



AINO MATTILA

# Alexithymia in Finnish General Population



ACADEMIC DISSERTATION

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the Faculty of Medicine of the University of Tampere,  
for public discussion in the Auditorium of  
Tampere School of Public Health, Medisiinarinkatu 3,  
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ACADEMIC DISSERTATION

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Watt had watched people smile and thought he understood how it was done. And it was true that Watt's smile, when he smiled, resembled more a smile than a sneer, for example, or a yawn. But there was something wanting to Watt's smile, some little thing was lacking, and people who saw it for the first time, and most people who saw it saw it for the first time, were sometimes in doubt as to what expression exactly was intended. To many it seemed a simple sucking of the teeth.

Watt used this smile sparingly.

~ Samuel Beckett, *Watt*



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# LIST OF ORIGINAL PUBLICATIONS

The dissertation is based on the following original publications, which are referred to in the text by Roman numerals I-IV.

- I Mattila AK, Salminen JK, Nummi T, Joukamaa M (2006): Age is strongly associated with alexithymia in the general population. *J Psychosom Res* 61:629-35
  
- II Mattila AK, Ahola K, Honkonen T, Huhtala H, Salminen JK, Joukamaa M (2007): Alexithymia and occupational burnout are strongly associated in working population. *J Psychosom Res* 62:657-65
  
- III Mattila AK, Saarni SI, Salminen JK, Huhtala H, Sintonen H, Joukamaa M: Alexithymia and health-related quality of life in general population. *Psychosomatics* (accepted 5/2007)
  
- IV Mattila AK, Kronholm E, Jula A, Salminen JK, Koivisto A-M, Mielonen R-L, Joukamaa M (2008): Alexithymia and somatization in general population. *Psychosom Med* 70:716-722

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# ABBREVIATIONS

AAS	Amsterdam Alexithymia Scale
AAS	Analog Alexithymia Scale
ACC	anterior cingulate cortex
APQR	Alexithymia Provoked Response Questionnaire
BDI	Beck Depression Inventory
BIQ	The Beth Israel Hospital Psychosomatic Questionnaire
BVAQ	Bermond-Vorst Alexithymia Questionnaire
CAQ-AP	California Q-Set Alexithymia Prototype
CBT	cognitive behavioural therapy
CLAD	censored least absolute deviations
COMT	catechol O-methyltransferase
DDF	difficulty describing feelings
DIF	difficulty identifying feelings
EOT	externally oriented thinking
fMRI	functional magnetic resonance imaging
GMI	group motivational intervention
HPA	“hypothalamic-pituitary-adrenal”
HRQoL	health-related quality of life
LEAS	Levels of Emotional Awareness Scale
MBI	Maslach Burnout Inventory
MBI-GS	Maslach Burnout Inventory - General Survey
M-CIDI	Composite International Diagnostic Interview, Munich version
MMPI	Minnesota Multiphasic Personality Inventory
MMPI-A / MMPI-AS	MMPI alexithymia scale
MRI	magnetic resonance imaging
OR	odds ratio
PET	positron emission tomography
SAM	“sympathetic-adrenal-medullar”
SAT <sub>9</sub>	Objectively Scored Archetypal <sub>9</sub> Test
SCL SOM	Somatization Scale of the 90-item Hopkins Symptom Checklist
SCL-90	90-item Hopkins Symptom Checklist
SEM	structural equation modelling
SSPS	Schalling-Sifneos Personality Scale
TAS	Toronto Alexithymia Scale

TAS-20	20-item Toronto Alexithymia Scale
TAS-26	26-item Toronto Alexithymia Scale
TAS-R	Revised Toronto Alexithymia Scale
TBI	traumatic brain injury
TMS	transcranial magnetic stimulation
TSIA	Toronto Structured Interview for Alexithymia

# ABSTRACT

Alexithymia refers to difficulties in identifying one's own feelings and in describing feelings to others as well as to an unimaginative and externally oriented way of thinking. According to earlier studies, alexithymia seems to be associated with several mental health disorders and somatic diseases. Results from epidemiological studies on the prevalence and socio-demographic associations of alexithymia have so far been somewhat contradictory. Moreover, there are no earlier nationally representative studies on the epidemiology of alexithymia. The aims of the present dissertation were as follows: to find out the prevalence and socio-demographic correlates of alexithymia in the Finnish general population, and if alexithymia is associated with occupational health, health-related quality of life and somatization, three factors with significance to public health.

This dissertation is based on data from the Health 2000 Study. The gathering of data took place in Finland in 2000 - 2001. A large national network coordinated by the National Public Health Institute was responsible for the planning and execution of the field phase of this multidisciplinary epidemiological survey. It was designed according to the concept of a two-stage stratified cluster sampling, and comprised adults aged 30 years and over. Of the nationally representative sample of 8028 subjects, 5454 were selected as the basic sample for this dissertation.

The prevalence of alexithymia was 9.9%. Men (11.9%) were significantly more commonly alexithymic than women (8.1%). The mean TAS-20 score for the whole sample was 45.8, for men 47.8 and for women 43.9, the sex difference being significant. Of the three dimensions of alexithymia, difficulties identifying feelings (DIF) was not associated with sex while the scores of difficulties describing feelings (DDF) and externally oriented thinking (EOT) were higher for men. The prevalence of alexithymia and the mean TAS-20 score increased significantly with age. Of other socio-demographic variables, alexithymia was associated with being unmarried or widowed, with lower education levels and with lower income. Occupational burnout was measured with the Maslach Burnout Inventory – General Survey in a sample of 3322 working people. DIF and DDF were stronger determinants of burnout than EOT. According to Sobel-Goodman mediation analyses, the impact of alexithymia on depression was partly mediated through occupational burnout. Health-related quality of life (HRQoL) was measured with the 15D and alexithymia was found to be significantly associated with poorer HRQoL. In the case of dichotomized alexithymia as well as the total TAS-20 score and DIF score, the difference in 15D scores were also clinically noteworthy. Somatization, operationalized as somatic symptom reporting on the Hopkins Symptom Checklist – 90 somatization subscale, was significantly associated with alexithymia. According to structural equation modelling, all alexithymia variables were statistically significant. However, the correlation between somatic symptom reporting and EOT was negligible.

In conclusion, every tenth individual in Finland is alexithymic. Men are more commonly alexithymic than women, and older adults more commonly than younger adults. Alexithymia is associated with lower levels of education and income, with occupational burnout, with poorer HRQoL and with somatization. It is important to recognize alexithymia as it may have a negative impact on the outcome of various disorders and on treatment relationships. In future, prospective population studies on the predictive value and the stability of alexithymia are needed. Furthermore, studies on etiological factors of alexithymia as well as on appropriate treatment strategies for helping alexithymic people are required.



# TIIVISTELMÄ

Aleksitymiällä tarkoitetaan vaikeuksia omien tunteiden tunnistamisessa ja kuvailemisessa muille sekä taipumusta ulkoistavaan ajatteluun ja vähäiseen mielikuvituksen käyttöön. Aikaisempien tutkimusten mukaan se näyttää olevan yhteydessä lukuisiin mielenterveyden häiriöihin ja somaattisiin sairauksiin. Epidemiologinen tieto aleksitymian esiintyvyydestä ja sosiodemografisista yhteyksistä on ollut ristiriitaista eikä aiempia kansallisesti edustavia tutkimuksia ole tehty. Tämän väitöskirjatutkimuksen tavoitteena oli selvittää aleksitymian esiintyvyys Suomen väestössä ja aleksitymiaan liittyvät sosiodemografiset tekijät. Lisäksi haluttiin selvittää, onko aleksitymia yhteydessä kolmeen kansanterveydellisesti merkittävään ilmiöön: työuupumukseen, terveyteen liittyvään elämänlaatuun ja somatisaatioon.

Väitöskirja perustuu Terveys 2000 – aineistoon, jonka keruu tapahtui Suomessa vuosina 2000–2001. Laaja Kansanterveyslaitoksen koordinoima verkosto vastasi kyseisen monialaisen epidemiologisen tutkimuksen suunnittelusta ja kenttävaiheen toteutuksesta. Kaksiasteisella ryväotannalla kerättiin 30 vuotta täyttäneistä aikuisista kansallisesti edustava 8028 ihmisen otos. Heistä 5454 seuloutui tämän väitöskirjatutkimuksen perusjoukoksi.

Ensimmäisen osatutkimuksen mukaan 9.9% tutkittavista oli aleksityymisiä. Miehet (11.9%) olivat merkitsevästi yleisemmin aleksityymisiä kuin naiset (8.1%). 20-osioisen Toronton aleksitymiakyselyn (Toronto Alexithymia Scale, TAS-20) keskipistemäärä oli koko otoksessa 45.8; miesten osajoukossa se oli 47.8 ja naisten osajoukossa 43.9 eron ollessa tilastollisesti merkitsevä. Aleksitymian kolmesta dimensiosta tunteiden tunnistamisen vaikeus (difficulties identifying feelings, DIF) ei ollut yhteydessä sukupuoleen, kun taas miehet saivat merkitsevästi korkeammat pisteet tunteiden kuvailemisen vaikeudesta (difficulties describing feelings, DDF) ja ulkoistavasta ajattelutavasta (externally oriented thinking, EOT). Sekä aleksitymian esiintyvyys että TAS-20-keskipistemäärä nousivat iän myötä. Aleksitymia oli merkitsevästi yhteydessä myös naimattomuuteen tai leskeyteen, alhaiseen koulutustasoon ja alhaiseen tulotasoon. Työuupumusta tutkittiin Maslachin työuupumuskyselyllä (Maslach Burnout Inventory – General Survey) 3322 työssä käyvän ihmisen otoksessa. Löydöksenä oli aleksitymian merkitsevä yhteys työuupumukseen. DIF ja DDF määrittivät työuupumusta voimakkaammin kuin EOT. Sobel-Goodman-mediaatioanalyysien mukaan työuupumus välitti osittain aleksitymian vaikutusta depression. Kolmannessa osatutkimuksessa terveyteen liittyvää elämänlaatua mitattiin 15D-kyselyllä, ja aleksitymian todettiin olevan merkitsevästi yhteydessä huonoon elämänlaatuun. Dikotomoitu aleksitymia, TAS-20-kokonaispistemäärä ja DIF-pistemäärä olivat lisäksi kliinisesti merkittävästi yhteydessä 15D-pistemääriin. Neljännessä osatutkimuksessa somatisaatiota tutkittiin somatisaatiokyselyllä, joka oli 90-osioisen Hopkins Symptom Checklistin osa-asteikko. Rakenneyhtälömallinnuksessa löytyi tilastollisesti merkitsevä yhteys somatisaation ja kaikkien aleksitymiamuuttujien välillä. Somatisaation ja EOT:n välinen yhteys oli kuitenkin käytännössä merkityksetön.

Joka kymmenes suomalainen on siis aleksityyminen. Miehet ovat naisia yleisemmin aleksityymisiä, ja vanhat aikuiset useammin kuin nuoret aikuiset. Aleksitymia on yhteydessä alhaiseen koulutus- ja tulotasoon, työuupumukseen, huonoon terveyteen liittyvään elämälaatuun ja somatisaatioon. Aleksitymian tunnistaminen on tärkeää, koska sillä saattaa olla häiriöiden ennustetta ja hoitosuhteen laatua heikentävä vaikutus. Tulevaisuudessa tarvitaan pitkittäisiä väestötutkimuksia aleksitymian ennustearvon ja pysyvyyden selvittämiseksi, lisää tutkimuksia aleksitymian etiologian määrittämiseksi samoin kuin tutkimuksia hoitomuodoista, joilla aleksityymisiä ihmisiä voidaan parhaiten auttaa.





# 1. INTRODUCTION

Alexithymia refers to difficulties in identifying and describing feelings, and to an externally oriented, unimaginative way of thinking. The term was first coined in a psychosomatic clinical setting (Sifneos 1973) as patients with illnesses which were thought to have psychosomatic etiology seemed to demonstrate a paucity of inner feelings. Later, the interest in alexithymia moved beyond the psychosomatic clinics. Accumulating empirical evidence suggests associations between alexithymia and several physical diseases and mental health disorders (Taylor 2000, Taylor and Bagby 2004, Lumley et al. 2007).

Alexithymia is primarily seen as a personality construct, a trait (Taylor 2000, Taylor and Bagby 2004). It is thought to reflect a deficit in cognitive processing and regulation of emotions (Taylor et al, 1997a,b). Adverse childhood experiences, including low maternal care, general family pathology and both mental and physical abuse, have been proposed as psychosocial etiological factors for alexithymia (Berenbaum 1996, Lumley et al. 1996a, Taylor et al. 1997a, Fukunishi et al. 1999b). There may also be cultural differences in the etiology and levels of alexithymia (Dion 1996, Joukamaa et al. 2003, Taylor et al. 2003). Alexithymia also seems to be associated with some neurobiological manifestations (Taylor 2000, Taylor and Bagby 2004). Furthermore, there is some evidence of genetic factors having a role in the etiology of alexithymia (Jørgensen et al. 2007).

Alexithymia has been shown to have a negative impact on various treatment outcomes (e.g. De Groot et al. 1995, McCallum et al. 2003, Porcelli et al. 2003, Honkalampi et al. 2007). It may also have a deleterious effect on the patient's status in health care as it has been shown to evoke negative feelings in health care workers (Taylor 1977, Rasting et al. 2005).

In the first decade of alexithymia research there was lack of psychometrically sound measures. After the introduction of the Toronto Alexithymia Scale and its improved versions (Taylor et al. 1985, Bagby et al. 1994a) conducting more comparable studies has been possible. There are a few studies on the prevalence of alexithymia on community or population samples indicating prevalence figures between 5.2% (Kokkonen et al. 2001) and 34.5% (Joukamaa et al. 1996) depending on the age and sex of the participants and on the version of the alexithymia scale. Most of the population studies have been conducted in Finland. None of these studies, however, have been representative of the whole Finnish population. The Health 2000 study, organised by the National Public Health Institute, made it possible for the first time to assess the prevalence of

alexithymia in a large, representative general population sample comprising both young and old adults (age range 30-97 years).

Even though the associations between alexithymia and several mental health problems, including depression and somatization, have been actively studied, there are no representative population studies on the relationships between alexithymia and occupational burnout, alexithymia and health-related quality of life, or alexithymia and somatization. Furthermore, many earlier studies in smaller non-clinical samples or in patient samples have failed to control for essential confounding factors such as socio-demographic variables, mental health and physical health. These shortcomings have made it difficult to generalize the findings to general population. Nevertheless, as it is the general population that utilises public health care, it is important to determine the prevalence of alexithymia and its associations with the above-mentioned health outcomes specifically in general population. This makes it possible to assess the impact of alexithymia on public health, not only on selected patient samples.

## 2. REVIEW OF THE LITERATURE

### 2.1 The concept of alexithymia

#### *2.1.1 From early psychosomatic ideas to the coining of the term “alexithymia”*

The history of alexithymia is rooted in the history and development of psychosomatic medicine. The Western medical tradition is profoundly based on ancient Greek medical and philosophical ideas. The interaction between mind and body was seen as an essential factor in medicine and in overall health by such ancient physicians and medico-philosophers as Hippocrates, Zalmoxis, Pythagoras, Plato and Aristotle (Rigatos and Scarlos 1987). According to Plato, “everything is associated with the soul, evil as well as good in the body and in the entire human being and it is the soul that affects the entire body...” (Rigatos and Scarlos 1987).

In the modern Western world, the mind-body dilemma has been a subject of interest especially in the psychoanalytic tradition (Wittkower 1977, Bucci 1997, Gottlieb 2003). Freud introduced the concept of conversion hysteria, which he further developed to include the ideas of conflict, defence and compromise formation (Gottlieb 2003). Ferenczi applied the conversion model to organ neurosis, the theory on which Deutsch and Melanie Klein further elaborated (Wittkower 1977). According to the psychoanalytic thinking, somatic symptoms were meaningful symbols of unconscious mental conflicts (Gottlieb 2003).

Dunbar studied the personality profiles of patients suffering from various organic disorders and described, for example, the “ulcer personality” (Wittkower 1977). She found “a parallelism between degree of crystallization of physiological dysfunction in somatic damage and degree of crystallization of psychological defenses in characterological armor” (Dunbar and Arlow 1944). Dunbar as well as Alexander refuted the symbolic significance of psychosomatic dysfunction and proposed that psychosomatic disorders were the result of chronic tension on the autonomic nervous system caused by inappropriately or inadequately expressed emotions (Wittkower 1977). Alexander emphasized the role of verbal communication, “...man in contrast to the animal organisms is able to convey...internal sensations to others by verbal communication. Verbal communication is therefore one of the most potent instruments of psychology and consequently also psychosomatic research.” (Alexander 1943). He held that chronic repression of emotions was one explanation for “vegetative neurosis”

(Alexander 1943). There were seven illnesses thought to be “classic” psychosomatic illnesses: ulcerative colitis, bronchial asthma, essential hypertension, peptic duodenal ulcer, regional enteritis, Graves’ disease and rheumatoid arthritis (Gottlieb 2003). Alexander and his group attempted to formulate for different psychosomatic illnesses the specific psychodynamic conflict that characterised the psychological functioning of the individual suffering from it (Nemiah 1978).

Ruesch (1948) studied patients with psychosomatic conditions and described the “infantile personality”. Characteristic of this type of personality was poor symbolic self-expression. In Ruesch’ own words, “Mature persons can...expend any excess tension through verbal, gestural, or creative symbolisms in interpersonal relations”. According to him, immature persons were not capable of this. Lack of proper ways to discharge tension would, consequently, lead to chronic tension and psychosomatic problems such as hypertension.

MacLean (1949) attempted to construct a model connecting the psychoanalytic ideas concerning psychosomatic diseases to the functions of the “visceral brain”. He noted that patients with psychosomatic illness were incapable of verbalizing their emotional feelings. According to him, “...emotional feelings, instead of finding expression and discharge in the symbolic use of words and appropriate behaviour, might be conceived as being translated into a kind of “organ language””.

