

Alexithymia

Advances in Research, Theory,
and Clinical Practice

Cambridge University Press
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Edited by Olivier Luminet , R. Michael Bagby , Graeme J. Taylor
Frontmatter
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Advances in Research, Theory, and Clinical Practice

Edited by

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For Annette, Leah, and Pablo, and to the memory of my dear
father, Daniel Luminet **OL**

For Charmaine and David **RMB**

For Salma **GJT**

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Foreword

I am honored to write the foreword for this important book on alexithymia. It has been nearly three decades since I was first introduced to that strange noun, the Greek-rooted neologism to describe unique characteristics of patients who had psychosomatic disorders and unproductive psychotherapy. My doctoral training in clinical and health psychology in the late 1980s never mentioned alexithymia, but in 1990, a psychodynamically informed, behavioral-oriented psychiatrist did. He treated patients with pain, anxiety, and other stress-related disorders, and shared with me his fascination with the power of biofeedback to help patients understand the linkages among their stories, emotions, and bodily reactions. Many alexithymic patients needed such an external aid to recognize these connections, and the biofeedback device often became a valued attachment object, with which many patients were reluctant to part.

That introduction to alexithymia served as a springboard to my research program as a newly appointed psychology professor, and my students and I included the *Toronto Alexithymia Scale* (TAS) and subsequently the TAS-20 in every data set we collected. I became part of a small cohort of researchers who tried to understand what alexithymia is and how it is related to a wide range of criteria, from physiological activity to dreams, from mental health to social relations, and from disease states to health behaviors. Our research suggested that alexithymia was a correlate, and possibly risk factor, for a host of problems.

In the early to mid-1990s, I was often asked, and sometimes challenged, about whether “this alexithymia thing” would catch fire and become mainstream – generate substantial research, influence clinical practice, and perhaps even enter the lexicon of lay people. Or would alexithymia reach a peak, fade, and burn out, as have many psychological constructs? To shed light on this issue, I recently consulted Google Scholar, and a search of the term “alexithymia” returned fully 42,900 references through early 2018.

An examination by year reveals a steady increase almost every year since the mid-1970s, with growth in alexithymia-related publications averaging about 13% per year over the past three decades. The handful of publications in the 1970s has swelled to nearly 4,000 per year recently. Although part of this substantial growth reflects the overall increase in the volume of all scientific research, it is clear that alexithymia has become and remains a popular research topic – sometimes the sole focus of a study, but more often one of several constructs included in a project. Given the growth in the alexithymia literature, I can comfortably respond to those challengers from years ago: alexithymia has survived and thrived!

Next to my desk sits a gray-covered book published in 1997 by Taylor, Bagby, and Parker. My copy of *Disorders of Affect Regulation: Alexithymia in Medical and Psychiatric Illness* is well worn – it has probably seen more action than any other text on my shelf. My students and I have referenced it heavily over the years, but we have increasingly longed for an update. Given the substantial growth in the literature, however, such an endeavor by a single author – or even a trio – is too much to ask, and a team approach is needed. Thus, I was delighted to learn of the plans to assemble the world’s leading alexithymia researchers and have each give a presentation on their topic of interest at a workshop in the Netherlands in May 2017. I was delighted to attend this workshop, meet so many people I have previously read but not seen, learn from their presentations, and share my views on the field. Each of these scholars was asked to contribute a chapter to an edited volume. The result, which you have before you, will become, I believe, the long-awaited update to the 1997 text, not only further substantiating the field, but stoking its fire and guiding future work.

The Preface of this text provides an excellent overview of the many topics that are covered and is a must-read to get the topography of the construct.

From there, readers can select chapters that are of most relevance to them. I will share a few general comments about this book overall.

First, it is clear that alexithymia has worldwide appeal. Although North America is where the construct was named and where much of the early research was produced, the light is shining brightly in Europe and also in Asia, as reflected in the home countries of the text's authors. I think that this pattern reflects the cognitive-behavioral bias of America, whereas Europe has long recognized the value of psychosomatics, psychodynamics, and emotional processes.

