterans with PTSD, alexithymia significantly predicted outcome of an 8 week trial of pharmacotherapy [83]. And in a study of psychiatric inpatients with anxiety or somatoform disorders who were treated with cognitive and behavioural therapies for a minimum of 8 weeks and reassessed 2 years later, alexithymia was a significant predictor of persistent somatization [84]. In a more recent study, patients with functional gastrointestinal disorders received usual medical treatment and were followed for 6 months [82]. Although treatment outcome was predicted significantly by both alexithymia and depression, alexithymia was the stronger predictor.

Krystal [35] proposed that alexithymia may be a consequence not only of childhood psychic trauma but also of catastrophic trauma in adult life. In a study of Holocaust survivors, Yehuda et al. [85] found that alexithymia was associated significantly with severity of PTSD symptoms, but not with severity of trauma. There is the unanswered question, however, as to whether alexithymia itself may be a risk factor for the development of PTSD in individuals who have been exposed to extreme traumatic stressors. Serving in a war zone is a powerful stressor that may result in PTSD and can be easily investigated. There is some evidence that the medically unexplained somatic symptoms of some Persian Gulf War veterans are related to

PTSD [86, 87]. The assessment of alexithymia among new military recruits would allow researchers to conduct prospective studies to evaluate whether or not the alexithymia trait predicts the development of PTSD and unexplained physical illnesses following psychic trauma in a combat zone.

Despite the early observations of Sifneos [88] and others that alexithymic patients respond poorly to dynamic psychotherapy, there has been little empirical research to investigate whether alexithymia predicts psychotherapy outcome. A study of patients referred to a psychiatric consultation-liaison service in Finland found that high alexithymia patients were recommended for psychotherapy as often as low alexithymia patients and they did not differ in compliance with treatment [89]. However, this study did not indicate whether the psychotherapy provided was dynamic or supportive in type; nor did it measure the patients' responses to the therapy. While other research has demonstrated a strong inverse relation between alexithymia and psychological mindedness [2], thereby supporting the view that alexithymic patients are not good candidates for interpretive psychotherapies, it is quite possible that high alexithymia patients are compliant and responsive to supportive psychotherapy. Moreover, in a preliminary study of patients with coronary heart disease, Beresnevaite [90] found that modified psychotherapeutic techniques in a group setting can alter alexithymic characteristics, especially when they focus on increasing affect awareness and imaginative activity. Another recent study found that participation in a four-week meditation program reduced the somatic concerns of high alexithymia students, but there was no decrease in depression [91]. There is obviously plenty of scope for psychotherapy researchers to conduct studies that will evaluate the extent to which alexithymia can predict psychotherapy outcome. It is necessary also for clinicians and researchers to continue to devise and evaluate psychotherapeutic techniques for modifying alexithymia.

### **Relations with Other Health-Related Personality Constructs**

A question that some researchers are exploring is whether alexithymia differs from other health-related personality constructs such as *inhibition* and the *repressive coping style*. Whereas alexithymia is considered a deficit in the cognitive processing and regulation of emotions, inhibition and the repressive coping style are linked theoretically with the mobilization of characteristic ego de-

fense mechanisms to reduce the conscious awareness of distressing emotions. The repressive coping style, for example, is characterized by high defensiveness and low anxiety despite high levels of physiological reactivity to stressful situations. In a recent study that involved a series of emotion recognition tasks, Lane et al. [92] found that individuals with high alexithymia and individuals with a repressive coping style showed similar impairments in the recognition of both pleasant and unpleasant emotions. But despite similar impairments, there is no evidence that alexithymia and the repressive coping style involve the same method of processing of emotions to reach a similar outcome in response to emotion recognition tasks. Moreover, other studies suggest that repressors are low alexithymia individuals and that high alexithymia individuals show the uncommon combination of high defensiveness and high anxiety [93, 94]. Rather than repression and other neurotic defenses, however, alexithymia is most strongly associated with primitive defenses such as splitting, projective identification, and somatization [95, 96] that generally imply deficits in symbolic functioning [97].

Some researchers have begun to explore the health effects of written emotional disclosure among alexithymic people using the writing paradigm developed by Pennebaker [98]. The development of this paradigm was motivated by Pennebaker's theory that inhibition, which is defined as the conscious suppression of emotions, may contribute to long-term health problems. Given that alexithymic individuals have difficulty describing their subjective emotional experiences, one would expect them to not benefit from the disclosure task. Findings from the few studies to date mostly support this prediction. In a study of young adults with migraine headaches, for example, Lumley et al. [99] found that alexithymia predicted less improvement in headache frequency, sensory and affective pain, and negative and positive affect among disclosure patients relative to nondisclosure patients over a three month follow-up period. And in a study of women with chronic pelvic pain who were followed for two months, this research team found that alexithymia predicted increased pain and medication use among those who had written about stressful experiences, but decreases among those who had written about positive experiences [99]. Whereas three other studies also suggest that alexithymia reduces the benefits of disclosure [100], Paez et al. [101] found that individuals high on the difficulty describing feelings facet of the alexithymia construct had a reduction in negative affect 2 months after disclosure. And Solano et al. [102] found that writing about one's thoughts and feelings about being in hospital for a surgical

operation (papilloma resection) had a favorable impact on the postoperative course (fewer days in hospital and lower SCL-90 scores) for high alexithymia patients. Low alexithymia patients had a favorable postoperative course independent of writing. In the latter two studies, however, alexithymia was associated with writing in which there was minimal focus on the self, low introspection, and reduced emotion. Although these characteristics are consistent with alexithymia, Lumley (personal communication, August 28, 2003) points out that they are the exact opposite of what is thought to lead to better outcomes after disclosure writing. In sum, it appears that the balance of evidence from the various studies suggests that high alexithymia individuals do not derive the benefit from written disclosure that is experienced by some research participants. Further studies are required to clarify the extent to which high alexithymia might interfere with the potential health benefits from written disclosure.

Whereas the writing paradigm is used as a potential therapeutic intervention, other researchers have examined the content of written language as a possible predictor of longevity. In a longitudinal study of older Catholic sisters (the 'Nun Study'), Snowden et al. [103, 104] found that nuns whose autobiographical essays in early adulthood were rich in ideas and positive emotional content showed a reduced risk of mortality in later adult life. Given that the alexithymia construct or one or more of its facets are associated with a reduced tendency to experience positive emotions and with reduced introspection

when writing about emotional events [2, 101], it is possible that alexithymia might be related negatively to survival and longevity. There is preliminary support for this idea from a prospective study of 2,000 middle-aged Finnish men; alexithymia was predictive of mortality by any cause over 5 years, independently of other well-known risk factors [105]. It is hoped that more prospective studies (and of longer duration) will be conducted to establish whether alexithymia is a risk factor for general health.

## Conclusions

During the past 10 years alexithymia research has advanced and broadened considerably to include a wide spectrum of methodologies and experimental techniques that offer a significant challenge to alexithymia researchers. The pace of research will likely gain momentum as a result of current trends and increasing collaboration with investigators in other disciplines. The new methods and techniques must be embraced for the field of research to further increase understanding of the alexithymia construct and its association with physical and mental illness.

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