Horney (1952) and Kelman (1952) described psychotherapy with patients who demonstrated failure to experience inner processes. According to them, these patients had an externalised way of living. Kelman listed certain characteristics of such patients: each session involved a chronological recital of latest life events with the patient being elusive as to his or her thoughts, feelings or associations; the character of the patient was monotonic or monochromatic; and the patient had little interest in his or her dreams. Many of these patients developed psychosomatic symptoms. Horney and Kelman approached this phenomenon from a psychoanalytical point of view and concluded that the paucity of inner experiences and the externalised way of living were manifestations of a neurotic process causing the patients to develop a defence-like numbing of emotions. As Horney put it, “...unawareness protects illusions and unconscious pretenses. Furthermore, it is an overall protection against all *painful* inner experiences” (Horney 1952, italics Horney’s).

In the early 1960’s Marty and de M’Uzan, representatives of the “Parisian school”, coined the term “pensée opératoire” (operative thinking) by which they implied to the utilitarian, pragmatic way of thinking that many physically ill patients seemed to employ (Lolas and von Rad 1989, Marty and Debray 1989). Later, Marty and Debray (1989) preferred to use the term “vie opératoire” (operative life) to describe the mechanical state of existence observed in psychosomatic patients. Patients with these features seemed to lack inner life and imagination. Another prominent author from the Paris Psychoanalytical Society, McDougall, stated that certain psychosomatic patients *refused* to “give in to psychic pain, anguish or depression” which gave an “impression of superhuman

emotional control” (McDougall 1974), and that “...the inability to name, recognize, contain or work through one’s affective states is frequently one manifestation of defensive structures of a psychotic kind (more radical than denial which deals with certain neurotic anxieties)” (McDougall 1982, parentheses McDougall’s). McDougall also coined the term “normopath”: “...these patients appeared to have no psychological problems...they seemed to have achieved in early childhood a robot-like adaptation to the demands of external reality” (McDougall 1986).

Nemiah and Sifneos (1970) analysed interviews with patients having psychosomatic illnesses and discovered that a majority of these patients evinced 1) a total unawareness of feelings or an almost complete incapacity to put into words what they were experiencing, 2) a nearly total absence of fantasy or other material related to their inner mental life and 3) a detailed recounting of circumstances and events in their environment, their own actions included. Nemiah and Sifneos concluded that the thoughts of these patients were stimulus-bound rather than drive-directed.

In the 1960s and the early 1970s, Krystal, unaware of the work of Marty, de M’Uzan, Sifneos and Nemiah, found a lack of differentiation of affects in drug withdrawal states and described the same characteristic problems in severe post-traumatic states (Krystal 1982).

In the early 1970s Sifneos further elaborated these ideas and “for lack of a better term” he called the characteristics described above “alexithymic” (Sifneos 1973). Alexithymia was a neologism constructed from a Greek prefix a = lack, and Greek words lexis = word and thymos = mood or emotion. Literally, the word means “no words for feelings”. Sifneos also speculated, “At this point, the question which must be raised is whether these observations constitute new clinical findings or whether, in fact, these phenomena have been observed before, but they have been explained by our familiar psychodynamic theoretical concepts...” Sifneos hoped that paying attention to and investigating alexithymia would help in finding appropriate ways to treat patients with psychosomatic diseases as it had been observed that patients with alexithymic characteristics tended to fail to respond to dynamic psychotherapy.

### *2.1.2 The contemporary formulation of the alexithymia concept*

Since the early 1970s numerous researchers world-wide have contributed to the development of alexithymia theory (Taylor et al. 1991, Taylor 2000, Taylor and Bagby 2004). The focus of interest gradually shifted from the “classic” psychosomatic diseases to an attempt to understand the influence of emotions and personality on sickness and health (Taylor et al. 1991). This has yielded a constantly growing pool of information on the associations between alexithymia and different aspects of mental and somatic health.

Alexithymia was the main theme of the 11<sup>th</sup> European Conference on Psychosomatic Research in Heidelberg, Germany in 1976 (Bräutigam and von

Rad 1977, Bagby and Taylor 1997a). In this conference a consensus regarding the construct of alexithymia was provisionally achieved and it was agreed that more research on the concept was needed. The process of defining the construct has led to a summary of the salient features of alexithymia as follows: 1) difficulties in identifying feelings and distinguishing between feelings and the bodily sensations accompanying emotional arousal, 2) difficulties in describing feelings to other people, 3) constricted imaginal processes with paucity of fantasies, and 4) a stimulus-bound, externally oriented cognitive style (Bagby and Taylor 1997a).

In regard to the process of defining the alexithymia concept, the most pivotal issue has perhaps been the shift of paradigm from the earlier psychodynamic hypotheses to the idea of alexithymia being a deficit in the cognitive processing and regulation of emotions and affects (Salminen et al. 1995, Lane et al. 1997, Taylor et al. 1997a, Taylor et al. 1997b, Taylor 2000). Lane and Schwartz constructed a cognitive-developmental model for the organisation of emotional experience by integrating Piaget's theory of cognitive development with Werner and Kaplan's theories of symbolisation and language development (Lane and Schwartz 1987, Taylor et al. 1997a). An individual's ability to recognise and describe emotions in self and others is assumed to be a cognitive skill acquired through a developmental process (Lane and Schwartz 1987, Lane et al. 1997, Lane et al. 1998a). According to this model, there are five levels of "emotional awareness" which, in ascending order, are physical sensations, action tendencies, single emotions, blends of emotions and blends of blends of emotional experience (Lane et al. 1997, Lane et al. 1998a). In the earliest levels of development, emotions have not yet been structurally transformed from bodily sensations and action tendencies to differentiated verbal representations (Lane and Schwartz 1987, Lane et al. 1997, Taylor et al. 1997b). At the first level, the sensorimotor reflexive level, emotions are experienced solely as bodily sensations and the subject has either no description for his or her emotions or describes bodily sensations (Lane and Schwartz 1987). At the second level, the sensorimotor enactive level, emotions are experienced as an action tendency and/or global arousal while the individual describes action tendencies or global hedonic states (Lane and Schwartz 1987). At the third, preoperational level, emotions are pervasive, they are differentiated as either/or experiences and described unidimensionally; this is the level where emotion, for the first time, becomes a psychological as well as a somatic experience (Lane and Schwartz 1987). At the third level, the range of emotions experienced is, however, limited; verbal descriptions of emotion are often stereotyped and other people are seen to be different on the basis of their external characteristics (Lane and Schwartz 1987). Experiencing differentiated and more complex emotions is not truly possible until the fourth and fifth level (concrete operational and formal operational, respectively) are reached. This theory is quite feasible in explaining the emotional deficits in alexithymia: the cognitive-developmental process of highly alexithymic individuals has arrested at the earliest levels and these

individuals have never acquired the full ability to symbolize and therefore to verbally process their emotions.

The deficit in the capacity for symbolisation of emotion in verbal behaviour, fantasy and dreams is thought to result in dysregulation of emotions and affects (Lane et al. 1996, Taylor et al. 1997a, Taylor 2000). In addition to the cognitive-experiential system that comprises subjective awareness and verbal reporting of feeling states, it is assumed that two other systems are involved in emotion regulation: the neurophysiological system and the motor-expressive system (Taylor 2000). The reciprocal interactions among these three systems constitute the basis for emotional responding and emotion regulation and it is conjectured that difficulties in any one of these domains may cause pathological changes in the other domains (Taylor 2000). Social interactions provide an additional resource for interpersonal emotion regulation (Taylor 2000). Having difficulties in verbally communicating their feelings to other people, alexithymic individuals also face problems in interpersonal relationships and cannot fully utilise these in emotional regulation (Taylor 2000, Vanheule et al. 2007a).

The defective capacity for symbolisation in fantasy and dreams results in a cognitive style that is literal, utilitarian and externally oriented (Sifneos 1973, Taylor et al. 1997a). This is expressed as a tendency to focus on details of objects and events of the outside world. The connection between difficulties in identifying and expressing feelings and externally oriented cognitive style is logical: if there is very little referential material as to one's inner feelings and fantasies, the thoughts are occupied with matters from the outside (Taylor et al. 1997b).

It is important to realise that alexithymia does not imply a total unawareness of having emotions. People with alexithymic characteristics may, for example, complain of depression. The emotions of alexithymic individuals, however, are relatively diffuse, poorly differentiated and not well represented psychically (Taylor et al. 1997b). Furthermore, a tendency to an externally oriented and unimaginative way of thinking does not mean that people with high levels of alexithymia are totally incapable of imagining but, rather, that the contents of their mental imagery are mundane and focused on everyday tasks.

### *2.1.3 Secondary alexithymia*

The characterisation of alexithymia being a developmental deficit situates the concept in the context of personality traits. These should be relatively stable as opposed to state-phenomena. It has, however, been conjectured that alexithymia could also be a state-dependent phenomenon. Freyberger (1977) coined the terms "primary alexithymia" and "secondary alexithymia" to distinguish between these two phenomena in patients with somatic disorders. He defined primary alexithymia as "an important disposition factor" and secondary alexithymia as "a protective factor towards the emotional significance and seriousness of the illness...a defence mechanism". Krystal (1979) formulated a somewhat similar

idea concerning the differences between an infantile type and an adult, catastrophic type of trauma. He held that the infantile form of psychic trauma causes an arrest in affect development whereas the adult catastrophic trauma leads to a regression in affective function; consequently, both of these mechanisms would cause alexithymia. According to Krystal (1979), "Regressions are, of course, more spotty, irregular, fluctuating and reversible". As to the adult, catastrophic type of trauma, Simha-Alpern (2007) reviewed psychoanalytic theories as well as findings from neuropsychological studies and suggested that severe traumatic experiences may be organised as material lacking clarity, differentiation and symbolic representation. Hence, the alexithymic features associated with catastrophic traumata would be a defence-like consequence of an "overload" of the psychological and neurobiological apparatus rather than a manifestation of a regression mechanism as such.

To investigate the constructs of primary and secondary alexithymia, studies on the stability of alexithymia have been conducted, especially in connection with depression but also with some other disorders. The findings of these studies have been somewhat contradictory. There are a few reports on the positive association between alexithymia and depression indicating that the level of alexithymia is reduced when the symptoms of depression are alleviated (De Groot et al. 1995, Honkalampi et al. 2000a, Honkalampi et al. 2001). On the other hand, several studies support the assumption that alexithymia is a trait (Porcelli et al. 1996, Martinez-Sanchez et al. 1998, Luminet et al. 2001, De Gucht 2003, Picardi et al. 2005b, Mikolajczak and Luminet 2006, Saarijärvi et al. 2006, Salminen et al. 2006). In these studies, it has been shown that alexithymia has both absolute and relative stability over various periods of time. Moreover, alexithymic features are normally distributed in general population in both genders (Salminen et al. 1999, Franz et al. 2007), which further buttresses the theoretical concept of alexithymia being a dimensional construct, a personality trait (Bagby and Taylor 1997a). In a similar way as, for example, in the case of the Intelligence Quotient, which is normally distributed in populations, both those with very strong alexithymic features and those with very weak alexithymic features represent the extremities of normal distribution. However, some contemporary researchers suggest that the balance between the trait and state components of alexithymia vary among people and that alexithymia should be considered a complex manifestation that includes both trait and state components (Lumley et al. 2007).

An important matter with regard to the conceptualisation of alexithymia, and to the clinical implications of any research findings concerning alexithymia, is whether one is dealing with a personality construct or with a transient phenomenon. Perhaps the concept of trait-alexithymia should be kept more clearly distinct from the concept of state-alexithymia as their origins are obviously quite different. Indirect evidence for this was provided by a study by Honkalampi et al. (2004a) who, following patients with major depression for two years, found adverse childhood experiences only in patients with long-lasting alexithymic features, not in those who moved from an alexithymic group to a



non-alexithymic group during follow-up (that is, patients with “secondary alexithymia”). Thus, primary, trait-like alexithymia is most conveniently explained as a result of deficient psychological development. Secondary, state-like alexithymia is rather a defensive reaction against overwhelming affects or a manifestation of a reactive regression to earlier states of psychological development where emotions were still undifferentiated. Even though both types of alexithymia may be captured with the same instruments, the behaviour induced by the latter type might better be called, as often is the case in medicine when a condition resembles another, “alexithymoid” rather than alexithymic. Hence, primary alexithymia would be *alexithymia proper* and secondary alexithymia would be *alexithymoid regression* or *alexithymoid defence*.

#### 2.1.4 Alexithymia and defence mechanisms

Some of the earliest psychodynamic theories concerning alexithymia seemed to connote a defence against feelings (e.g. Horney 1952, Kelman 1952). The concept of secondary alexithymia also resembles, by definition, a defence mechanism. There has been some discussion as to whether alexithymia should not be regarded as a personality trait but merely a defence mechanism as certain psychodynamic defence mechanisms, such as avoidance, inhibition, denial or repression may be associated with scant production of emotional speech (Lumley et al. 2007) and may therefore resemble alexithymia.

The relationships and the possible overlap between alexithymia and repression has been a subject of some debate. There is empirical evidence suggesting that these phenomena are, after all, distinct (Newton and Contrada 1994, Lane et al. 2000). The same applies to the alleged overlap between alexithymia and denial (Bagby et al. 1986, Linden et al. 1996). According to some empirical studies however, there may be a relationship between alexithymia and immature or maladaptive defence styles (Parker et al. 1998, Helmes et al. 2008) and immature defences such as inhibition (Wise et al. 1991, Helmes et al. 2008), acting out, withdrawal, regression, projection, undoing, passive aggression, consummatory behaviour (Wise et al. 1991) and dissociation (Irwin and Melbin-Helberg 1997, Grabe et al. 2000). Furthermore, a negative association between alexithymia and mature defensive operations has been suggested (Wise et al. 1991, Parker et al. 1998).

Even though there seem to be associations between alexithymia and various immature defences or coping styles, this does not confirm that these are interchangeable phenomena. It is quite conceivable that people with alexithymic characteristics are also prone to maladaptive defence styles. Furthermore, people demonstrating, for example, avoidance, inhibition, denial or repression are expected to have the capacity for emotional insight and expression after relinquishing the defences (Lumley et al. 2007). Working with these defences is a cornerstone of insight-oriented therapies where patients are assumed to have acquired the ability to have inner feelings and fantasies. The concept of

alexithymia, for its part, was explicitly formulated in circumstances where the traditional psychodynamic therapeutic approach was proven to be inapplicable.

### *2.1.5 Three types of alexithymia*

In 2001 Vorst and Bermond (2001) suggested that there are two types of alexithymia, “type I” and “type II” alexithymia. According to their formulation, both type I and type II alexithymia are characterized by a low degree of emotion accompanying cognitions, but type I alexithymia is further defined by a low degree of conscious awareness of emotional arousal while type II alexithymia is defined by a normal or high degree of conscious awareness of emotional arousal (Vorst and Bermond 2001). Later, “type III” alexithymia has been added to this typology. It is defined as an opposite to type II alexithymia, being characterised by low emotionality and a poor fantasy life but with well developed cognitions accompanying emotions (Moormann et al. 2008).

So far, there is little empirical evidence to support this definition of alexithymia. In their recent study on a large international database, Bagby et al. (2008), in fact, showed with confirmatory factor analysis that alexithymia could not be decomposed into two types. Hence, the existence of type I and type II alexithymia was not supported.

### *2.1.6 Psychological constructs conceptually close to alexithymia*

There are a few psychological concepts demonstrating some parallelism with alexithymia. Emotional intelligence and levels of emotional awareness are probably the constructs that most commonly appear in the recent alexithymia literature.

According to Salovey and Mayer (1990), emotional intelligence can be defined as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them, and to use this information to guide one’s thinking and actions”. There is evidence that alexithymia and emotional intelligence are significantly and inversely related concepts (Parker et al. 2001, Coffey et al. 2003, Lumley et al. 2005, Velasco et al. 2006). They have, on the one hand, been shown to be independent constructs (Parker et al. 2001), but, on the other hand, there are also studies indicating substantial overlap between alexithymia and emotional intelligence (Coffey et al. 2003, Velasco et al. 2006).

As earlier was outlined (see Section 2.1.2), alexithymia represents the earliest levels of the cognitive-developmental model of the organisation of emotional experience, that is, the lowest levels of emotional awareness (Lane and Schwartz 1987, Lane et al. 1997, Taylor et al. 1997a, Lane et al. 1998a). In some papers, a performance measure for emotional awareness, the Levels of Emotional Awareness Scale (LEAS), has been considered an alexithymia measure (e.g. Lane et al. 1996, Waller and Scheidt 2004, Subic-Wrana et al. 2005). The

correlations between alexithymia and levels of emotional awareness seem, however, to be relatively weak when alexithymia is measured with a self-report scale and levels of emotional awareness with the LEAS (Lane et al. 1996, Ciarrochi et al. 2003, Waller and Scheidt 2004, Subic-Wrana et al. 2005). Some additional confusion is caused by the use of the term “emotional awareness” as a synonym for low levels of alexithymia in some studies where assessments, however, have been performed with an actual alexithymia measure (possibly with some modifications) (e.g. Serper and Berenbaum 2008).

The terms “social and emotional competence” and “emotional competence” have been used to describe a more general concept that is assumed to be captured with measures, for example, of emotional intelligence, levels of emotional awareness and alexithymia in studies where these are considered to overlap substantially (e.g. Ciarrochi et al. 2003, Ciarrochi and Scott 2006). Furthermore, sometimes findings from studies using either the concept of emotional intelligence or the concept of emotional awareness are presumed to lend (at least indirect) support to the associations between alexithymia and various phenomena.