Second, the chapters make clear that much of the research on alexithymia is basic or foundational – striving to better understand what alexithymia is and how it might impact functioning. The text has substantial coverage of how alexithymia is assessed and how it is related to basic cognitive-affective processes (e.g., emotion regulation, memory, executive functioning, and language), neuroscience, physiology (e.g., genetics, immune and endocrine activity, psychophysiology), body awareness, attachment, empathy, morality, social behavior, culture, and psychological and somatic disorders. My take on this body of research is that it clearly substantiates alexithymia as a unique, valuable, transdiagnostic explanatory construct, but I will confess to sometimes wondering about discriminant validity – with what does alexithymia not correlate?

Third, the text also points to what is needed in alexithymia research. Interestingly, only one chapter is primarily clinically oriented, and much of it examines alexithymia as a predictor of treatment out-

comes, rather than what one might do about alexithymia. Yet, I hear from clinicians who recognize alexithymia in their patients and bemoan the lack of its presence in standard psychiatric diagnostic manuals. Some of my psychodynamically oriented colleagues are being guided by the *Diagnostic Criteria for Psychosomatic Research*, which includes alexithymia. I have seen clinician interview forms that list alexithymia as an option under the “affect” categories. I have heard an increasing number of practitioners distinguish between the “defenses” of neurotic individuals and the “deficits” of their alexithymic patients, showing some recognition that the presence of alexithymia calls for a different conceptualization, approach to intervention, and perhaps way of relating to the patient. Yet, these clinical observations and practices seem to be outstripping the research, and the need is great to understand better how to assess alexithymia efficiently and validly in a clinical encounter, and what one should do with such patients. I hope that some of the substantial energy devoted to the thousands of alexithymia studies each year will also focus on studying how to work with alexithymia clinically.

I greatly applaud the editors and the many authors for creating this impressive and important body of work. It reflects not only how far alexithymia research has come, but where it can – and no doubt will – go.

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Preface

The idea for this volume grew from a discussion among the three editors that two decades have passed since Taylor, Bagby, and Parker (1997) published *Disorders of Affect Regulation: Alexithymia in Medical and Psychiatric Illness*. That book provided a comprehensive review of theoretical models and interdisciplinary research on alexithymia and associated disturbances in affect regulation since the mid-1970s when the alexithymia construct was introduced. We were aware that an enormous amount of research on alexithymia has been conducted since *Disorders of Affect Regulation* was published, and that there have also been important advances in alexithymia theory and in developing and evaluating treatment approaches to patients with high levels of alexithymia. Moreover, the development of valid measures of alexithymia, and their translation and validation in different languages, has led to an expansion of alexithymia research into many different countries and cultures. In 2013, Olivier Luminet, Nicolas Vermeulen, and Delphine Grynberg published a review of contemporary work on alexithymia in *L'Alexithymie. Comment le manque d'émotions peut affecter notre santé*; however, this book was written in the French language and was therefore primarily of value to researchers and clinicians in France and French-speaking regions of Belgium, Switzerland, and Canada. We decided therefore that it was time to publish a new book on the topic in English to reach a broader audience; and because alexithymia research has extended into many different fields of inquiry including attachment and trauma research, cognitive psychology, culture, genetics, neurobiology, and psychophysiology, we concluded that it should be a collection of chapters written by authors from different institutions and universities who are recognized for their expertise in those fields.