### *2.1.7 Alexithymic features from an empirical perspective*

Several investigators have attempted to empirically substantiate the theoretical aspects of alexithymia. Possible difficulties in identifying emotions have been studied with facial emotions recognition tasks. The earliest studies indicated no association between alexithymia and difficulties in recognising facial emotions (Mayer et al. 1990, McDonald and Prkachin 1990), whereas later, with more developed measures of alexithymia, an association has been discovered (Parker et al. 1993, Mann et al. 1994). There is also evidence of alexithymia being associated with difficulties in both verbal and nonverbal emotion recognition (Lane et al. 1996, Lane et al. 2000). These difficulties seem to be pervasive, that is, alexithymia affects the recognition of both pleasant and unpleasant emotions (Lane et al. 2000). Parker PD et al. (2005) hypothesised that emotional processing in alexithymia involves a deficit in its *efficiency*. Their results supported this hypothesis: difficulty in describing feelings was associated with reduced capacity to detect facial expressions of negative emotion in a speeded condition.

The findings from studies utilising the emotional colour-naming Stroop task have been contradictory implying, on the one hand, that subjects high in alexithymia are more distracted by words that cause emotional arousal (Lundh and Simonsson-Sarnecki 2002) and, on the other hand, that they are less distracted by these words possibly because of allocating fewer processing resources to such words (Müller et al. 2006). Suslow and Junghanns (2002), having shown that alexithymic tendencies were negatively related to emotion situation priming, proposed that alexithymic people are impaired in linking emotion-eliciting scenarios and emotion concepts. Alexithymia also seems to be

associated with poorer recall of both positive and negative emotion words (Luminet et al. 2006). The impaired regulation of intense emotional states in alexithymic individuals could thus be attributed to a deficit in the ability to consciously access emotional material (Luminet et al. 2006).

Emotional expressiveness has been addressed in a few studies. Troisi et al. (1996), videotaping psychiatric interviews of young volunteers, observed that alexithymia was associated with nonverbal inexpressiveness (apparent emotional indifference, postural rigidity and lack of facial expressivity). Wagner and Lee (2008) studied verbal and nonverbal expression by videotaping patients and found that individuals high in difficulty identifying feelings were less emotionally expressive nonverbally. Furthermore, in a study where participants wrote a list of words describing their emotional reactions to emotion-eliciting colour slides, subjects with high alexithymia supplied fewer emotion-related words than did the controls – for a greater number of slides they produced no response at all (Roedema and Simons 1999). On the other hand, Verissimo et al. (1998), conducting a questionnaire study in a sample of patients with inflammatory bowel disease, could not find any correlation between alexithymia and emotional expression.

The externally oriented, utilitarian way of thinking may manifest as a lesser need to understand and analyse feelings and thoughts. Bagby et al. (1986) detected a strong negative correlation between alexithymia and both psychological mindedness and need for cognition. Furthermore, a negative correlation between alexithymia and both attempts to understand one's emotion and attempts to appropriately express one's emotions has been found (Lumley et al. 2005). Maio and Esses (2001), having empirically established a negative correlation between need for affect and alexithymia, stated that there are motivational differences in people's needs to experience and understand the emotions of oneself and others.

Wastell and Taylor (2002), using the Theory of Mind paradigm, hypothesized that alexithymic individuals have difficulties in mapping the internal world of another person. They concluded that the external orientation of alexithymic people may be focused on building up a good general social knowledge. Thus, people with high levels of alexithymia develop the ability to interpret and navigate the social world by applying a set of rules about beliefs and behaviours but in intimate social situations face problems as they have difficulties either in understanding other people or in predicting how to best interact with others. (Wastell and Taylor 2002) This hypothesis was further supported by Moriguchi et al. (2006) who found that alexithymia was associated with impairment in mentalising and the related empathic ability of perspective taking.

The unimaginative and concrete way of thinking may also be reflected in reduced dreaming and fantasising. Consistent with this theoretical assumption, there is empirical evidence of alexithymia being associated with dreams that are concrete and tied to reality (Krystal 1979). According to a few sleep studies, alexithymia seems to be linked to reduced dream recall (Nielsen et al. 1997, Lumley and Bazydlo 2000, De Gennaro et al. 2003), with less fantastic dreams

(Parker et al. 2000), with shorter, boring dreams lacking vividness and with more bizarre and aggressive dreams (Lumley and Bazydlo 2000). De Gennaro et al. (2003), however, disputed any qualitative differences between the dreams of alexithymic and non-alexithymic individuals. As to fantasising and imagining, Campos et al. (2000), measuring visual imaging capacity with a questionnaire, found that alexithymic subjects showed poorer imaging capacity than non-alexithymic subjects. On the other hand, Gay et al. (2008) did not find deficiencies in general imagery or in imagery preference in a sample of alexithymic female students.

### *2.1.8 Personality and temperamental characteristics related to alexithymia*

People with alexithymic characteristics are often claimed to be rigid and unimaginative. Krystal (1979) described these features as follows: “Patients...may show a diminution of mimetic and expressive movements of the face and body with a resulting stone-face expression and wooden stiffness of posture...The patient’s thoughts turn out to be composed of trivial details of their everyday life, and they seem to be devoid of the capacity to get beyond their mundane preoccupations.” In contrast to this, alexithymic people may sometimes manifest outbursts of weeping, anger or rage without being able to profoundly explain their feelings (Bagby and Taylor 1997a). Other features often connected with alexithymia are a tendency toward social conformity and a tendency toward action to express emotion or to avoid conflicts, but these features are, however, not considered salient to the theoretical concept (Bagby and Taylor 1997a). It has also been claimed that alexithymic people are prone to undifferentiated negative affective states. In addition, they may have a limited capacity to experience positive emotions, which may manifest as anhedonia (Bagby and Taylor 1997a).

As earlier mentioned, postural rigidity and inexpressiveness have been empirically linked to alexithymia (Troisi et al. 1996). Of different temperamental characteristics, alexithymia has been shown to be associated with harm avoidance (Grabe et al. 2001, Picardi et al. 2005b) and with low reward dependence (Grabe et al. 2001). Of different personality features, alexithymia seems to be associated with neuroticism and introversion (Wise et al. 1992, Mann et al. 1994, Pandey and Mandal 1996, Deary et al. 1997, Parker and Taylor 1997, Luminet et al. 1999, Picardi et al. 2005b), with low openness (Wise et al. 1992, Luminet et al. 1999, Picardi et al. 2005b), with low conscientiousness (Mann et al. 1994), and with low self-directedness (Grabe et al. 2001, Picardi et al. 2005b). Parker and Taylor (1997) argued that, while alexithymia shows some relation to neuroticism and introversion, these personality features do not capture certain crucial aspects of the alexithymia construct. Even if introverted people tend not to communicate with other people they are thoughtful and introspective about their emotions; the difference between neurotic and alexithymic people is

shown in their capacities to verbally process the physiological arousal that both are supposed to easily experience (Parker and Taylor 1997).

As to interpersonal tendencies, there is empirical evidence of the following features being associated with alexithymia: insecure attachment styles, mainly preoccupied or fearful (Troisi et al. 2001, Wearden et al. 2003, Montebanocci et al. 2004), interpersonal distrust (Taylor et al. 1996), cynical hostility and anger (Fukunishi and Koyama 2000), interpersonal detachment, blaming and shyness with strangers (Grabe et al. 2001), low friendliness (Picardi et al. 2005b), cold and socially avoidant behaviour (Spitzer et al. 2005b) and social insecurity (Müller et al. 2008). Vanheule et al. (2007a) showed that alexithymia was associated with “a double interpersonal indifference: not much is expected from others, nor is there a personal urge to fulfill the expectations of others”. In conclusion, alexithymic people seem to be, on the one hand, either hostile or socially detached and indifferent, and on the other hand, socially insecure and anxious.

## 2.2 Etiology of alexithymia

There are psychosocial and biological theories with regard to the etiology of alexithymia (Taylor and Bagby 2004). Childhood experiences, cultural influences, neurobiological differences and hereditary aspects have been studied in this context. No overarching model on the etiology of alexithymia has yet been developed. Nevertheless, several authors have discussed the possibility that alexithymia may result from a combination of psychosocial and neurobiological factors.

### 2.2.1 *Psychosocial factors*

Alexithymia has been linked to deficient rearing patterns: if the primary caregivers do not respond adequately to an infant's emotional states, the child learns defective ways to regulate distressing affects and to relate to other people (Taylor et al. 1997a). Lemche et al. (2004) conducted a prospective empirical study on the development of mentalising language in a sample of small children. Their results suggested that securely attached children rapidly acquire emotion, physiology, cognition and emotion-regulatory language. In contrast to this, insecurely attached and disorganised children may either completely lack internal state language or they may have considerable difficulties in using emotion and cognition vocabulary. Lemche et al. (2004) proposed that alexithymia may be a consequence of deficits in the development of internal state language which in turn may be associated with insecure or disorganised childhood attachment relationships.

There is some empirical evidence from retrospective studies in adults supporting the hypothesis that maternal attachment in infancy or in childhood may play an important role in the development of alexithymic characteristics as significant associations between alexithymia and retrospectively reported lower maternal care have been reported (Fukunishi et al. 1999b, Mason et al. 2005). Furthermore, the connection between alexithymia and disturbances in early parental bonding has been observed in psychoanalytic therapy (Taylor 1977, Gündel et al. 2002).

Maternal (Lumley et al. 1996a, Fukunishi and Paris 2001, Grabe et al. 2008b) as well as paternal (Grabe et al. 2008b) alexithymic characteristics seem to be significantly correlated with those of the offspring suggesting an intergenerational continuum of alexithymia in families. A complementary association between alexithymia in one parent and low levels of empathy in the other was found in a sample of women with borderline personality disorder (Guttman and Laporte 2002). According to a few studies, poor family expressiveness during childhood is associated with alexithymia in adulthood (Berenbaum and James 1994, Kench and Irwin 2000, Yelsma et al. 2000).

Perceived lack of affection and perceived overprotection shown by each of the parents were associated with a higher degree of alexithymia in a study by Kooiman et al. (2004). In a Finnish epidemiological study, having been born as an unwanted child or to a family with many children was associated with alexithymia in adulthood (Joukamaa et al. 2003). In another Finnish population study, comprising 15 to 16-year-old adolescents, number of siblings was not significantly associated with the level of alexithymia whereas living in a broken family was (Joukamaa et al. 2007).

General family pathology seems to be associated with alexithymia according to Lumley et al. (1996a). In their study, difficulties in identifying feelings were related to dysfunctional family affective involvement, whereas externally oriented thinking was related to deficient family behaviour control, and impaired imagination was related to inadequate family problem solving. Honkalampi et al. (2004a) reported that long-lasting alexithymic features in patients with major depression were associated with harsh discipline and unhappiness of childhood home but not with domestic violence. The association between alexithymia and domestic violence (parental physical fights and/or medical interventions due to family violence) was, however, found by Modestin et al. (2005).

History of childhood abuse has been related to alexithymia in several studies (Berenbaum 1996, Zlotnick et al. 2001, Guttman and Laporte 2002, Paivio and McCulloch 2004, Mitchell and Mazzeo 2005, Frewen et al. 2006, Hund and Espelage 2006, Joukamaa et al. 2008) even though some contradictory findings have also been reported (Kooiman et al. 2004). There is also some inconsistency with regard to physical and sexual abuse. There are studies reporting that alexithymia is associated with both physical and sexual abuse in childhood (Berenbaum 1996, Frewen et al. 2006) but also that it is not associated with sexual abuse (Zlotnick et al. 2001, Paivio and McCulloch 2004).

### *2.2.2 Cultural factors*

The psychosocial factors beyond family circumstances include cultural influences. Taylor et al. (2003) noted that, in the literature, some authors have suggested that alexithymia may be a culture-bound construct merely reflecting the emphasis of Western psychotherapy on introspection and psychological mindedness. In a Canadian student sample, ethnic Chinese students scored higher on alexithymia indexes than students from Anglo-Celtic and European ethno-cultural backgrounds (Dion 1996). This was thought to reflect the operation of socio-cultural processes characteristic of Chinese culture, which strongly encourages a somatic idiom for construing, expressing and describing one's emotional states as an alternative to the psychological idiom prominent in many Western cultures. Le et al. (2002) found a similar difference in levels of alexithymia between people from Asian and Western cultures and hence claimed that cultures can influence the ability to identify and communicate emotions. However, they hypothesized that the differences in somatization-proneness were not the only explanation for their finding and therefore tested the effects of gender and parental socialization of emotions on alexithymia. They found that it was more common in Western culture than in Asian culture for parents to verbalize positive emotions and display physical affection. In addition, male gender was associated in general with less physical affection from parents.

Possible socio-cultural influences on alexithymia have been studied in Germany comparing residents of former West and East Germany (Brosig et al. 2004, Franz et al. 2007). For over 40 years these areas were under very different political and social regimes. The results of the studies are contradictory. Brosig et al. (2004) found alexithymia to be associated with residence in the former eastern states of Germany; in their opinion this finding was expected given the preceding societal situation in East Germany. Franz et al. (2007), on the other hand, reported that the level of alexithymia was lower among those who had lived in East Germany but did not discuss their finding any further.

Joukamaa et al. (2003) found an association between alexithymia and rural upbringing in a Finnish population sample. They hypothesized that the traditional Finnish lifestyle, that was more prevalent in rural areas than in urban areas in the 1960s when the subjects in their sample were born, had a direct effect on the emotional development of the subjects. They elaborated that the traditional Finnish lifestyle does not encourage people to express their emotions and feelings freely. This would concern men especially. A similar difference between rural and urban residence was also detected in a younger cohort, a population sample of 15 to 16 year-olds born in the mid 1980's (Joukamaa et al. 2007).

The studies reviewed here imply that there may be differences in the levels of alexithymia in different cultures. This, however, not necessarily mean that alexithymia as a construct is not a universal trait regardless of cultural differences (Taylor et al. 2003). This hypothesis was supported by Taylor et al. (2003), who compared studies on an alexithymia measure from several countries



and determined that the factorial construct of the measure was replicable in different cultures. Nevertheless, they noted that some ethnic and cultural groups may be more alexithymic than others as there were differences in the mean scores of the scale.

### *2.2.3 Biological and genetic factors*

In addition to the psycho-socio-cultural theories on the etiology of alexithymia, various neurobiological theories have been put forward. MacLean (1949) already attempted to outline the neurological deficits behind the difficulties of psychosomatic patients in communicating feelings and suggested that there was interference with communication between the “visceral brain” (limbic areas) and the neocortex. Sifneos (1994) pointed out that “Neocortical functioning in the form of “cognition” can be seen...to be added to the more primitive “limbic emotion” in the form of images, fantasies and thoughts which can be expressed linguistically.” He stated that this interaction between “limbic emotion” and added cognition is called “feeling”. There are several areas in the central nervous system that contribute to the formation and processing of emotions and feelings. The neural and functional networks between these areas are obviously quite complex. So far, no comprehensive theory on the biological basis of alexithymia has been presented. The hypotheses concerning interhemispheric transfer deficit and hemispheric lateralisation were probably the earliest approaches in the attempt to explain alexithymia from a neurobiological perspective. The roles of the limbic system, the prefrontal cortex and the frontal cortex have been more in focus in recent years. Furthermore, a concept named “organic alexithymia” has been introduced (Becerra et al. 2002). As to the genetic etiology of alexithymia, few studies on it have been so far conducted.

The so-called split brain patients, that is, patients having undergone a commissurotomy, were of interest from the 1960s to the 1980s, also in the context of alexithymia (TenHouten et al. 1986). These patients used fewer affect laden words and their speech was dull, uninvolved, flat and lacking in colour and expressiveness (Hoppe and Kyle 1990). They also evinced concrete, discursive and rigid symbolisations, their dreams lacked condensation, displacement and symbolisation, and their fantasies were unimaginative, utilitarian and tied to reality (TenHouten et al. 1986, Hoppe and Kyle 1990). Therefore, it was assumed that alexithymia could also be associated with reduced transfer between the two hemispheres and the term “functional commissurotomy” was introduced (Hoppe and Kyle 1990). The interhemispheric transfer deficit hypothesis has been studied with the tactile finger localisation task and with transcranial magnetic stimulation (TMS). Two studies with the first mentioned method supported the deficit hypothesis in all-male samples (Zeitlin et al. 1989, Parker et al. 1999) whereas in one study with both sexes the deficit was found only in men (Lumley and Sielky 2000). The results of two studies utilising the TMS indicated that alexithymia was not associated with a dysfunction of the corpus callosum

but with facilitated transcallosal inhibition (Grabe et al. 2004, Richter et al. 2006). This, however, was disputed by Romei et al. (2008) who, using a somewhat different TMS technique, found that male and female subjects high in alexithymia showed reduced transcallosal inhibition in both directions.

Hemispheric lateralisation is another theory for explaining the neurobiological underpinnings of alexithymia (Sifneos 1988). Abnormal functional asymmetry associated with lower levels of emotional awareness or alexithymia has been demonstrated with a chimeric faces test (Lane et al. 1995, Jessimer and Markham 1997), with a test in processing emotional stimuli (Gerhards et al. 1997), with the tactile finger localisation task in men but not in women (Lumley and Sielky 2000), in male but not female stroke patients (Spalletta et al. 2001), with positron emission tomography (PET) (Kano et al. 2003, Karlsson et al. 2008) and with functional magnetic resonance imaging (fMRI) (Moriguchi et al. 2006). In contrast to these studies in favour of left lateral dominance, Li and Sinha (2005) found with fMRI that in a both-sexes sample of abstinent cocaine abusers alexithymia was correlated predominantly with activity in the *right* hemisphere during an imagery task of stressful situations. Houtveen et al. (1997), using electroencephalography, showed that alexithymic subjects had reduced coherence between the right frontal lobe and the left hemisphere.

The amygdala is a part of the limbic system and has a crucial role in both the perception of emotional cues and the production of emotional responses (Davidson and Irwin 1999, Hariri et al. 2000). The amygdala responds to both positive and negative stimuli, with a preference for faces depicting emotional expressions (Sergerie et al. 2008). Nevertheless, Berthoz et al. (2002), studying men with fMRI, did not find any difference in the amygdala, the hippocampal formation or the hypothalamus between alexithymic and non-alexithymic subjects in response to the presentation of emotion-arousing pictures. Furthermore, Silani et al. (2008) studying autistic patients and healthy controls, concluded that alexithymia could not be explained by a reduced emotional response in the amygdala-orbitofrontal system to the presentation of unpleasant stimuli; they found alexithymia to be associated with changes in activity in the anterior insula in the control group and in the anterior insula and the amygdala in the patient group. Kugel et al. (2008), on the other hand, studying a sample of healthy men and women with fMRI detected an alexithymia-related deficit: difficulties in identifying feelings were negatively correlated with the neural response of the right amygdala to masked sad faces.

The anterior cingulate cortex (ACC) is also a part of the limbic system. It receives ascending viscerosensory inputs and is thought to code affective attributes of pain and motivate appropriate behaviour through projections to motor and autonomic centres (Olsson and Ochsner 2008). By so doing, the ACC is assumed to direct experiential understanding of the intentions behind affective states (Olsson and Ochsner 2008). Support for the theory that the ACC has an important role with respect to alexithymia has been lent by PET studies (Lane et al. 1998a, Kano et al. 2003, Karlsson et al. 2008), by a magnetic resonance

imaging (MRI) study (Gündel et al. 2004) and by fMRI studies (Berthoz et al. 2002, Frewen et al. 2006). In addition, there is evidence from an fMRI study of alexithymia-related differences in the function of posterior cingulate cortex (Mantani et al. 2005).

People with a history of head injury may have difficulties with emotional expression, affect regulation, impulse control, and lack of insight into their own emotions (Williams et al. 2001). Indeed, there are a few studies indicating that people with a history of traumatic brain injury (TBI) have higher levels of alexithymia than those without such history (Allerdings and Alfano 2001, Williams et al. 2001, Koponen et al. 2005, Henry et al. 2006). The concept of “organic alexithymia” was first introduced by Becerra et al. (2002), who described a case study of a patient with acquired brain injury. This patient developed difficulties in identifying and describing feelings but not externally oriented thinking. It has been proposed that the connection between TBI and alexithymia could be mediated by frontal lobe damage (Allerdings and Alfano 2001, Henry et al. 2006). Koponen et al. (2005), however, did not find any correlation between alexithymia and MRI findings (e.g. size or location of TBI) and concluded that alexithymia in these patients reflects a non-specific dysfunction of the injured brain.

The hereditary underpinnings of alexithymia have been studied very little. Valera and Berenbaum (2001) studied a relatively small sample of twins and deduced that of the different facets of alexithymia externally oriented thinking was influenced by genetic factors. More recently, the results of a large Danish twin-study comprising 8785 twin pairs have been reported (Jørgensen et al. 2007). These suggest that genetic factors may have a significant impact on all facets of alexithymia. So far, only one gene study on alexithymia has been conducted (Ham et al. 2005). In this South Korean study, a possible association between alexithymia and the catechol O-methyltransferase (COMT) Val108/158Met gene polymorphism was found. The authors chose to study the COMT pathway because the frontal lobe functioning is particularly dependent on it. Van Rijn et al. (2006) studied people with Klinefelter syndrome (47,XXY) and found them to have more alexithymic features than the controls. As one explanation for this relation van Rijn et al. proposed that X-linked genes are important for the functional integration of autonomic, emotional arousal with cognitive appraisal of emotions.

In several studies reviewed here sex differences were apparent. Outside the realm of alexithymia research there are studies indicating neurobiological sex differences in emotions. It has, for example, been shown that there are sex-related differences in the neural basis of emotional memory (Canli 2002, Cahill 2003) and vocal emotional processing (Schirmer and Kotz 2006). Lumley and Sielky (2000) went as far as to suggest that alexithymia may have a different etiology or pathogenesis for men and for women. They proposed that alexithymia in men is based on biological development, whereas in women it is more likely to be developed as a consequence of emotional trauma.

On the other hand, there were also studies in this review that showed alexithymia-related neurobiological changes in both sexes. Taylor and Bagby (2004) raised the possibility that the developmental neurobiological changes in maltreated children with post-traumatic stress disorder (smaller cerebral and prefrontal cortex volumes and underdevelopment of middle portions of the corpus callosum compared to non-maltreated children) may lead to alexithymia in adulthood. If this hypothesis was verified with prospective longitudinal studies (as Taylor and Bagby suggested), the psycho-social and neurobiological underpinnings of alexithymia could, at least to some extent, be incorporated into one theory.

## 2.3 Measuring alexithymia

### *2.3.1 Interviews and self-report scales*

Sifneos created a 17-item interviewer-rated forced choice questionnaire (Sifneos 1973) which was named “The Psychosomatic Questionnaire of the Beth Israel Psychiatric Service” or later “The Beth Israel Hospital Psychosomatic Questionnaire” (BIQ). The first item of this questionnaire was, “Does the patient describe endless details rather than feelings?” The questionnaire, which was in effect an interview, was later fortified with six items describing the interviewer’s feelings about the patient (Apfel and Sifneos 1979). An example of such item was, “Do you like the patient?” The BIQ was widely used in the first decade of alexithymia research (Bagby et al. 1988). Even though there was some evidence supporting its factor structure (Gardos et al. 1984), it had, however, been constructed without formal psychometric testing. Moreover, the interrater reliability of the BIQ was considered to be strongly influenced by the characteristics of individual interviewers (Apfel and Sifneos 1979, Lolas et al. 1980, Bagby et al. 1988).

At the same time as the BIQ, a 20-item questionnaire, the Schalling-Sifneos Personality Scale (SSPS), was in use in the Beth Israel Hospital (Apfel and Sifneos 1979). Apfel and Sifneos (1979) already noted that SSPS did not perform as well as anticipated, and agreed on the need for a standardized measurement of alexithymic characteristics. Later on, the psychometric properties of the SSPS were investigated by several researchers. Some of these reported favourable results concerning the factor structure and the usefulness of the SSPS (Blanchard et al. 1981, Martin et al. 1984, Shipko and Noviello 1984) whereas others stated that SSPS demonstrated little factor stability (Bagby et al. 1988) and poor internal consistency (Faryna et al. 1986, Bagby et al. 1988).

As the concept of alexithymia gradually gained broader attention, other measures were developed in addition to those created in the Beth Israel Hospital. These included self-report measures, interviews, projective techniques and other

measures. There are at least two alexithymia scales derived from the Minnesota Multiphasic Personality Inventory (MMPI). A 22-item self-report scale was developed by Kleiger and Kinsman (Kleiger and Kinsman 1980, Taylor and Bagby 1988). It was based on correlations of MMPI items with the BIQ and was later known as the MMPI-A, the MMPI-AS and the Denver scale. For a some time it was widely used in alexithymia research. It was, however, eventually found to be lacking in both face validity and construct validity (Federman and Mohns 1984, Bagby et al. 1988, Bagby et al. 1991). Another MMPI alexithymia scale, the Irvine scale, was based on 20 MMPI items correlating with the SSPS (Shipko and Noviello 1984). It had practically no overlap with the MMPI-AS with which it correlated negatively (Shipko and Noviello 1984, Bornstein and O'Neill 1993). The Irvine scale was later deemed to lack construct validity (Bornstein and O'Neill 1993).

The Toronto Alexithymia Scale (TAS) has been by far the most frequently used self-report scale for assessing alexithymia. The first version, a 26-item scale, the TAS-26, was introduced in the mid 1980's in an attempt at a psychometrically valid development process of a self-report alexithymia scale (Taylor et al. 1985, Bagby et al. 1988, Taylor et al. 1988). The authors of the scale also conducted an evaluation study on the alexithymia construct itself - the development of the earlier alexithymia measures having been based on the assumption that the validity of the construct was already established (Taylor et al. 1990). Taylor et al. (1985) began the scale development by reviewing the literature and selecting five content areas they deemed to reflect the alexithymia construct: difficulty in describing feelings, difficulty in distinguishing between feelings and bodily sensations, lack of introspection, social conformity and poor dream recall. Based on these areas, 41 items were written (some of them from the SSPS). The final 26-item scale came to consist of four factors: 1) difficulty identifying and distinguishing between feelings and bodily sensations, 2) difficulty describing feelings, 3) reduced daydreaming and 4) externally oriented thinking (Taylor et al. 1985, Bagby et al. 1986, Taylor et al. 1992). As the factor structure of the TAS-26 was later found to be somewhat problematic, a revised version of TAS (TAS-R) was developed (Taylor et al. 1992). The TAS-R consisted of 23 items and of only two factors. Factor 1 comprised items assessing the ability to distinguish between feelings and the bodily sensations associated with emotional arousal as well as the ability to describe feelings to others. Factor 2 consisted entirely of items assessing externally oriented thinking. Not later than two years after introducing the TAS-R, the authors of the scale reported of a new revision of the scale: the 20-item Toronto Alexithymia Scale, TAS-20 (Bagby et al. 1994a, Bagby et al. 1994b). This latest version of the TAS has been translated into several languages (Taylor et al. 2003) and is currently the most commonly used version of the TAS. It consists of three factors, namely 1) Difficulty identifying feelings (DIF), 2) Difficulty describing feelings (DDF), and 3) Externally oriented thinking (EOT). Even though the factor concerning fantasy and imaginal activity was omitted from the TAS-20, mainly because of having high correlations with measures of social desirability,

there is evidence that this dimension is indirectly assessed by the EOT factor (Bagby et al. 1994b, Parker et al. 2003). Nevertheless, the TAS-26 has still been used in a few studies but in some of these the daydreaming factor has been dropped from the analyses because of negative correlation with the other factors (Gunzelmann et al. 2002, Brosig et al. 2004). The TAS-26 and the TAS-20 are the only alexithymia questionnaires proper that have so far been translated into Finnish.

The Analog Alexithymia Scale (AAS) was developed in the mid-1980's (Faryna et al. 1986). It was basically the SSPS converted into an analogous format and never attained any status in alexithymia research. This scale is not to be confused with another self-report measure with the same acronym, AAS, namely the Amsterdam Alexithymia Scale, which was created in the early 1990's and was soon further developed into the Bermond-Vorst Alexithymia Questionnaire (BVAQ) (Vorst and Bermond 2001). The BVAQ consists of two parallel versions: a shorter one with 20 items and an extended one with 40 items. Both versions can be divided into five subscales: Identifying/Differentiating/Insight, Verbalizing, Emotionalizing, Fantasizing and Analyzing. The BVAQ has been translated into several languages and has in the recent years been used by some researchers. According to some studies, the psychometric qualities of the BVAQ are promising (Zech et al. 1999, Berthoz and Hill 2005, Morera et al. 2005).

As to alexithymia interviews, the BIQ was later modified and has been in some use (Bagby et al. 1994b, Haviland et al. 2002). Krystal et al. (1986) also used the Beth Israel Psychosomatic Questionnaire as a basis for an interview, the Alexithymia Provoked Response Questionnaire (APQR), which, however, has only been used sporadically (Lumley et al. 1997). The most recently developed interview for assessing alexithymia is the Toronto Structured Interview for Alexithymia (TSIA) (Bagby et al. 2006) which is currently in the process of being translated from English into Finnish. It consists of four dimensions: 1) difficulty identifying feelings, 2) difficulty describing feelings, 3) externally oriented thinking and 4) imaginal processes.

### *2.3.2 Projective tests and other measures*

Some projective tests have also been used to assess alexithymia. With the Objectively Scored Archetypal<sub>9</sub> Test (SAT<sub>9</sub>) a researcher can measure a subject's ability to internally represent conflict through the manipulation of symbols (Cohen et al. 1985). However, it measures only one dimension of alexithymia, the imaginative process. The Rorschach test is another projective method used in alexithymia research (Acklin and Bernat 1987, Tibon et al. 2005). Acklin and Bernat (1987) hypothesized that with the Rorschach test, alexithymia-related functions fantasy, affect, cognition-perception and adaptive resources could be assessed. Tibon et al. (2005) found that a Rorschach index, the Reality-Fantasy Scale was significantly correlated with the TAS-20.

In addition to the above-mentioned methods, two observer-rated alexithymia measures have been developed to obtain collateral reports on alexithymic features and behaviour. Haviland and Reise (1996) first developed the California Q-Set Alexithymia Prototype (CAQ-AP) with the help of judgements by 17 contributors to the alexithymia literature. The CAQ-AP was based on the 100-item California Q-set. Later, as the CAP-AQ took from 45 minutes to an hour to complete, Haviland et al. (2000) developed a relatively brief observer-based scale phrased in terms of ordinary language, the Observer Alexithymia Scale. This 33-item scale has a five-factor structure tapping the dimensions of alexithymia that the developers of the scale deemed essential to the construct, namely *distant*, *uninsightful*, *somatizing*, *humourless* and *rigid*. The Observer Alexithymia Scale has been used in some studies in recent years (Müller et al. 2006, Berthoz et al. 2007).

### 2.3.3 Criticisms and comparisons of different measures of alexithymia

From the very beginning of the era of measuring alexithymia, the question has been debated whether alexithymia should be assessed by an interview or by a questionnaire. Apfel and Sifneos (1979) already noted, “The basic problem of whether to measure alexithymia as an interactional phenomenon in an interview or in a ‘purer’ self-assessment form is unresolved”. One of the key problems associated with self-report measures is inherent to the alexithymia construct itself: if a person is supposed to have difficulties in identifying and describing his or her feelings, is he or she able to assess these difficulties reliably? In this vein, Lane et al. (1996) questioned whether one of the self-report methods, the TAS-20, can detect the most severe cases of alexithymia. Moreover, alexithymic individuals seem to prefer the middle categories of a mood questionnaire (Kupfer et al. 2000) which may be an indication of their diffidence in claiming emotional states in self-report measures.

In an attempt to evaluate the differences between the various approaches to measure “emotional ability”, Lumley et al. (2005) conducted a study on several measures, including three measures of alexithymia: the TAS-20, the modified BIQ and the Observer Alexithymia Scale. They found significant, albeit moderate correlations between the TAS-20 and the modified BIQ ( $r = .26$ ) and between the TAS-20 and the Observer Alexithymia Scale ( $r = .27$ ). The positive association between the TAS-20 and the modified BIQ has also been found in a few other studies. For example, Bagby et al. (1994b) found an  $r = .53$  correlation between these two measures. Furthermore, Lumley et al. (2005) discovered a moderate to strong negative correlation between the TAS-20 and two self-report questionnaires for constructs related to but separate from alexithymia, namely emotional intelligence (Mayer-Salovey-Caruso Emotional Intelligence test, version 2,  $r = -.37$ ) and emotional approach coping (Emotional Approach Coping Scale,  $r = -.59$ ). Parker et al. (2001) detected a significant inverse correlation

between the TAS-20 and another measure of emotional intelligence (the BarOn Emotional Quotient Inventory,  $r = -.72$ ).

Even though the measures for emotional intelligence and other constructs conceptually close to alexithymia do not capture exactly the same phenomenon as alexithymia measures, these findings indirectly suggest that, despite certain potential sources of bias, alexithymic responses can also be captured with self-report methods. This is valuable information as self-report questionnaires are the most feasible method in large-scale studies such as population surveys.

## 2.4 Alexithymia and health

### *2.4.1 Alexithymia and somatic health*

When the alexithymia construct was formulated, researchers assumed a connection between alexithymia and the “classic” psychosomatic illnesses. However, they had little biomedical evidence to support this assumption. As biomedical methods have improved, new evidence has emerged. One of the most prominent theories concerning the connections between alexithymia and somatic health is nowadays the assumption that alexithymic individuals’ failure to regulate negative emotions results in altered autonomic, endocrine, and immune activity, leading to conditions that are conducive to the development of somatic disease (Lumley et al. 2007). The results of the studies concerning the associations between alexithymia and various somatic phenomena, however, are not entirely consistent with each other.

There are several studies indicating that alexithymic characteristics are related to exaggerated or dysregulated autonomic activation (Linden et al. 1996, Friedlander et al. 1997, Waldstein et al. 2002, Guilbaud et al. 2003, Neumann et al. 2004, Byrne and Ditto 2005, Waller and Scheidt 2006). However, contradictory findings have also been reported (Franz et al. 2003, Virtanen et al. 2003, Niiranen et al. 2006, Connelly and Denney 2007). A novel finding concerning the associations between alexithymia and cardiovascular functions is that reported by Koelsch et al. (2007). They conducted a study using electrocardiograms and several measures of emotionality, including the first factor (difficulties identifying feelings) of the TAS-26. According to their results, low emotionality caused a distinctively different pattern in the electrocardiogram than did high emotionality.

As to the association between alexithymia and immunity, lower counts of lymphocytes have been found in alexithymic individuals (Todarello et al. 1994, Dewaraja et al. 1997). Corcos et al. (2004), studying healthy females, found a significant association between alexithymia and increased levels of proinflammatory cytokine interleukin-4. Guilbaud et al. (2003) pointed out that the neuroendocrine and immune response of alexithymic subjects seems to be



similar to that in individuals afflicted with chronic stress. This may be explained by the fact that an increased production of glucocorticoid can promote type 2 cytokine production. Some evidence of a possible relationship between alexithymia and the type 1 cytokine Tumour Necrosis Factor  $\alpha$  has been found in patients with rheumatoid arthritis (Bruni et al. 2006). Gil et al. (2007) studied alexithymia and interleukin variations in somatoform disorders. Their results suggested that somatoform disorders, with clinically significant alexithymia, are associated with augmented serum levels of interleukin-6 and interleukin-10 and elevated immunoglobulin E. Another finding concerning alexithymia and immunity is that reported by Temoshok et al. (2008): alexithymia was associated with decreased production of the anti-HIV  $\beta$ -chemokine MIP-1 $\alpha$ .