As an initial step, Olivier Luminet, together with Sander Koole (Director of the Amsterdam Emotion Regulation Laboratory in the Clinical Psychology

Department of the Vrije Universiteit Amsterdam), and Dalya Samur (a doctoral student at Vrije Universiteit Amsterdam), sought external funding from the Netherland Institute for Advanced Study in the Humanities and Social Sciences (NIAS) for a four-day workshop for invited alexithymia researchers to be held at the Lorentz Center in Leiden, the Netherlands in early May 2017. We gratefully acknowledge the financial support provided by NIAS for the workshop, and also express our appreciation to the extremely helpful staff at the Lorentz Center, especially Aimée Reinards and Nienke Tander for their excellent coordination of all of the practical arrangements for the workshop. The invited participants were the majority of senior authors and several co-authors of the chapters that we decided were essential for this volume, and they represented the diverse scientific areas in which there have been major advances in alexithymia research. Over the four consecutive days, the workshop created an ideal context for interaction among alexithymia researchers who generally do not meet at conferences owing to their specific interest in different scientific fields – psychiatry, neurobiology, genetics, clinical psychology, cognitive psychology, social psychology, health psychology, and personality psychology. The senior authors in attendance presented an overview of their chapter at the workshop and benefited from audience discussion and comments from the other authors. They subsequently revised their chapters and sent them to the editors for further comments and suggestions.

At around the time we were organizing the workshop, we prepared a book proposal, which was submitted to Cambridge University Press (CUP) in June 2016. Catherine Barnes, who was the Executive Publisher, Medicine, sent the proposal to four anonymous reviewers in July 2016, and after we responded to some of the questions and suggestions from the reviewers, the academic Syndicate of the University

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Press considered the proposal. By early October 2016, we received the news that the Syndicate had approved our book proposal. This news further supported our view that a book describing the “state of the art” in alexithymia research, theory, and clinical practice was much needed.

The book is divided into five parts, and most chapters focus their review on studies that have been conducted since the publication of *Disorders of Affect Regulation*. When Taylor et al. (1997) wrote their book, the alexithymia construct was just beginning to be integrated into the broader field of emotion research. Over the subsequent two decades, interdisciplinary efforts and studies from diverse perspectives have led to important advances including the development of several new measures of alexithymia, systematic investigations of ways by which alexithymic individuals process emotional and non-emotional information, the use of modern brain imaging techniques to explore the neural correlates of alexithymia, family and twin studies to examine the potential role of genetic factors in alexithymia, and exploration of cultural issues in alexithymia. The introduction of Bucci’s (1997) multiple code theory of emotional processing, and increasing interest in the concept of mentalization (Fonagy et al., 2002), have helped to advance the theoretical understanding of alexithymia, resulting in a greater realization that the construct does not merely involve difficulty in finding words for feelings, but reflects a deficit in the mental representation of emotions (Taylor, Bagby, & Parker, 2016).

The first part of the book is a review of the historical background of the alexithymia construct, the methods that have been developed to assess alexithymia, and the role of cultural factors in shaping alexithymia. Much of the background history of alexithymia has been described in several previous works (e.g., Lesser, 1981; Taylor, 1984; Taylor et al., 1997), and is therefore well known to clinicians and researchers. What are less well known are the various ways in which the history of alexithymia has been influenced by psychoanalytic observations of patients and psychoanalytic theories. Graeme Taylor traces this aspect of the history in Chapter 1. He explores similarities and differences between the theoretical approach proposed by French psychoanalysts and the Paris School of Psychosomatics and the approach taken by psychoanalysts in America and several other countries. This includes a discussion of drives and

affects, and the role that different theorists assign to them in the psychosomatic process. Taylor then reviews the historical background to the concept of mentalization and describes different theoretical models that associate alexithymia with deficits in the mental representation of emotions. Next, he outlines changes in the emphasis that psychoanalysis has given to trauma over the decades and the important role of trauma in alexithymia theory. Although there is general agreement that patients with high degrees of alexithymia are not good candidates for psychoanalytic psychotherapies, Taylor describes the contributions of some psychoanalysts who have devised modified forms of psychotherapy, including ways to use countertransference experiences to access intense trauma-related affects that have not been represented mentally.

The authors of Chapter 2 provide a comprehensive review of the available instruments for assessing alexithymia. These include self-report scales, observer-rated measures, structured interviews, and performance-based tests. Two of the authors (R. Michael Bagby and Piero Porcelli) played a major role in developing methods for measuring the construct; the first author, Angela Sekely, a doctoral student in the Graduate Department of Psychological Clinical Science, University of Toronto, has been using item response theory in collaboration with Michael Bagby and Graeme Taylor to develop a short version of the *Toronto Structured Interview for Alexithymia*. The authors frame their review by using the widely accepted guidelines presented by the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association & National Council on Measurement in Education, 2014) to evaluate each instrument, including various aspects of reliability and validity. As the alexithymia construct is recognized and used in many research sites worldwide, and the different measures have been translated into many languages, the chapter also discusses the validity of the various translations of the measures and the methods needed to establish language and cultural equivalence across these translations.

In Chapter 3, Andrew Ryder and his colleagues first review published studies on sociodemographic differences in alexithymia, including age, sex, educational level, ethnicity, and language. They then review cultural issues in alexithymia, which is an area of alexithymia research that has hitherto received little

attention. They argue that the externally oriented thinking (EOT) component of the alexithymia construct is not defined in terms of problems, but rather in terms of preferences common to a number of cultural contexts and demographic subgroups. The authors also argue that even if the other components of the construct describe difficulties that are problematic, they may nonetheless be culturally shaped. They then explore the meaning of “culture”, describing its role within the overall framework of culture–mind–brain, and consider a small collection of studies about “Chinese somatization” that do emphasize the role of cultural context, particularly on EOT, to exemplify the importance of considering culture. In a final section of the chapter, the authors reflect on a culturally informed agenda for alexithymia research, emphasizing the burgeoning literature on culture and emotion.

The second part of the book focuses on emotions and cognitive processes, including emotion regulation, memory and executive functioning, and language processing in alexithymia. In Chapter 4, Olivier Luminet and Giorgia Zamariola first review the results of recent experimental studies that have investigated key cognitive, affective, and behavioral aspects of the alexithymia construct. Based on the collective outcomes of these studies, they then attempt to provide a theoretical framework that accounts for emotion processing deficits, which are thought to be the core of alexithymia. The authors draw upon two well-established constructs in emotion research – emotion knowledge and emotion regulation – to structure their review and to guide the formation of their theory. Emotion knowledge includes the capacity to detect, identify, recognize, and label emotions in oneself and in others, and the ability to understand situations that elicit emotions and the capacity to attribute emotions to particular situations; emotion regulation includes all the attempts to control and modify emotional responses. The authors examine how alexithymia moderates the performances for each dimension of emotion knowledge and emotion regulation. They found that people scoring higher on measures of alexithymia have more difficulties in identifying, detecting, and recognizing emotions in themselves and in others, or in labeling their emotions. Importantly, the deficits were observed only under specific contexts and conditions.

In Chapter 5, Nicolas Vermeulen, Irena Domachowska, and Kristy Nielson review findings from

studies that collectively demonstrate that memory is specifically impaired by alexithymia for accuracy performance when “to-be-memorized” stimuli or personal autobiographical events are emotional in kind and context. The authors review evidence showing that these deficits cannot be attributed to anxiety or depression, and also show that specific contexts (e.g., music) and personal relevance or salience (e.g., illness words) appear to influence emotion processing in individuals with high levels of alexithymia. They then review studies in which alexithymia was found to be associated with impaired executive performances. The facets of alexithymia that involve difficulty identifying feelings and difficulty describing feelings, in particular, correlated negatively with verbal fluency and were associated with worse performance in tasks that focus on psychomotor speed and abstraction. While these results suggest that the examination of alexithymia with memory and executive function has provided important information about the alexithymia construct, the authors draw attention to important limitations in the studies. They recommend the use of larger-scale and longitudinal studies in alexithymia of different types of memory, including short-term memory, as well as a broader spectrum of executive functions and their neural foundations as directions for future research.