Van Middendorp et al. (2005) proposed a model connecting the potential physiological mediators between emotion regulation and health. They stated that emotion regulation and inflammation are linked through stress-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medullar (SAM) system. The end-products of the HPA and SAM systems, cortisol and catecholamines, have both immunosuppressive and immunostimulating effects, and can activate proinflammatory cytokines through inflammation. According to van Middendorp et al. (2005), proinflammatory cytokines may signal the brain and be involved in so-called sickness behaviour. Finally, poorer perceived health may induce further stress via impaired emotion regulation, and the vicious circle is complete. Spitzer et al. (2005a), however, found that the adrenalin/cortisol ratio was significantly associated with alexithymia only in men. Furthermore, police academy recruits with higher scores of alexithymia demonstrated a decreased catecholamine response to psychological stress (McCaslin et al. 2006). In this study, no association between alexithymia and cortisol reactivity was observed.

It has also been postulated that alexithymia could have an impact on physical health through a behavioural pathway (Lumley et al. 1996b, Lumley et al. 2007, Lumley et al. 2008). There are some studies suggesting that alexithymia is associated with potentially unhealthy behaviours such as disturbed eating (De Groot et al. 1995, Beales and Dolton 2000, Bydlowski et al. 2005, Kessler et al. 2006, Speranza et al. 2007), poor nutrition and sedentary lifestyle (Helmerts and Mente 1999), alcohol and drug abuse (Speranza et al. 2004), and higher body-mass index (Neumann et al. 2004). All these can result in somatic health problems and diseases.

Among different somatic diseases, alexithymia seems to be associated at least with essential hypertension (Todarello et al. 1995, Jula et al. 1999), inflammatory bowel disease (Porcelli et al. 1995, Porcelli et al. 1996), diabetes mellitus (Topsever et al. 2006), migraine (Muftuoglu et al. 2004), asthma (Dirks et al. 1981, Plaza et al. 2006), rheumatoid arthritis (Bruni et al. 2006), male infertility (Conrad et al. 2001), female infertility (Lamas et al. 2006), psoriasis (Picardi et al. 2005a, Conrad et al. 2008), chronic idiopathic urticaria (Conrad et al. 2008) and female breast cancer (Manna et al. 2007). In coeliac disease, the prevalence of alexithymia does not differ from normal populations (Collin et al.

2008). Psychopathology or socio-demographic variables were not controlled for in all of these studies, which makes it difficult to evaluate whether in some cases the association reflected the influence of, for example, depression, sex or age.

Given this evidence that alexithymia is associated with various kinds of illnesses and potential health risks, it is not surprising that Kauhanen et al. (1996) found alexithymia to be an independent risk factor for death in middle-aged Finnish men. Another striking example of the association between alexithymia and somatic health outcomes is the finding by Beresnevaite (2000) who studied the effect of group therapy in reducing alexithymia in post myocardial infarction patients. She reported that during a two-year follow-up period the number of cardiac events and fatalities was lower in the group whose level of alexithymia was reduced compared to those whose level of alexithymia remained unchanged.

#### *2.4.2 Alexithymia and mental health*

Sifneos (1973) conducted his prevalence study of alexithymia on patients with classic psychosomatic illnesses. His control group consisted of patients with “neurotic complaints which included such diagnoses as borderline personality, depression, hysterical personality, alcoholism, and so on”. As Sifneos observed that alexithymic features also were present in some of his control patients, he suggested that his findings pointed “to the existence of these defects on a larger scale than it was originally thought”.

Today it seems almost miraculous that Sifneos found any differences at all between his study and control groups as his prediction has indeed proven correct. Several researchers have reported a positive association between alexithymia and various mental health problems. Except for somatization, which will be discussed in a later chapter (2.8.4), the relationship between depression and alexithymia has probably been the most exhaustively investigated topic in this area. The majority of these studies suggest that depression and depression severity are strongly associated with alexithymia (e.g. Honkalampi et al. 1999, Honkalampi et al. 2000b, Honkalampi et al. 2007, Le et al. 2007). In addition, the correlation between alexithymia and depression or depressive symptoms has been detected as a side-product of numerous studies. It is possible that there is a specific subtype of alexithymic depression with more somatic-affective depressive symptoms and withdrawn interpersonal functioning (Vanheule et al. 2007b). Furthermore, alexithymic patients may need a higher cut-off point for a self-report depression scale than non-alexithymic patients (Mattila et al. 2008b).

Alexithymia has also been found to be associated with anxiety disorders such as post-traumatic stress disorder (Kupchik et al. 2007, O’Brien et al. 2008, Frewen et al. 2008) and post-traumatic stress symptoms in patients with severe mental illness (Spitzer et al. 2007), with panic disorder (Joukamaa and Lepola 1994, Marchesi et al. 2005, De Berardis et al. 2007, Galderisi et al. 2008), with generalised anxiety disorder (Mennin et al. 2005, Turk et al. 2005), with social anxiety disorder (Turk et al. 2005) and with obsessive-compulsive disorder

(De Berardis et al. 2005, Grabe et al. 2006). There is also some evidence of an association between alexithymia and sleep disturbances (Bazydlo et al. 2001, Lundh and Broman 2006, Kronholm et al. 2008).

Another well covered area is the relationship between alexithymia and eating disorders. Most studies support a positive association between these two perturbations (De Groot et al. 1995, Taylor et al. 1996, Beales and Dolton 2000, Bydlowski et al. 2005, Kessler et al. 2006, Speranza et al. 2007). There are also findings supporting the association between alexithymia and alcohol abuse (Kauhanen et al. 1992, Loas et al. 1997, Speranza et al. 2004, Sakuraba et al. 2005) and between alexithymia and other substance abuse (Troisi et al. 1998, Speranza et al. 2004).

The association between alexithymia and personality disorders has been studied to some extent. Bach et al. (1994) used a personality disorder questionnaire to assess abnormal personality characteristics in a sample of overweight women and detected a positive association between alexithymia and schizotypal, dependent and avoidant personality dimensions, and a negative association between alexithymia and histrionic features. There is also empirical evidence of an association between alexithymia and borderline personality (Berenbaum 1996, Zlotnick et al. 2001, Guttman and Laporte 2002, Modestin et al. 2004, Modestin et al. 2005). Studies on the association between alexithymia and psychopathy, asocial behaviour or delinquency have yielded somewhat contradictory results (Kroner and Forth 1995, Louth et al. 1998, Wastell and Booth 2003, Mattila et al. 2008a).

Autism spectrum disorders and schizophrenia have also been of interest as they commonly manifest with difficulties in describing mental states of self and others (Moriguchi et al. 2006). In a few studies higher levels of alexithymia have been found in patients with autism spectrum disorders (mostly Asperger syndrome) (Hill et al. 2004, Tani et al. 2004, Berthoz and Hill 2005, Silani et al. 2008). As to schizophrenia, there is some evidence indicating that it also has a relationship to alexithymia (Stanghellini and Ricca 1995, van 't Wout et al. 2007, Serper and Berenbaum 2008). However, Todarello et al. (2005), conducting a longitudinal study, found no association between alexithymia and the negative symptoms of schizophrenia which indicates that, despite possible conceptual parallelism of negative symptoms and alexithymia, these are distinct constructs.

### *2.4.3 Alexithymia, psychotherapy and treatment outcomes*

As alexithymia seems to be associated with numerous health problems as well as different kinds of psycho-social adversities, a pivotal question is what the role of alexithymia is in the management of these. Alexithymia is not a disorder as such, but it may be a risk factor as well as a sustaining factor for several conditions. Alexithymia has often been deemed immutable and alexithymic people poor candidates for insight-oriented psychotherapies (Freyberger 1977, Taylor 1997b). In order to be able to understand the clinical implications of studies on

alexithymia, it is essential to be acquainted with what is known about the predictive value of alexithymia and also if it can be reduced.

MacLean (1949) suggested that “psychosomatic patients”, being inarticulate about their emotional feelings, would benefit from a supportive approach at the onset of psychotherapy. He nevertheless believed that after establishing a good patient-doctor relationship a gradual progress towards insight therapy was possible. Later, the very emergence of the alexithymia construct was based on the notion that certain patients with psychosomatic illnesses tended to fail to respond to dynamic psychotherapy (Sifneos 1973). Freyberger (1977) deemed alexithymic patients unsuitable for psychoanalytic psychotherapy because of their reduced or failing self-reflection abilities, their diminished tolerance of frustrations typical of the psychoanalytically orientated psychotherapeutic situation and their reduced capacity for learning new emotional behaviour. Taylor (1977), however, described how the creative use of counter-transference permits access to the archaic inner world of alexithymic patients. The counter-transference evoked by alexithymic patients is, according to Taylor, typically characterised by increasing frustration, dullness, boredom and aggressive feelings. Taylor suggested that the therapist should sustain and analyse this counter-transference as it gradually helps the therapist to gather information about the patient’s primitive internalized object relationships.

Krystal (1979) observed that the nature of transference with alexithymic patients is characterised by the patients’ failure to interact emotionally with the therapist. According to Krystal, alexithymic patients tend to assume the role of a medical patient expecting a therapist to cure them. He was also concerned about the risk of symptom exacerbation in alexithymic patients as a result of an ill-tolerated psychoanalytically oriented therapeutic approach. He proposed that the first task of a therapist is to help the patients to observe the nature of their alexithymic disturbances. This includes guiding the patients to understand in which way their emotions are not like those of other people, and to contend with having somatic sensations instead of feelings. The second task of a therapist is helping the patients to develop affect tolerance by observing with them the way they experience their emotions and react to having them. If the therapy succeeds to the point where a therapist can begin to help the patients to gradually verbalize their emotions, “the therapist performs a function which child analysts and parents take for granted”. However, Krystal concluded that “The process of helping the patients to recognize and verbalize their emotions is a slow and tedious one”.

Negative therapist reactions, which may result from insufficiently recognised and managed negative counter-transference, may contribute to poorer than average therapy outcomes with alexithymic patients. Rasting et al. (2005) observed, videotaping patient-therapist sessions, that with alexithymic patients the therapists tended to display facial affects predominantly implying contempt. In contrast to this, Kooiman et al. (2008) did not find any association between alexithymia and pejorative feelings in clinicians. However, they made the assessment with questionnaires during a diagnostic phase before any

psychotherapeutic interventions had been implemented. The hypothesis of negative therapist reactions having an influence on therapy outcomes was supported by Ogrodniczuk et al. (2005), who found that less positive reactions from therapists mediated, to a substantial degree, the impact of alexithymia on poorer outcomes in group therapy. Moreover, even in spite of having difficulties in recognising both their own and other people's feelings, alexithymic individuals are not immune to lack of empathy: Graugaard et al. (2004) showed that alexithymic patients were significantly more satisfied when they received a greater empathetic reaction from a physician.

As to the often suggested alexithymia-related poorer adherence to recommended therapy, there are a few studies with contradictory results. Äärelä et al. (1997) found that alexithymic features did not predict compliance with psychotherapy in consultation-liaison patients, Friedman et al. (2003) showed that alexithymia was unrelated to compliance in diabetes treatment and the results reported by Grabe et al. (2008a) indicated that alexithymic inpatients did not discontinue a psychodynamically oriented treatment programme more frequently than non-alexithymic patients. Moreover, Lumley et al. (1994) found that alexithymic patients were even *more* likely to remain in group cognitive behavioural therapy for smoking cessation than non-alexithymic patients. However, according to the results from a study by Cleland et al. (2005), alexithymia may be a risk factor for non-adherence in therapy among patients with substance abuse.

Given the relatively large number of studies concerning alexithymia, and the original context of the concept itself, a surprisingly small number of studies have focused on the impact of alexithymia on treatment outcomes and, on the other hand, whether it is possible to alleviate alexithymia. According to the studies concerning the impact of alexithymia on treatment outcome, alexithymia predicts poorer outcome in somatization (Bach and Bach 1995), in eating disorders (De Groot et al. 1995, Speranza et al. 2007), in alcohol abuse or dependence (Loas et al. 1997), in functional gastrointestinal disorders (Porcelli et al. 2003), in alcohol abuse (Cleland et al. 2005), in depression (Viinamäki et al. 2002, Honkalampi et al. 2007), in post-traumatic stress disorder (O'Brien et al. 2008) but not in obsessive-compulsive disorder (Rufer et al. 2004, Rufer et al. 2006). Judging by the publication years of these studies, there may be an increasing trend in studies on the predictive role of alexithymia.

McCallum et al. (2003) studied the impact of alexithymia on the outcomes of four different types of therapy: short-term supportive or interpretive individual therapy for patients with mixed diagnoses, and short-term supportive or interpretive group therapy for patients with complicated grief. They found that lower levels of alexithymia were associated with benefit from all four forms of therapy and suggested that the patients most suited to psychotherapy, whether interpretive or supportive, are those with low alexithymia. Rosenblum et al. (2005) studied the suitability of group cognitive behavioural therapy (CBT) and group motivational intervention (GMI) in treating substance abusers. They found that patients with high levels of alexithymia derived greater benefit from CBT

than from GMI: alexithymic CBT patients had significantly more abstinent days than GMI patients. The authors hypothesized that CBT was more suitable because it places more emphasis on teaching concrete coping skills and relapse avoidance and less emphasis on affect and decision making. Findings concerning the impact of alexithymia on emotional disclosure writing have been contradictory; evidence of both positive (Paez et al. 1999, Solano et al. 2003) and negative (Lumley 2004) outcomes have been reported. The finding reported by De Berardis et al. (2005) may help to explain the results of some of these studies: they found a relationship between alexithymia and poor or absent insight in patients with obsessive-compulsive disorder.

Studies concerning specific treatment strategies for reducing alexithymia are rare. There are two reports on successful treatments involving group therapy. Beresnevaite (2000) treated post myocardial infarction patients with modified group psychotherapy involving progressive relaxation, role playing, nonverbal communication, writing, music and imagery and observed a significant reduction in alexithymia compared with a control group that received two educational sessions. Treatment in a “high-care” psychodynamically oriented inpatient setting has also been proven to ameliorate alexithymia effectively: Grabe et al. (2008a) reported a major reduction in alexithymia in alexithymic inpatients who received psychodynamic short-term group psychotherapy three times a week with an insight-oriented approach emphasising the verbalisation of individual emotional and individual problems. In addition to this, the patients once a week attended a group session involving role plays and psychodrama, and were also offered art therapy, sports therapy, relaxation therapy and body and movement therapy. All patients had an additional one-hour individual therapy session once a week.

Kennedy and Franklin (2002) described the results of a skills-based intervention with three patients and suggested that this approach effectively helped the individuals to clarify, identify and describe their feelings. Simha-Alpern (2007) reported a case study illustrating how implementing psychoanalytic understanding in the context of the psycho-educational principles of emotional intelligence training could expand a patient’s ability to articulate his traumatic experience by giving him the “emotional language”. Furthermore, Gay et al. (2008) showed that hypnotic imagery reduced alexithymia in female students and assumed that the technique was well accepted by the participants as it required neither active involvement in the therapeutic process nor introspective abilities.

It seems that alexithymia is not an absolute contraindication for psychodynamic therapy even though some authors (Lumley et al. 2007) suggest that cognitive therapies could be more appropriate in this group of patients. Modifications and additional techniques may, however, be needed. Furthermore, the therapist needs to be active, recognise the alexithymic features in the patient and monitor his or her own counter-transference feelings.

## 2.5 Epidemiology of alexithymia

The earliest prevalence studies were conducted with measures of uncertain quality and have therefore been of limited value. Since the introduction of the TAS, a few comparable reports on the prevalence and socio-demographic associations of alexithymia in populations and community samples have been published (Table 1, page 48).

All the studies listed in Table 1 were conducted with either the TAS-26 or the TAS-20. The prevalence of alexithymia is usually reported as a percentage of those reaching a total score of either  $\geq 74$  (TAS-26) (Taylor et al. 1988) or  $\geq 61$  (TAS-20) (Bagby and Taylor 1997b). In some studies, however, other ways for calculating prevalence have been employed. In addition to the prevalence figures, in most cases the mean TAS scores are also reported, and in two studies only these (Parker et al. 2003, Moriguchi et al. 2007).

The majority of the population studies come from Finland (Joukamaa et al. 1996, Salminen et al. 1999, Honkalampi et al. 2000b, Kokkonen et al. 2001, Joukamaa et al. 2007). Germany is another country where actual general population based studies on alexithymia have been published (Gunzelmann et al. 2002, Brosig et al. 2004, Franz et al. 2007). Studies on community samples have been carried out at least in Canada (Parker et al. 1989, Parker et al. 2003), in Italy (Pasini et al. 1992, not in Table 1), in the USA (Lane et al. 1998b, not in Table 1), in Japan (Moriguchi et al. 2007) and in Finland (Säkkinen et al. 2007). Some of the studies have been conducted in cohort samples of a certain age such as young adults 31 years of age (Kokkonen et al. 2001) or old adults 72 years of age (Joukamaa et al. 1996). Some studies have focused on working aged populations (Salminen et al. 1999, Honkalampi et al. 2000b, Franz et al. 2007). There are also studies with very wide age ranges: Brosig et al. (2004) studied people between 14 and 95 years (age range 82 years), and Moriguchi et al. (2007) had a community sample of individuals aged 14 to 84 years (age range 71 years).