Human beings rely on verbal and non-verbal language to communicate their inner thoughts and feelings to others and to also understand the utterances of others. This interaction eventually forms an active communication, which is central to social life. As Nemiah and Sifneos (1970) and many other clinicians have observed, individuals with high levels of alexithymia manifest difficulties in verbally expressing their feelings and reading the emotions that others express both verbally and non-verbally. In Chapter 6, Carlotta Welding and Dalya Samur review research studies exploring relations between alexithymia and the production and comprehension of verbal and non-verbal language. They discuss findings from language production studies showing that individuals with high levels of alexithymia have impairments in expressing emotions verbally, which are reflected by a lower frequency of emotion words and a lower complexity of their emotion vocabulary. The authors also consider research results from language comprehension studies in which individuals with high scores on measures of alexithymia manifested no deficits in basic processing tasks, such as word recognition, but

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had difficulties with more complex ones, such as memory and semantic integration. In a later section of the chapter, they review studies reporting associations between alexithymia and reduced sensitivity to the emotional qualities of speech at a neurophysiological level.

The third part of the book focuses on clinical issues and somatic and psychiatric pathology. Although the concept of alexithymia was derived originally from clinical observations made on patients with so-called “classic” psychosomatic diseases (Nemiah, Freyberger, & Sifneos, 1976; Nemiah & Sifneos, 1970), it was subsequently extended to become a transdiagnostic construct associated with a wide variety of physical and psychiatric disorders. In Chapter 7, Piero Porcelli and Graeme Taylor adopt a psychosomatic (biopsychosocial) approach to explore associations between alexithymia and physical illness. In the first section of the chapter, they review theoretical concepts and models by which alexithymia may potentially affect health, including the constructs of somatization, emotional awareness, neuroticism, somatosensory amplification, illness behavior, the multiple code theory of emotion processing, and the dysregulation model of disease. In the second section of the chapter, they review a large number of empirical investigations that have been conducted during the past two decades exploring associations between alexithymia and several common physical illnesses including psychopathological somatization, gastrointestinal disorders, cardiovascular disorders, bronchial asthma, skin diseases, diabetes, cancer, and chronic pain. A clinical case of a patient with a somatic symptom disorder associated with an autoimmune disease is also discussed. In a final part of the chapter, the authors briefly review a small number of studies that have examined the potential influence of alexithymia, or the benefits of reducing alexithymia, on the outcome of medical treatments.

In Chapter 8, Adriano Schimmenti and Vincenzo Caretti review the theoretical contributions and the empirical evidence linking alexithymia to psychological trauma and insecure attachment. They note that early conceptualizations of alexithymia, particularly those of Henry Krystal (1988), included childhood interpersonal trauma and massive adult trauma among the potential precursors of alexithymic conditions. The authors then review research studies with clinical and community samples that have clearly demonstrated that trauma exposure and insecure

attachment styles resulting from negative experiences with caregivers during childhood are positively associated with alexithymia. The strong convergence between theoretical considerations and research findings support the view that a thorough assessment of childhood attachment relationships and traumatic experiences is imperative in clinical work with alexithymic individuals, in order to better understand the origins and characteristics of their maladaptive strategies of emotion regulation and to provide treatment accordingly.

In Chapter 9, Kirsi Honkalampi and Domenico De Berardis and their colleagues review studies investigating relations between alexithymia and depressive disorders, anxiety disorders, and personality disorders, as well as personality trait dimensions. They also review studies examining evidence that alexithymia is a risk factor for suicide in both clinical and non-clinical populations. Most studies report moderate to high levels of alexithymia among patients with depressive disorders, and although alexithymia scores tend to decrease as depression responds to treatment, there is empirical evidence for the relative stability of the construct. This understanding has led to the idea that alexithymia is a vulnerability factor for some depressive disorders and not an epiphenomenon. Studies have also reported elevated levels of alexithymia among patients with panic disorder, generalized anxiety disorder, or social anxiety disorder, although the levels may decline after controlling for depression. The treatment of depression and anxiety may be compromised in the presence of alexithymia, especially in patients with high levels of externally oriented thinking. Other studies have reported strong associations between alexithymia and borderline personality disorder, which is not surprising given that they share many characteristics and have similar etiologies including deficits in emotional processing and regulation, impulsive behavior, and a history of trauma. The empirical literature on the associations between alexithymia and the personality domains of the five-factor model of personality (FFM) suggests that alexithymia is a distinct construct, and a unique constellation of FFM domains of (high) neuroticism, (low) extraversion, and (low) openness to experience. Given that many studies have pointed to a strong relationship between alexithymia and increased suicide risk, particularly in depressed individuals, the authors conclude that screening for alexithymia should be an integral part of all psychiatric