### *2.5.1 Prevalence and level of alexithymia in populations and community samples*

Prevalence figures and/or mean TAS-26 or TAS-20 scores are presented in Table 1 (page 48). It should be noted that the prevalence figures obtained with the TAS-26 and the TAS-20 may not be quite comparable. Brosig et al. (2004) demonstrated this by using, on the one hand, the whole scale of TAS-26 and, on the other hand, only three subscales (DIF, DDF and EOT) comprising altogether 18 items. They obtained two different cut-off values for the abridged scale by calculating the mean item scores according to the established cut-off point for TAS-26 and for TAS-20 respectively. The cut-off value using the cut-off point

**Table 1.** *Earlier studies on the prevalence and/or mean levels and socio-demographic correlates of alexithymia in community and population samples (not including separate analyses with different dimensions). Results reported in the articles are displayed in the table, empty cells indicating missing data.*

Author, year of publishing and country (type of sample)	Sample size, age and alexithymia measure	Prevalence (P) of alexithymia and/or mean (M) TAS-scores (significance of sex difference)	Age	Marital status	Socio-economic situation including education, employment and income
Parker et al. 1989 Canada (normal adults)	N=101 20-80 years TAS-26	P(all)=18.8% M(m)=62.37, M(f)=63.83 (not significant)	no association		no association with educational level or socioeconomic status
Joukamaa et al. 1996 Finland (population)	N=190 72 years TAS-26	P(all)=34%; P(m)=34.5%, P(f)=33.0% (not significant) M(m)=68.0, M(f)=67.8 (not significant)		no association	lower education, but no association with social status or residential area
Salminen et al. 1999 Finland (general population)	N=1285 18-64 years TAS-20	P(all)=12.8%; P(m)=16.6%, P(f)=9.6% (significant) M(all)=46.0; M(m)=48.8, M(f)=43.8 (significant)	older age	no association	low educational level, low socioeconomic status
Honkalampi et al. 2000b Finland (general population)	N=2018 25-64 years TAS-20	P(all)=10.3%; P(m)=12.8%, P(f)=8.2% (significant) M(all)=44.1; M(m)=46.5, M(f)=42.2 (significant)	older age (when not controlled for depression)	no association	lower education, blue-collar workers, lower economic status (when not controlled for depression)
Kokkonen et al. 2001 Finland (general population)	N=5028 31 years TAS-20	P(m)=9.4%, P(f)=5.2% (significant) M(m)=46.8, M(f)=42.5		unmarried men	lower level of education, lower income, unemployment, rural dwelling
Gunzelmann et al. 2002 Germany (general population)	N=566 61-95 years TAS-26	P(all)=38.9% (full scale) P(all)=15.2% (abridged <sup>1</sup> )			



Parker et al. 2003 Canada (community population)	N=1933 M=35.5 years TAS-20	M(all)=45.6; M(m)=47.3, M(f)=44.2 (significant)	weak negative correlation	low negative correlation with education
Brosig et al. 2004 Germany (general population)	N=2047 14-95 years TAS-26	P(all)=33.2% (full scale) P(all)=19.6% (abridged <sup>2</sup> ) P(all)=10.2% (abridged <sup>3</sup> )		lower socioeconomic status, unemployment
Joukamaa et al. 2007 Finland (general population)	N=6000 15-16 years TAS-20	P(m)=6.9%, P(f)= 9.5% (significant) M(m)=48.7, M(f)=47.7 (significant)		living without partner  broken family  low vocational education of mother, social class of parents other than white-collar
Säkkinen et al. 2007 Finland (pupils from two secondary schools)	N=882 12-17 years TAS-20	P(all)=15.9%; P(m)=14.6%, P(f)=17.3% (not significant) M(all)=51.1; M(m)=50.9, M(f)=51.3 (not significant)	younger age	
Franz et al. 2007 Germany (general population)	N=1859 20-69 years TAS-20	P(all)=10%; P(m)=11.1%, P(f)=8.9% (not significant <sup>4</sup> ) M(all)=48.8; M(m)=49.5, M(f)=48.2 (significant)	no association	lower education, unemployment, lower household income
Moriguchi et al. 2007 Japan (normative community sample, mostly college- graduated white-collar workers)	N=2718 14-84 years TAS-20	M(all)=48.3; M(m)=48.2, M(f)=48.4 (not significant)	younger age	divorced or living alone

N = number of subjects, P = prevalence, M = mean, m = male, f = female

<sup>1</sup> Abridged TAS-26 scale with 18 items (dimensions DIF, DDF and EOT); prevalence of those at least 1 standard deviation above the mean value

<sup>2</sup> Abridged TAS-26 scale with 18 items (dimensions DIF, DDF and EOT) using the cut-off point calculated from the mean item value based on TAS-26 cut-off point  $\geq 74$

<sup>3</sup> Abridged TAS-26 scale with 18 items (dimensions DIF, DDF and EOT) using the cut-off point calculated from the mean item value based on TAS-20 cut-off point  $\geq 61$

<sup>4</sup>  $\chi^2$  test using figures given in the article

for TAS-26 was 2.85x18 (=51.3) and using the cut-off point for TAS-20 it was 3.05x18 (=54.9). In their population sample of 2047 subjects aged 14-95 years, the prevalence of alexithymia was 33.2% using the full TAS-26, 19.6% using the abridged scale with cut-off value of 2.85x18 points, and 10.2% using cut-off value of 3.05x18 points. As the TAS-20 is the new psychometrically improved version of the TAS, it has usually been used in more recent studies.

In those studies on working aged populations where prevalence figures have been given for whole samples, these (measured with the TAS-20) have varied between 12.8% (Salminen et al. 1999), 10.3% (Honkalampi et al. 2000b) and approximately 10% (Franz et al. 2007). If alexithymia is seen as a dimensional personality trait, which most often is the case, there may be little sense in reporting prevalence figures for it. Furthermore, the  $\geq 61$  cut-off point for the TAS-20 is based on a study with a small patient sample (Bagby and Taylor 1997b). It has, however, nowadays gained a certain status of convention in alexithymia research and gives a tool for comparison between different studies. Moreover, Parker et al. (2003) noted that in their study of a large community sample a score that was one and one half standard deviations above the mean score for the entire sample was very close to the cut-off score of  $\geq 61$ .

Another way to compare the levels of alexithymia in populations is to study the mean scores of alexithymia measures. Parker et al. (2003) recommended that the mean TAS-20 scores which they obtained with a large community sample should be considered norms against which the results of other studies can be compared. Their mean TAS-20 score for both sexes was 45.57, for men 47.30 and for women 44.15. In the studies listed in Table 1, mean scores of the TAS-20 for both sexes vary between 44.1 and 51.1, for males between 46.5 and 50.9 and for females between 42.2 and 51.3. The age range of the study by Parker et al. (2003) was not given. Nearest to their results, when all values are considered, come the mean scores obtained by Salminen et al. (1999), who studied a general population sample of working age people: their mean TAS-20 score for all was 46.0, for men 48.8 and for women 43.8.

### *2.5.2 Association with gender*

In Table 1, 12 studies are reviewed. They are all based on samples with both genders and six of these studies report whether gender difference in the prevalence of alexithymia was studied. Nine studies report whether there was significant gender difference between mean TAS scores. In two studies gender difference was studied only between different factors, not between prevalence or total scores (Gunzelmann et al. 2002, Brosig et al. 2004).

In four studies, no gender difference was found (Parker et al. 1989, Joukamaa et al. 1996, Säkkinen et al. 2007, Moriguchi et al. 2007). In five studies males had unequivocally higher levels of alexithymia than females (Salminen et al. 1999, Honkalampi et al. 2000b, Kokkonen et al. 2001, Parker et al. 2003, Franz et al. 2007) whereas in one study on an adolescent sample the prevalence of

alexithymia was significantly higher among females but the mean TAS-20 score was higher among males (Joukamaa et al. 2007).

In eight studies, gender differences were studied comparing scores of the different TAS factors. In three of these studies the following pattern emerged: no gender difference as to the DIF scores but higher scores of DDF and EOT for men (Salminen et al. 1999, Parker et al. 2003, Franz et al. 2007). In two studies females had higher DIF scores and males had higher EOT scores, while no difference was found in DDF scores (Säkkinen et al. 2007, Moriguchi et al. 2007). Of the remaining three studies, one indicated a higher DIF score for women and no gender differences in DDF and EOT scores (Kokkonen et al. 2001), one indicated a higher DDF score for women but no other gender differences (Gunzelmann et al. 2002) and one indicated a higher EOT score for men with no other differences (Brosig et al. 2004). Pasini et al. (1992), studying an Italian community sample (N=417) found no gender differences in the TAS-26 total score or in different factor scores except for DIF score which was higher for women. On the other hand, in a North American community sample on 380 subjects aged 18 to 80 years, alexithymia (TAS-20) was associated with male sex (Lane et al. 1998b). Furthermore, there was no gender difference between DIF scores, but DDF and EOT scores were higher for men. All in all, the findings concerning gender differences in the prevalence and levels of alexithymia are quite variable.

### *2.5.3 Association with age*

In seven studies presented in Table 1, the association between full alexithymia and age is reported. In two of these no association between levels of alexithymia and age was found (Parker et al. 1989, Franz et al. 2007). On the other hand, some studies indicate a positive association (Salminen et al. 1999, Honkalampi et al. 2000b, Parker et al. 2003) whereas some other studies report a negative association between alexithymia and age (Säkkinen et al. 2007, Moriguchi et al. 2007). Regarding the different dimensions of alexithymia, Gunzelmann et al. (2002) found a positive association between age and both EOT and reduced daydreaming. Parker et al. (2003) found a negative correlation between age and DIF and DDF but not between age and EOT. Both Säkkinen et al. (2007) and Moriguchi et al. (2007) reported a negative correlation between age and both DIF and DDF, but Säkkinen et al. also found a negative association between age and EOT while Moriguchi et al. found the association between age and EOT to be positive. Brosig et al. (2004) reported age to be positively associated with EOT but not with other dimensions. Furthermore, Pasini et al. (1992) found a significant positive association between age and the TAS-26 total score as well as between age and DIF, EOT and reduced daydreaming. Lane et al. (1998b) reported a positive correlation between age and both the TAS-20 total score and EOT but a negative correlation between age and DIF.

#### *2.5.4 Association with marital status*

In seven of the papers reviewed in Table 1 the association between alexithymia and marital status or other family situation was studied. In three of these, no association was found (Joukamaa et al. 1996, Salminen et al. 1999, Honkalampi et al. 2000b). In three studies alexithymia was associated with being single, divorced or for some other reason living alone (Kokkonen et al. 2001, Brosig et al. 2004, Franz et al. 2007). Joukamaa et al. (2007), studying an adolescent sample, found alexithymia to be associated with living in a broken family.

#### *2.5.5 Association with socio-economic status*

In seven studies presented in Table 1, the association between alexithymia and the level of education of the participants was assessed. In one of these studies no association was found (Parker et al. 1989) while in six studies alexithymia was associated with a lower educational level (Joukamaa et al. 1996, Salminen et al. 1999, Honkalampi et al. 2000b, Kokkonen et al. 2001, Parker et al. 2003, Franz et al. 2007). In their study on adolescents, Joukamaa et al. (2007) found an association between alexithymia and low vocational education of mothers. Furthermore, in the Italian (Pasini et al. 1992) and the North American (Lane et al. 1998b) studies on community samples, alexithymia was significantly associated with lower educational level. Gunzelmann et al. (2002) compared only the association between education and the different dimensions of alexithymia and found no association between these.

The associations between alexithymia and other indicators of socio-economic status were reported in eight studies displayed in Table 1. In two of these studies alexithymia was not associated with socio-economic status (Parker et al. 1989) or social status (Joukamaa et al. 1996). In six studies alexithymia was found to be associated with lower socio-economic status (Salminen et al. 1999, Honkalampi et al. 2000b, Kokkonen et al. 2001, Brosig et al. 2004, Franz et al. 2007). In an adolescent sample, alexithymia was associated with social class of parents being other than white-collar workers (Joukamaa et al. 2007). Moreover, Lane et al. (1998b) reported a negative correlation between socio-economic status and the TAS-20 total score as well as DIF, DDF and EOT.

In conclusion, the associations between alexithymia and marital status, educational level and socio-economic status seem to be more unambiguous than those between alexithymia and sex or age. The majority of the studies reviewed here support the notion that alexithymia is associated with living alone or in a broken family, being less educated and having a poorer socio-economic situation.

## 2.6 Alexithymia and occupational burnout

### *2.6.1 Definition of occupational burnout*

Occupational burnout is an important health and organizational issue in modern work life (Shirom 2005, Shirom et al. 2005). It predicts medically certified sick-leave absences due to mental health disorders and physical diseases (Bakker et al. 2003, Toppinen-Tanner et al. 2005). The first studies on occupational burnout were conducted in the mid-1970s (Maslach et al. 2001). The early papers described the experiences of people working in human services where occupations are characterized by emotional and interpersonal stressors. Later, burnout research broadened to other occupations as well (Maslach et al. 2001, Kalimo et al. 2003). The word “burnout” is a metaphor that is used to describe a state of mental weariness (Schaufeli and Bakker 2004). Occupational burnout is defined as a prolonged response to chronic stressors on the job with exhaustion being the central feature and one of the three dimensions of the construct (Maslach et al. 2001). The two other dimensions of burnout are cynicism and reduced professional efficacy (Maslach 2001). Cynicism is manifested as indifference or a distant attitude toward the job (Schaufeli and Bakker 2004). Reduced professional efficacy is reflected as problems in both social and non-social aspects of occupational accomplishments (Schaufeli and Bakker 2004). It has been argued that exhaustion and cynicism are the most essential dimensions of the burnout concept, while reduced professional efficacy is less central to the syndrome (Cox et al. 2005).

Occupational burnout is mainly predicted by job demands but also by lack of job resources (Schaufeli and Bakker 2004). Difficulties in working conditions, such as diminished support from superior, co-operation and autonomy as well as deteriorated organisational climate have been found to predispose to occupational burnout (Kalimo et al. 2003). Dysfunctional ways of coping also play a role in the development of the burnout syndrome (Schaufeli and Bakker 2004). Sense of coherence, strong self-esteem and sense of competence are individual characteristics that seem to prevent workers from burning out (Kalimo et al. 2003).

### *2.6.2 Epidemiology of occupational burnout*

In developed western countries, the prevalence of severe occupational burnout is 4-10% in the working population (Shirom 2005). In the Finnish working population aged 30-64 years, 25.2% were found to be suffering from mild burnout and 2.4% from severe burnout (Ahola et al. 2005).

Occupational burnout has been shown to be related to age, gender, marital status and education (Schaufeli and Enzmann 1998, Ahola et al. 2006). There is also a strong association between burnout and depression (Kalimo et al. 2003,

Ahola et al. 2005) and between burnout and physical illnesses (Ahola et al. 2006).

### *2.6.3 Measuring occupational burnout*

The vast majority of burnout research has been conducted with the Maslach Burnout Inventory (MBI) (Schaufeli and Enzmann 1998). This was first developed for measuring burnout in human services (the MBI-Human Service Survey) (Maslach et al. 2001). Another people work version was developed for people working in educational settings (the MBI-Educators Survey) (Maslach et al. 2001). As the interest in studying burnout outside human service occupations increased, a third version of the MBI was created, the MBI-General Survey (MBI-GS). In addition to the MBI, there are a few other measures for assessing burnout but they have so far not been widely used (Halbesleben and Demerouti 2005, Kristensen et al. 2005).

There has been some criticism of the MBI (Cox et al. 2005). It has, for example, been argued that two of the three dimensions measured by the MBI are not core features of burnout but either a coping strategy (depersonalization leading to cynicism) or a consequence of long-term stress (reduced accomplishment) (Kristensen et al. 2005). It has, however, been shown in earlier studies that the general version of the MBI, the MBI-GS, is a psychometrically sound measure of the three-dimensional concept of burnout across occupational groups and nations (Schutte et al. 2000).

### *2.6.4 Studies on alexithymia and occupational burnout*

There is only one earlier study on alexithymia and occupational burnout. On two occasions De Vente et al. (2006) studied a small patient sample (n=69) with work-related stress and a control group of approximately the same size. As measures they used the TAS-20 and the MBI. Their results indicated that the patients were more alexithymic than the controls. Moreover, the absolute stability of DIF and DDF and the relative stability of DIF were lower in the patient group, raising the question whether alexithymia, associated with occupational stress, was a state dependent phenomenon.

Although the associations between alexithymia and burnout have not been widely studied so far, there is literature on the associations between emotional intelligence and burnout. According to a few studies, lower emotional intelligence is associated with occupational burnout in human service work (Duran et al. 2004, Gerits et al. 2005). There are, however, also arguments contradictory to these (Zeidner et al. 2004). Nonetheless, the findings concerning emotional intelligence and occupational burnout lend indirect support to the theory that alexithymia and burnout could be related.

## 2.7 Alexithymia and health-related quality of life

### 2.7.1 *Quality of life and health-related quality of life (HRQoL)*

“Quality of life” has been an important concept in medicine for a few decades (Musschenga 1997). The common use of this term has been to question the biological parameters (“quantity of life”) as the sole criteria for the effectiveness of medical treatments. Musschenga (1997) saw the concept of quality of life as a container concept, covering quite diverse considerations. He proposed that the concept has three different meanings: quality-of-life as the degree of normal functioning, quality-of-life as the degree of satisfaction with life, and quality-of-life as the level of human development. As to the value of health in people’s lives, it is usually seen to be quite important. Bowling (1996) found in a British population study that respondents were most likely to report as the first most important thing in their lives relationships with family or relatives followed by their own health and by the health of significant others.

Health-related quality of life (HRQoL) is used as an outcome in clinical trials, effectiveness research and research on quality of care (Wilson and Cleary 1995). It is thus a narrower concept than quality of life. Health-economists use HRQoL-measures in order to compare costs and benefits of treating different diseases. There is a general agreement that HRQoL is a multidimensional concept but it has been defined in several ways (Sintonen 1994, Guyatt et al. 2007).

Wilson and Cleary (1995) proposed a conceptual model that, on a causal continuum, links biological and physical variables to overall quality of life. Their model focuses on five types of patient outcomes. It begins with “biological and physiological variables” which are seen as the most fundamental determinants of health status. They are followed by “symptom status”, which includes emotional, cognitive and physical symptoms. After this on the continuum comes “functional status”, which addresses physical functioning, social functioning, role functioning and psychological functioning. The fourth outcome is “general health perceptions”, which refers to a subjective evaluation that integrates all the preceding components. The end-point of the continuum is “overall quality of life”, an indicator of subjective well-being signifying how happy or satisfied an individual is with life as a whole. In Wilson and Cleary’s model there are a few additional factors that influence the five patient outcomes. “Characteristics of the environment” include psychological support, social support and economic support. “Characteristics of the individual” encompass symptom amplification, personality motivation and value preferences.