management programs, especially for patients with depressive or anxiety disorders.

Clinicians have long observed that alexithymia is prevalent among patients with substance use disorders and eating disorders and often seems related directly to symptoms. In Chapter 10, Kristen Morie and Nathan Ridout review research studies published during the past two decades exploring associations between alexithymia and these disorders. In the first section of the chapter, they review studies investigating the prevalence of alexithymia in alcohol and substance users, how alexithymia affects the treatment of substance abusers, and the neural underpinnings of alexithymia in substance users. The stability of alexithymia throughout substance use treatment, how alexithymia interacts with the impaired regulation seen in substance abusers, and its potential as a vulnerability factor for substance use are also discussed. In the second section of the chapter, the authors review investigations of alexithymia in eating disorders. Although high levels of alexithymia are found in both clinical and subclinical disordered eating, Morie and Ridout point out that elevated scores tend to be found only on the difficulty identifying feelings and the difficulty describing feelings facets of the alexithymia construct. Moreover, they present evidence that alexithymia in disordered eating is not simply a consequence of comorbid depression, but rather appears to be a trait feature of individuals who are vulnerable to disordered eating. In both substance use and eating disorder patients, high levels of alexithymia are associated with poor emotion regulation, a less favorable prognosis, and a poorer treatment response.

In Chapter 11, Delphine Grynberg, Sylvie Berthoz, and Geoffrey Bird focus on relations between alexithymia and social issues, with an emphasis on deficits that occur in interpersonal relationships. They first review studies examining associations between alexithymia and the constructs of emotional intelligence and self-construal, as well as one's degree of concern and investment in social relationships. The authors then review studies exploring relations between alexithymia, empathy, and impairments in morality. The findings from these studies highlight impaired processing of the emotional states of others, empathy deficits, and less prosocial behavior in individuals with high levels of alexithymia. In a final section of the chapter, the authors use the example of autism spectrum disorder (ASD) to describe the role of

alexithymia in interpersonal deficits in psychopathology. Research with ASD patients suggests that only those with high levels of alexithymia are likely to be particularly impaired in terms of empathy. The authors argue that future alexithymia research needs to focus on processes that account for interpersonal deficits as well as the intrapersonal deficits associated with the construct.

It has long been acknowledged that patients with high levels of alexithymia respond poorly to insight-oriented forms of psychotherapy (Krystal, 1979; Sifneos, 1975). In Chapter 12, John Ogronczuk and colleagues discuss the complex therapeutic issues that arise when treating alexithymic patients. Specifically, they review and discuss research studies examining whether alexithymia influences treatment engagement, alexithymia as a predictor of psychotherapy outcome, therapy processes influenced by alexithymia, and the effect of different psychotherapeutic treatments on alexithymia. Collectively, the findings from these studies suggest that patients with high levels of alexithymia do not have reservations about entering into a psychotherapeutic treatment, and that alexithymia does not have much influence on whether patients remain engaged in treatment. There is mixed evidence regarding the influence of baseline alexithymia on treatment outcomes, with several studies reporting no effect of alexithymia on the outcome of therapy, but twice as many studies reporting a negative effect. There is also emerging evidence suggesting that it may be difficult to establish or maintain a positive therapeutic relationship with highly alexithymic patients; some findings suggest that it is the lack of expression of positive emotions by the patient that contributes to a negative reaction from the therapist. Nonetheless, many studies have shown that the level of alexithymia can be reduced by psychological interventions, although there is still uncertainty as to which interventions work best with alexithymic patients. The authors discuss the implications of the research findings for future research and conclude the chapter with some general clinical considerations that may be useful when working with alexithymic patients.