Even though several of the above-mentioned outcomes can be, to a certain degree, measured or evaluated from the outside, it is a general notion that quality of life and HRQoL are subjective concepts (Sintonen 1994, Wilson and Cleary 1995, Guyatt et al. 2007). There is empirical evidence suggesting that general measures of quality of life or happiness are not as strongly related to objective

life circumstances as could be expected (Wilson and Cleary 1995, Musschenga 1997). Compared to the objective conditions, there is a stronger association between quality of life and psychological conditions, for example feeling of competence, ego-strength, feeling of having control over one's life, maturity, coping abilities and optimism (Musschenga 1997). Diener et al. (1999) stated that personality is one of the strongest and most consistent predictors of subjective well-being. According to Emmons and Diener (1985), individuals who are satisfied with their lives are, among other things, warm, sociable, and active, and do not tend to be anxious or critical of others in their interpersonal relations.

In addition to the personality features predicting subjective well-being, negative affectivity (Panagopoulou et al. 2006), and depression (Saarijärvi et al. 2002, Saarni et al. 2007a) are associated with poorer HRQoL. Furthermore, and almost axiomatically, health status has been found to be associated with reported satisfaction with health (Michalos et al. 2000). Age has a notable role in the associations of health status and HRQoL: Saarni et al. (2007b) calculated that the impact of chronic conditions on HRQoL increased fourfold when comparing people aged 30-44 years to people aged over 75 years. They concluded that this was mainly due to the increase in the prevalence of chronic conditions while the severity of some conditions also varied with age. A similar association between age and HRQoL was found in a Swedish study, where the impact of age was diminished by increased number of chronic health problems (Michelson et al. 2001). Of other socio-demographic variables, lower socio-economic status has commonly been associated with poorer HRQoL (Michelson et al. 2001, Saarni et al. 2007b).

### *2.7.2 Measuring health-related quality of life*

There are both disease-specific and non-disease specific (generic) measures of HRQoL. The disease-specific measures are used to assess HRQoL in the context of a certain disease. The generic measures are designed to give an estimate of overall HRQoL. As HRQoL is seen to be a multidimensional concept encompassing the physical, emotional and social components associated with disease and health, the commonly assessed areas are physical functioning, psychological well-being, subjective symptoms, social functioning and cognitive functioning (Sintonen 1994, Németh 2006). The health-status classification systems that consist of several dimensions or "attributes", the levels of which range from full function to severely impaired function, are called *multi-attribute* systems (Torrance et al. 1995). It is often expected that a profile can be drawn from an HRQoL measurement. This way it is possible to detect where the problems lie in the population under study (Sintonen 1994). However, it is not possible to compare the overall HRQoL between different groups by comparing profiles. For this purpose, and also in order to provide a tool for those in charge



of resource allocation, an aggregation of the measures into a single index score is also expected (Sintonen 1994, Sintonen 1995).

People give different preferences to different kinds of conditions. Therefore authors of HRQoL measures have adopted various methods to take this into account in developing measurements for HRQoL (Sintonen 1995, Tengs and Wallace 2000). These include such techniques as rating scale, magnitude estimation, standard gamble, time trade-off and equivalence technique or person trade-off (Sintonen 1995). The purpose of these techniques is to get an estimate of how people value different states of health. Numerical values thus elicited are called utilities or weights (Wilson and Cleary 1995, Tengs and Wallace 2000). The multi-attribute utility technique determines a mathematical formula that allows the estimation of preference scores for health states defined in a multi-attribute framework (Torrance et al. 1995).

### *2.7.3 Studies on alexithymia and health-related quality of life*

#### *2.7.3.1 Alexithymia, life satisfaction and overall quality of life in population and patient samples*

There are a few earlier studies on associations between alexithymia and subjective well-being. An association between alexithymia and dissatisfaction with life has been found in two Finnish population studies (Honkalampi et al. 2000b, Honkalampi et al. 2004b), two studies on coronary heart disease patients (Valkamo et al. 2001a, Valkamo et al. 2001b) and in a study of outpatients with depression (Honkalampi et al. 1999). In these studies, however, satisfaction with life was not the main topic. The association specifically between alexithymia and satisfaction with life has been studied in primary healthcare patients (Mattila et al. 2007). In this study, alexithymia was a more prominent predictor of poorer satisfaction with life than perceived health and depression. Le et al. (2002), conducting a cross-cultural study, found that life satisfaction was negatively correlated with alexithymia in American students. Alexithymia has also been associated with dissatisfaction with life abroad (Fukunishi et al. 1999a).

The associations between overall quality of life and alexithymia have been studied in patients with brain injury (Henry et al. 2006) and in ulcerative colitis patients after surgery (Weinryb et al. 1997). Henry et al. (2006) reported that alexithymia was associated with poorer overall quality of life in patients who had suffered a traumatic brain injury. The finding of Weinryb et al. (1997) was contrary to all those mentioned above: in their study *absence* of alexithymia predicted poorer postoperative quality of life.

### *2.7.3.2 Alexithymia and HRQoL in patient samples*

The association between HRQoL and alexithymia has been studied in a few clinical samples. These indicate that alexithymia is associated with poorer HRQoL in patients with end-stage renal disease (Fukunishi 1990, Pucheu et al. 2004), with inflammatory bowel disease (Verissimo et al. 1998) and with breast cancer (Grassi et al. 2004). Wise et al. (1990) studied an unselected sample of medically ill patients and also found a negative association between HRQoL and alexithymia.

In these studies alexithymia and HRQoL were assessed with a variety of measures. Moreover, all the studies mentioned here were conducted with relatively small (n = 46-105) patient samples. On account of these methodological issues, it is somewhat difficult to compare the findings across studies.

### *2.7.3.3 Alexithymia and HRQoL in general population*

Only one congress abstract has been published reporting associations between alexithymia and HRQoL in general population. Salminen et al. (2002) studied these associations in a population sample of 1285 subjects aged 18 to 64 years. They measured alexithymia with the TAS-20 and HRQoL with the RAND-36. Alexithymic individuals had lower levels of physical functioning, more role limitations due to emotional problems, less energy, poorer emotional well-being, poorer social functioning, more pain and poorer general health than the non-alexithymic subjects. A major limitation in this study was that socio-demographic and other confounding factors were not controlled for. Modestin et al. (2004), studying medical students and members of nursing staff (N=223), detected significant alexithymia-related differences by bivariate chi-squared tests in following dimensions of the 36-item Short-Form Health Survey: general health perception, social functioning, emotional role functioning and mental health.

## **2.8 Alexithymia and somatization**

### *2.8.1 Definition of somatization*

There are numerous definitions of somatization, each emphasizing one or another aspect of the phenomenon. However, common to all of them is the notion that an individual complains or suffers from somatic symptoms that cannot be adequately or at all explained by organic etiology (Kellner 1990, Kroenke and Rosmalen 2006, Rief and Broadbent 2007). Somatization ranges

from mild over-reporting or amplification of somatic symptoms to a psychiatric disorder.

There are several theories explaining the phenomenon of somatization. The early psychodynamic theories defined somatization as a defence mechanism for keeping conflicts over drive-related wishes and associated dysphoric affects unconscious while permitting their partial expression through bodily symptoms (e.g., Taylor 1997a). In other words, the so-called “conflict paradigm” emphasises the role of unconscious conflicts that are assumed to generate chronic states of emotional arousal (e.g., Taylor et al. 1991). The psychodynamic theories include an apparent etiological statement of the phenomenon. Lipowski defined somatization as a “tendency to experience and communicate psychological distress in the form of physical symptoms, and to seek medical help for them” (Lipowski 1987). This definition includes a notion of somatization being related to psychological distress but does not refer to psychodynamic explanations. According to Lipowski, somatization encompasses three aspects: experiential, cognitive and behavioural.

Contemporary researchers have attempted to create etiological models to explain how mental processes are connected with somatic symptomatology. In their comprehensive review of models and mechanisms explaining medically unexplained symptoms, Rief and Broadbent (2007) listed several factors contributing to somatization. They classified these into *cognitive aspects* (including symptom interpretation and illness beliefs, causal attribution and illness beliefs, health attitudes and other cognitive styles, attention and perception, expectations and memory, the role of illness worry and health anxiety), *behavioural aspects*, and *emotional regulation, personality and attachment*. Thus, according to Rief and Broadbent, reporting and suffering from medically unexplained symptoms is a phenomenon with multiple etiologies.

In their review on explanations of medically unexplained symptoms, Rief and Broadbent, however, took quite a strong position against the idea of *alexithymia* being a predisposing factor to somatization. In their view, alexithymia is merely a covariate of mental and psychosomatic disorders in general. This they rationalised as follows: when controlling for comorbid depression, the association between alexithymia and somatization sometimes disappears. In addition, they argued that alexithymia (especially when measured with the TAS-20) seems to be associated with depression and demoralization.

### 2.8.2 Epidemiology of somatization

Having multiple unexplained physical symptoms is very common in the general population. Kroenke (2003) reported a prevalence figure of 35% for these symptoms in a large population-based survey of over 13,000 subjects. From 20% to 74% of symptoms in primary care are estimated to be medically unexplained (Kroenke 2003). The prevalence of actual somatization disorders in the general population varies from 2% to over 50% according to different studies (Rief et al.

2001, Nordin et al. 2006). Somatization is an important matter of public health as, in addition to subjective suffering, it commonly results in disability (Escobar et al. 1987), increased healthcare utilisation (Escobar et al. 1987, Barsky et al. 2005), increased costs (Kroenke 2001, Barsky et al. 2005) and high iatrogenic complication rates (Smith et al. 2003).

The majority of medically unexplained symptoms improve within several weeks, but the remaining 25% are more chronic in nature (Kroenke 2003). Most symptoms have a persistence rate of 20% to 25%, but the rate is even higher for some symptoms; prevalence figures of 35-45% have been established for back pain, headache and musculoskeletal complaints (Kroenke 2003).

Somatization is associated with common psychopathology such as depression and anxiety (Kellner 1990, Kroenke 2003, Kroenke and Rosmalen 2006, Lieb et al. 2007). In addition, it is associated with sex (Escobar et al. 1987, Barsky et al. 2005), age (Rief et al. 2001), marital status (Barsky et al. 2005) and education (Kellner 1990, Barsky et al. 2005).

### *2.8.3 Measuring somatization*

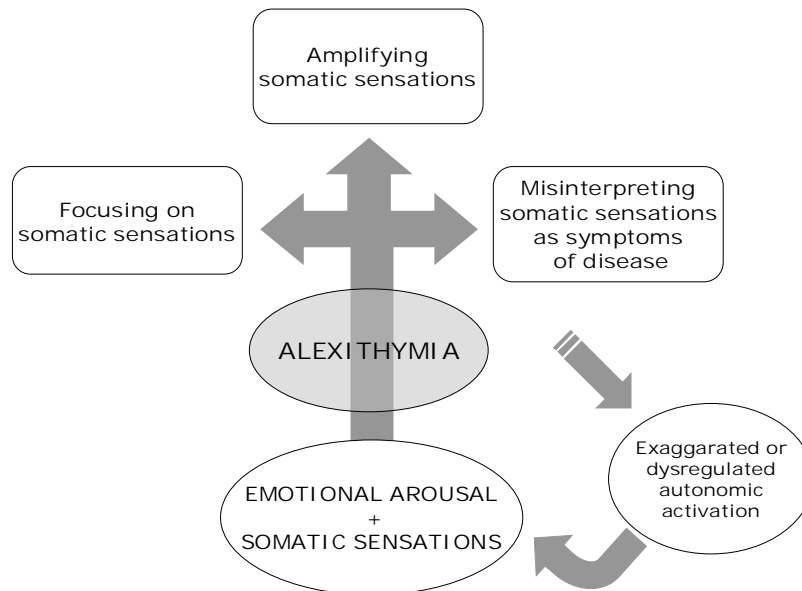
There are several methods for collecting data on medically unexplained symptoms and somatization: chart review or elicitation by a survey, questionnaire, symptom diary or a provider's review of systems (Kroenke 2001). Each method detects symptomatology of a different nature and threshold (Kroenke 2001). In large surveys self-report scales are the most feasible method.

There is a risk of over-endorsement bias when somatic symptoms are elicited by survey (Kroenke 2001); that is, people may tend to report more symptoms than they normally would. Moreover, the symptoms reported may not cause any impairment in the subjects' lives or be of clinical relevance. This obviously is a problem when surveys are used to establish the prevalence of somatization. However, when differences in symptom reporting between two or more groups are the main focus of interest, self-reports provide useful data.

### *2.8.4 Studies on alexithymia and somatization*

All emotions have a somatic component and emotions need to be cognitively processed before a feeling is experienced. It has been conjectured that the limited ability of alexithymic individuals to process emotions cognitively, so that they are experienced as conscious feeling states, leads both to focusing on, and amplification of, the somatic sensations accompanying emotional arousal while alexithymic people may also misinterpret the emotion-related somatic sensations as symptoms of disease (Taylor et al. 1991, Taylor 1997a, De Gucht and Heiser 2003, Jones et al. 2004, Taylor and Bagby 2004, Waller and Scheidt 2006). One assumption with regard to alexithymia and somatization is that the failure to experience complex emotional states is associated with exaggerated or

dysregulated autonomic activation (e.g., Waller and Scheidt 2006). However, as noted earlier, the empirical findings concerning alexithymia and exaggerated or dysregulated autonomic activation are still unclear (see Section 2.4.1). A schematic illustration of the possible mechanisms explaining the role of alexithymia in psychosomatic symptom formation is presented in Figure 1.



**Figure 1.** *Schematic illustration of the possible mechanisms explaining the role of alexithymia in psychosomatic symptom formation.*

The association between alexithymia and somatization has in the recent decades been actively investigated (Taylor 1997a, De Gucht and Heiser 2003) and since the development of the TAS, the results have been more comparable. According to a MedLine search, approximately 200 studies on this subject have been published since the coining of the term alexithymia. In a few recent review articles, a large part of the findings of these studies have been summarised (Kooiman 1998, De Gucht and Heiser 2003, Waller and Scheidt 2006). Most of the studies have indicated a positive association between alexithymia and somatic symptom reporting, although a few negative findings have also been reported.

In their exhaustive quantitative review of the literature on alexithymia and somatization, De Gucht and Heiser (2003) reported mean correlation coefficients between somatic symptom reporting and different alexithymia variables as follows: for general alexithymia  $r = .23$ , for DIF  $r = .35$ , for DDF  $r = .14$ , and for EOT  $r = -.04$ . In other words, the correlation between somatic symptom reporting and DIF was moderate, while the corresponding figures for general

alexithymia and DDF indicated a weak association. The association between somatic symptom reporting and EOT was negligible.

The majority of earlier studies were conducted with students or clinical patient samples. This makes generalising the findings beyond these groups problematic. The prevalence of somatization has been studied in populations but the association of somatization or somatic symptom reporting with alexithymia has only rarely been investigated in population samples. In Finland, Karvonen et al. (2005) studied the medical records of a 1002-subject sample of 31-year-old urban dwellers. They operationalized somatization with modified diagnostic criteria for a somatization disorder and found no association between somatization and alexithymia. Their study focused, however, on only one age group in one town. Hence, extrapolating these findings to general population may not be justifiable.

In addition to the problem with generalizability, a substantial number of the earlier studies have been criticised for not having controlled for essential confounders (Kooiman 1998, De Gucht and Heiser 2003, Waller and Scheidt 2006). Medically explained symptoms should self-evidently be controlled for. As both somatization and alexithymia are associated with sex, age, marital status, education and psychopathology, controlling for these variables is likewise essential fundamental.

## 2.9 Conclusions based on the literature reviewed

Despite some ongoing debate, alexithymia is most commonly seen as a trait-like personality construct originating in early developmental phases. Alexithymia manifests as difficulties in both identifying and describing inner feelings as well as in an unimaginative, externally oriented way of thinking. According to several studies, alexithymia is associated with interpersonal problems, several mental health problems and quite many somatic diseases. Alexithymia may have a deleterious impact on the treatment of mental and physical illnesses although some contradictory findings also exist.

There are a few earlier studies on the prevalence and socio-demographic associations of alexithymia in population or community samples. According to these, alexithymia may be more prevalent in men than in women. The association with age seems to be more contradictory as, on the one hand, no association but, on the other hand, both associations with younger age and with older age have been reported. In some studies an association with being single or otherwise living alone has been found. Probably the most unequivocal findings concern the relationship between alexithymia and socio-economic status: there is strong support for the notion that alexithymia is associated with lower levels of education and with a poorer socio-economic situation. There are only a few studies that have been conducted in general populations with both young and old adults. As alexithymia has been found to be an important variable with regard to

different kinds of health outcomes, it is necessary to establish to what extent it affects the general population.

Occupational burnout is an important health and organisational issue in modern work life as it predicts medically certified sick-leaves due to both mental health problems and physical diseases. Therefore it is important to establish the factors that contribute to it. There is only one earlier study on alexithymia and occupational burnout, the results of which cannot be generalized to general working population. As it is associated with interpersonal problems and poorer capacity to deal with stressful situations it is quite conceivable that alexithymia is indeed related to burnout. It is essential to control for depression and socio-demographic variables in order to ascertain the net effect of alexithymia on occupational burnout.

HRQoL is used as an outcome in clinical trials, effectiveness research and research on quality of care. Psychological conditions seem to have a substantial impact on how people evaluate their subjective well-being. There are no earlier studies on the association between alexithymia and HRQoL in general population controlling for essential confounders. According to studies on clinical samples, and two studies of limited generalizability in non-clinical samples, it seems plausible that alexithymia is also associated with HRQoL on population level. Controlling for mental health problems and physical health along with socio-demographic variables is necessary if the influence of a personality trait on HRQoL is to be determined.