The fourth part of the book is devoted to biological factors associated with alexithymia. In Chapter 13, Katharina Goerlich and André Aleman provide an overview of the current state of neuroscience research on alexithymia. They begin with a review of early and current models of the

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neurobiology underlying alexithymia, and then describe and discuss the complex interplay between cognition and emotion in the brain. The main part of the chapter is devoted to a review of findings from neuroimaging studies. The findings from functional neuroimaging studies suggest that alexithymia is associated with differences in neural activity of the amygdala, insula, anterior cingulate cortex, and several regions of the prefrontal cortex. In addition, there is evidence that alexithymia is associated with altered neural crosstalk within entire networks of brain regions, including the default mode network and the salience network. These findings are complemented by the results from structural neuroimaging studies, which have yielded evidence that alexithymia is associated with reduced gray matter volumes in the left insula and the left amygdala, orbital frontal cortex, and striatum. As Goerlich and Aleman point out, these areas are important for the conscious as well as unconscious perception and experience of emotions, emotional awareness, and the processing of rewards. In their view, reduced gray matter volumes in these regions of the brain likely underlie their aberrant functioning during the processing of social and emotional information, which would account for the difficulties in identifying and communicating emotional feelings that are experienced by individuals with high levels of alexithymia. Although the neuroimaging findings suggest that alexithymia is associated with dysfunction in a prefrontal-limbic network mediating the processing of cognitive-emotional information, because the findings are correlational, no causal inferences can be drawn regarding the etiology of alexithymia.

In Chapter 14, Katharina Goerlich reviews studies that have used electroencephalography to investigate potential influences of alexithymia on electrical activity in the brain during the processing of emotional information. She reports that findings from studies on frequency bands suggest that alexithymia is associated with alterations in alpha, theta, and gamma frequency bands indicative of deficits in the early appraisal of emotions and in the utilization of memory and emotional information during the processing of emotional information. Complementing such observations, several event-related potential studies have demonstrated impaired emotion processing in relation to high levels of alexithymia at very early (<100 ms), automatic processing levels. Goerlich indicates that these early alterations are thought

to hamper the conscious processing of emotional information, and thereby contribute to some of the behavioral problems associated with alexithymia, such as difficulty in understanding another person's feelings and intentions and reacting empathically in emotional situations encountered in everyday life.

In Chapter 15, Michiko Kano, Hans Jürgen Grabe, and Jan Teroock focus on genetic factors and endocrine and immune system functioning associated with alexithymia. In the first section of the chapter, they review family and twin studies, candidate gene studies, and genome-wide association investigations that have been used to examine the potential role of genetic factors in alexithymia. They report that one-third of the variance in alexithymia is explained by genetic effects, and conclude that there is increasing evidence supporting the role of the serotonin transporter polymorphism in alexithymia. In the second and third sections of the chapter, the authors review studies that have reported associations between alexithymia and alterations in endocrine and immune system functioning. Within the endocrine system, some evidence suggests a hypofunction of the hypothalamic–pituitary–adrenal (HPA) axis at baseline or at rest, and hyperfunction of the HPA axis under stress conditions. There is less and inconsistent evidence supporting an association between alexithymia and altered immune system functioning. Although some studies report associations of alexithymia with increased inflammation, most studies point at altered profiles of circulating cytokines rather than a clear shift towards pro-inflammatory or anti-inflammatory mediators. The endocrine and immune systems together with the autonomic nervous system are major components of stress/adaptive responses; genetic polymorphism and epigenetic modulation may influence these systems. The authors discuss methodological shortcomings in the studies and recommend that future research needs to focus on the interplay among the various systems.

In Chapter 16, Georgia Panayiotou, Maria Panteli, and Elke Vlemincx systematically review investigations of alexithymia that used peripheral physiological measures. Their aim is to explore whether the research findings support the view that alexithymia involves increased allostatic load (i.e., accumulation of bodily wear and tear), due to inflexibility of emotional processes, that may contribute to physical and mental illness and to illness perceptions. The authors focus on four markers of adaptive emotional

responses: appropriate reactivity, fast recovery, habituation, and coupling among emotional responses. They find strong evidence for autonomic under-reactivity in alexithymia, some evidence of tonic hyper-arousal, and limited evidence of poor anticipation, habituation, and recovery. The studies also show a decoupling between physiological and subjective responses to emotional stimuli, primarily revealing high or normal subjective reactivity paired with hypo-reactive physiology, rather than limited subjective emotional awareness and increased physiological response. These findings corroborate the idea that alexithymia involves emotion dysregulation and suggest that it may be linked to physical and psychological symptoms via increased allostatic load.

In Chapter 17, Olga Pollatos and Beate Herbert address the important topic of body awareness, which they believe provides a framework to explore and understand interactions between alexithymia and bodily processes. They focus on two aspects of the body awareness construct – interoception and body ownership. Whereas interoception refers to the awareness of sensations that arise from inside the body (e.g., hunger, thirst, and visceral sensations), body ownership is based on exteroceptive information from multiple channels (vision, temperature, itch, touch, etc.) and refers to the special status of one's own body that is characterized by the feeling that my "body belongs to me". The authors review theoretical models and some empirical evidence showing that the sense of body ownership based on exteroceptive information is closely linked to the interoceptive body, suggesting that these two "levels of embodiment" interact and complement each other to provide a unifying bodily self by multi-sensory integration across both exteroceptive and interoceptive channels. They also consider the neurobiological basis for both interoception and body ownership, and describe an interoceptive neural network which includes the insula as the relevant projection site of viscerosensory input from the different inner organ systems in the body; the right posterior insula is thought to underlie the subjective experience of body ownership. The authors then review empirical studies that have examined the relationships between alexithymia and interoception and body awareness. Although only a few studies have been conducted, the findings suggest that alexithymia is associated with deficits in both interoception and body

ownership. Pollatos and Herbert conclude that the process of multi-sensory integration across both exteroceptive and interoceptive channels is compromised in alexithymia, but indicate that further research is needed to test the possible causal connections among these processes and their developmental antecedents. They also propose that interventional strategies that focus directly on the body and the bodily self might ameliorate compromised interoceptive processes and possibly even play a mediating role in the reduction of alexithymia.

In the closing chapter of the book (Part V) we draw some broad and general conclusions from the preceding chapters with a focus on three main themes – advances in research, advances in theory, and advances in clinical practice. With each theme we also suggest some future directions for the field. We suggest, for example, how a consideration of concepts from the expanding field of affective neuroscience might further advance alexithymia theory, and also help guide the selection of psychotherapeutic interventions for patients with high levels of alexithymia. In sum, we believe that the content of the book reflects the current state of knowledge about alexithymia, and also points to areas of research that remain to be undertaken to yield an even more comprehensive understanding of the construct, and to further translation of the insights gained into effective interventions and treatments for those afflicted with disorders and illnesses attributed, either directly or indirectly, to alexithymia. In choosing the topics for the various chapters, we hope to have not only supported but also extended Sifneos's (1996) view that "The value of the concept of alexithymia lies in its ability to help us cut across our familiar nosological boundaries, build bridges between neurobiology and psychology, and bring together clinicians and non-clinical scientists so that they may develop appropriate therapies to alleviate the difficulties that are faced by patients with alexithymic characteristics" (p. 140). We express our gratitude to both the late Peter E. Sifneos and the late John C. Nemiah for their pioneering clinical research and theoretical ideas that inspired us to pursue programs of empirical research on the alexithymia construct.

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