Somatization or having multiple unexplained physical symptoms is very common in general population. Somatization is an important issue in public health as it commonly results in disability, increased healthcare utilization and costs and high iatrogenic complication rates. The association between alexithymia and somatization is a phenomenon that has been studied quite extensively in recent decades. Despite this activity there are no earlier studies in large general population samples representative of a whole nation. The results from earlier studies mainly suggest that alexithymia is related to somatization or increased somatic symptom reporting. When studying the association between somatization and alexithymia, controlling for mental health and somatic health as well as socio-demographic variables is necessary as all these are associated with somatization.





### 3. AIMS OF THE STUDY

The aims of the present dissertation were to seek answers to the following questions:

- 1) What is the prevalence of alexithymia in Finland in a representative population sample comprising young, middle-aged and old adults? (Study I)
- 2) What are the socio-demographic correlates of alexithymia in this population sample? (Study I)
- 3) Is alexithymia associated with occupational burnout in working population and is the possible association independent of depression and socio-demographic variables? (Study II)
- 4) Is alexithymia associated with health-related quality of life in general population independently of somatic health, depression and socio-demographic factors? (Study III)
- 5) Is alexithymia associated with somatization, operationalized as somatic symptom reporting, in general population controlling for the most common mental health problems, somatic illnesses and socio-demographic variables? (Study IV)



## 4. MATERIAL AND METHODS

### 4.1 Study design and subjects

The present study was a part of the Health 2000 Study (Aromaa and Koskinen 2004). The gathering of data took place in Finland in 2000 – 2001. Statistics Finland planned the two-stage stratified cluster sampling, which comprised adults aged 30 years and over, living in mainland Finland. The age limit was set at 30 years because the prevalence of somatic diseases is low in younger age groups. The sampling frame was regionally stratified according to the five Finnish university hospital regions, each containing roughly one million inhabitants. Altogether 80 health care districts, 16 from each university hospital region, were sampled as clusters and were the primary sampling units. These clusters included 160 municipalities. The Social Insurance Institution of Finland selected by systematic sampling altogether 8028 individuals, the ultimate sampling units. People aged 80 years and over were double-sampled. Of this sample, 6986 subjects (87%) were interviewed in their homes or in institutions. Of the whole sample, 79% participated in the health-examination proper, and 84% participated in the health examination proper or in the examination at home. The study also included several questionnaires which were given to the participants after the interview and during or after the health-examination. All participants received an information leaflet and gave written informed consent.

#### *4.1.1 Subjects in Studies I-IV*

The present study included only those subjects whose mother tongue was either Finnish or Swedish (the two official languages of Finland) and who returned the alexithymia measure completed. These 5454 participants (67.9% of the whole sample) formed the basic sample for Studies I-IV. Study I comprised these 5454 participants.

The sample in Study II included those 3322 participants belonging to the basic sample of 5454, who were of working age (< 65 years) and in gainful employment, and who did not have more than one missing item in each dimension of the burnout inventory.

Study III included 5418 subjects. Of the basic substudy sample, 36 participants failed to return the questionnaire on health-related quality of life acceptably filled in and were therefore excluded.

The sample in Study IV included those 5129 subjects who were from the basic sample of 5454 and who returned the somatization measure completed.

## 4.2. Socio-demographic variables

### 4.2.1 Age

In Study I, age was categorised into a six-class variable: 30-44, 45-54, 55-64, 65-74, 75-84 and 85 years and over (in practice 85-97 years) and over; this was the initial joint variable used in the Health 2000 Survey. In Study II the participants were working-aged. Their age was categorised into three classes: 30-39, 40-49 and 50-64 years. In Studies III and IV age was categorised slightly differently than in Study I: 30-39, 40-49, 50-59, 60-69, 70-79 and 80-97 years. In Studies I, II and IV age was also used as a continuous variable.

### 4.2.2 Marital status

In Studies I-IV, marital status was categorised as follows: *unmarried (single)*, *married/cohabiting*, *divorced/separated* and *widowed*. In addition, in Study IV marital status was also used as a two-class variable, namely *married/cohabiting* and *other*.

### 4.2.3 Education

Information on education was elicited in the interview. The participants were asked about their basic education and the highest completed education or qualification after basic education. The information thus acquired was combined into a variable of three categories describing level of education: basic, secondary and higher education. No vocational training beyond a vocational course or on-the-job training with no matriculation examination was classified as basic education. Completion of vocational school as well as passing the matriculation examination but having no vocational training beyond a vocational course or on-the-job training was defined as secondary education regardless of basic education. Higher education comprised qualifications from higher vocational institutions and degrees from polytechnics and universities. This was used in Studies I-IV. In addition, a variable of total years of formal education was used in Studies I and II.

#### 4.2.4 Income

The financial situation of the subjects was assessed by inquiring the monthly income of the households in which they lived. Initially, this information was elicited in the home interview by asking the participants to indicate a number of an appropriate income level from different categories on a card shown to them. All possible sources of income were to be taken into account. The levels of income on the card were in 13 categories from less than 2500 FIM a month to over 50 000 FIM a month. The initial 13-class variable was reduced to a three-class variable:  $\leq 10\ 000$  FIM, 10 001-20 000 FIM and  $> 20\ 000$  FIM ( $\leq 1680.7$  euros, 1680.8-3361.3 euros and  $> 3361.3$  euros).

### 4.3 Measures

#### 4.3.1 Alexithymia

Alexithymia was assessed using the Finnish or Swedish version of the 20-item Toronto Alexithymia Scale (TAS-20). Among the different methods for measuring alexithymia, the TAS-20 is so far the most widely used and presumably the most carefully validated (see chapter 2.3). Its internal consistency, test-retest reliability, as well as convergent, discriminant, and concurrent validity have been demonstrated to be good (Bagby et al. 1994a, Bagby et al. 1994b, Parker et al. 2003, Taylor et al. 2003). The psychometric properties of both the Finnish version (Joukamaa et al. 2001) and the Swedish version (Simonsson-Sarnecki et al. 2000) of the TAS-20 have proven satisfactory.

The items in the TAS-20 are statements on a five-point Likert scale ranging from *strongly disagree* to *strongly agree*. Five items (items 4, 5, 10, 18 and 19) are reverse coded. The minimum total score of the TAS-20 is 20 and the maximum total score 100.

The TAS-20 comprises three factors reflecting the three main facets of the alexithymia construct: difficulties in identifying feelings (DIF; seven items, score range 7-35), difficulties in describing feelings (DDF; five items, score range 5-25) and externally oriented thinking (EOT; eight items, score range 8-40). An example item of the DIF factor is, "I am often confused about what emotion I am feeling". One of the items in the DDF factor is, "It is difficult for me to find the right words for my feelings". The EOT factor includes, for example, an item, "I prefer talking to people about their daily activities rather than their feelings".

Even though alexithymia is considered to be a dimensional personality construct, a trait, a cut-off point of the TAS-20 has also been used in numerous studies. The cut-off point 60/61 is based on a study with a small patient sample

(Bagby and Taylor 1997b) but has now attained a certain status of convention in alexithymia research. There are no defined cut-off points for the three factors.

### *4.3.2 Depression, anxiety and earlier diagnosed psychiatric disorders*

#### *4.3.2.1 Beck Depression Inventory*

In Studies I and II, the 21-item Beck Depression Inventory (BDI) was used in order to control for depressive symptoms. The BDI is a widely used measure for depression (Beck et al. 1988) both in research and in clinical practice. In Study I, it was used as a categorical variable dividing the sample into three classes: a BDI score of <10 was considered to indicate cases without depression, while total scores of 10-18 and >18 were taken to indicate mild depression and moderate/severe depression, respectively. In Study II, the BDI was dichotomized into two categories: a total BDI score of less than 10 points was considered to indicate cases without depression and a score of 10 points and over cases with depression. In both studies, the BDI score was also used as a continuous variable.

#### *4.3.2.2 Depression and anxiety according to the Munich version of the Composite International Diagnostic Interview*

The comprehensive health examination included an assessment of 12-month prevalence of major depression, dysthymia and any anxiety disorder except for phobic anxiety. This was achieved by using a structured standardized psychiatric interview technique, the Munich version of the Composite International Diagnostic Interview (M-CIDI) (Wittchen et al. 1998). The diagnoses were composed according to the DSM-IV criteria (Finnish Psychiatric Association 1997). To obtain an overall depression diagnosis, major depression and dysthymia were combined thus yielding a dichotomized variable: *no depression* and *depression*. Similarly, anxiety diagnoses were combined into a dichotomized variable *no anxiety* and *anxiety*. The depression variable was used in Studies III and IV, and the anxiety variable in Study IV.

#### *4.3.2.3 Previously diagnosed psychiatric disorders*

During the interview, the participants were asked whether they had ever been given a diagnosis of a mental disorder by a physician. Answers to this question were treated as dichotomous *yes/no*-variable regardless of the number of possible diagnoses. This variable was used in Studies I and II.

### *4.3.3 Occupational burnout*

Occupational burnout in Study II was measured with the 16-item Maslach Burnout Inventory – General Survey (MBI-GS). This validated questionnaire has sound psychometric qualities (Leiter and Schaufeli 1996, Taris et al. 1999, Schutte et al. 2000). It measures the three dimensions of burnout: exhaustion (five items), cynicism (five items), and professional efficacy (six items). The items were scored on a seven-point frequency rating scale ranging from 0 (never) to 6 (daily). High scores of exhaustion and cynicism and low scores on professional efficacy are indicative of burnout. The items of professional efficacy were reversed for the analyses yielding a dimension of lack of professional efficacy.

To obtain an indicator of professional burnout as a three-dimensional syndrome (Brenninkmeyer and van Yperen 2003), the weighted sum score of the dimensional scores created by Kalimo and co-workers was used (Kalimo et al. 2003). Coefficients were formed by weighting each dimension so that the scores corresponded to the original response scale:  $0.4 \times \text{exhaustion} + 0.3 \times \text{cynicism} + 0.3 \times \text{lack of professional efficacy}$ . A score of 0-1.49 was considered to indicate no burnout, and scores of 1.5-3.49 and 3.5-6 were respectively considered to indicate mild burnout and severe burnout. For the statistical analyses, the categories “mild burnout” and “severe burnout” were combined thus yielding a dichotomous variable “no burnout” and “burnout”. Those with one missing value per burnout dimension were included in Study II, and the missing value was replaced by the mean of the existing values on that dimension for the respondent in question.

### *4.3.4 Health-related quality of life*

In Study III, HRQoL was measured with the 15D (Sintonen 1994, Sintonen 1995, Sintonen 2001). This self-report questionnaire includes 15 dimensions: mobility, vision, hearing, breathing, sleeping, eating, speech, elimination, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity. Each dimension has five grades of severity. The 15D compares favourably with similar instruments in most of the important properties (Sintonen 1994, Sintonen 1995, Hawthorne et al. 2001, Sintonen 2001, Stavem et al. 2001).

In calculating the 15D score, also known as the 15D health utility index, valuations elicited from Finnish population using the multi-attribute utility method were used (Sintonen 1995, Torrance et al. 1995). The 15D scores range between 1 (no problems on any dimension) and 0 (being dead). According to the developer of the method a change of .02-.03 points in the health utility index or 15D score is considered clinically noteworthy (Sintonen 2001). Subjects with 12 or more completed 15D dimensions were included, and missing values were predicted with linear regression analysis using the other 15D dimensions, with

age and sex as independent variables, as recommended by the developer of the measure (Sintonen 1994).

#### 4.3.5 Somatization (*somatic symptom reporting*)

In Study IV, somatization, operationalized as somatic symptom reporting, was assessed with the somatization scale, SCL SOM, derived from the 90-item Hopkins Symptom Checklist. SCL SOM includes 12 items and is intended to measure the self-reported intensity of somatic symptoms. It has been used widely both in research and in clinical practice, and has been proven to be a valid questionnaire of overall symptomatology (Derogatis et al. 1974, Holi et al. 1998). The Finnish version of the SCL-90 has been validated, and its internal consistency as well as its discriminant validity have been shown to be good (Holi et al. 1998).

The questions in the SCL SOM were on a five-point Likert scale ranging from *not at all* to *very much*. Scores from each item were summed to obtain a total score. Only those with completed SCL SOM were included in the analyses. In Study IV, the total SCL SOM score was used as a continuous variable.

#### 4.3.6 Perceived health

In Studies I and II, a variable describing subjectively perceived health was used. As part of the interview, the participants were asked to assess their subjective health on a five-class scale ranging from *good* to *poor*. The classes *good* and *fairly good* and the classes *fairly poor* and *poor* were combined. The three categories thus formed were *good or fairly good*, *average*, and *fairly poor or poor*.

#### 4.3.7 Chronic illnesses

During the interview, the participants were asked whether they had any permanent or chronic illness or any defect, trouble or injury, which had reduced their working capacity or functional ability. If the health problem had not been diagnosed by a physician but had lasted at least three months, it was included in the analyses. A dichotomized variable of chronic illness (*no/yes*) was created regardless of the number of possible chronic conditions. This variable was used in Studies I and II.



#### 4.3.8 Somatic diagnoses

Extensive anamnestic information of the health status of the participants was gathered before the health examination. Somatic diagnoses were confirmed by physicians after physical examinations that included a standard clinical examination, measurements of height and weight, a 12-lead resting electrocardiogram, blood pressure measurements, and tests related to joint function and joint movements. The diagnoses were classified according to the International Statistical Classification of Diseases and Related Health Problems, 10<sup>th</sup> revision (ICD-10) (www.who.int). The reliability of the somatic diagnoses was rated as “possible” or “certain” by the examining physicians. Only those diagnoses defined as “certain” were included in the analyses.

In Study III, a three-class variable “ICD-10 somatic diagnoses” was formed as follows: no somatic diagnoses, one somatic diagnosis, two or more somatic diagnoses. In Study IV, a dichotomous variable (no diagnosis/one or more diagnoses) was created of the diseases of endocrine, nervous, circulatory, respiratory, digestive and musculoskeletal system and connective tissue as they may present with symptoms similar to those measured with the SCL SOM.

#### 4.3.9 Health-related functional capacity

In order to control for the severity of the diseases, the examining physicians also assessed the health-related functional capacity of the participants with a four-class variable as follows: *unimpaired*, *slightly impaired*, *considerably impaired* and *almost totally or totally impaired*. In Study III, this variable was reduced to a variable with three categories by combining the last two classes to a single category *severely impaired functional capacity*.

### 4.4 Statistical methods

#### 4.4.1 Study I

At first, the reliability of the TAS-20 and the three subscales was assessed by internal consistency, measured by Cronbach’s  $\alpha$  coefficient. The means of the TAS-20 total scores and the three subscales for the whole sample and for both sexes were then calculated performing adjusted Wald tests for the equality of the groups in comparison. The prevalence of alexithymia was calculated with the dichotomous alexithymia variable by two-way analyses of frequency tables. Statistical testing was carried out by a Wald test for the Pearson statistic. To assess the correlation coefficients for the bivariate analyses, Spearman’s rho for each pair of variables was calculated. In addition, to obtain the odds ratios for the

association of alexithymia and depression, a logistic regression analysis with dichotomous alexithymia as a dependent variable and three-class depression as an independent variable was performed. The mean TAS-20 scores were compared with socio-demographic and health-related variables as well as the six age groups. To control for confounding factors, separate regression analyses for all subjects and both sexes were performed with TAS-20 total score as a response variable, entering the socio-demographic and health-related factors simultaneously as explanatory variables. In these analyses the BDI score and education (total years of education) were used as continuous variables. Categorical variables were transformed into a set of dummy variables by the statistical software. Because of the two-stage cluster sampling, the data were weighted in statistical analyses where applicable. The significance level  $p < 0.05$  was used throughout the study.

#### *4.4.2 Study II*

The prevalence of alexithymia, occupational burnout and depression were calculated with dichotomous TAS-20, MBI-GS and BDI by crosstabulation. The statistical analyses were performed both before and after adjusting for the weights and the associations found between the variables remained essentially identical. Spearman's correlation coefficients were calculated to assess the correlations between dichotomous TAS-20, MBI-GS and BDI. As the MBI-GS score was skewed, logistic regression approach for the hierarchical multivariate analyses was used. Full linear regression models with all the variables (alexithymia variables, BDI, MBI-GS, age and years of education as continuous variables and other variables categorical) produced, however, residuals distributed approximately normally. Binary logistic regression analysis was performed with dichotomized burnout as a response variable, entering TAS total score as an explanatory variable. The next step was to add socio-demographic variables into the first model. The third model was constructed by adding health-related factors to the second model. Finally, a full model was attained by adding depression to the previous model. The same procedures were performed with the three TAS factor scales (DIF, DDF and EOT) replacing TAS total score alternately with the scores of these scales. In order to report the ORs for continuous alexithymia scores (TAS-20, DIF, DDF and EOT) in 10-point differences, the scores were multiplied by 0.1. Weighting adjustment and sampling parameters were used in the linear regression analyses and in the logistic regression analyses to correct possible bias caused by the complex sample survey data and the loss of participants.

In order to analyse the possible mediating effects between alexithymia, depression and occupational burnout, Sobel-Goodman mediation tests were performed (MacKinnon et al. 2002). According to Baron and Kenny (1986), mediation occurs when the independent variable is significantly associated with the mediating variable, the mediating variable is significantly associated with the

dependent variable, and the effect of the independent variable on the dependent variable is attenuated upon the addition of the mediating variable to the model. To test for mediation, three regression analyses are required: regressing the dependent variable on the independent variable, regressing the mediating variable on the independent variable, and regressing the dependent variable on both the independent variable and the mediating variable. In these analyses TAS-20, DIF, DDF and EOT as well as MBI-GS and BDI were continuous variables (the alexithymia variables in 10-point increments). Three different sets of models were composed. In the first set, the MBI-GS score was the dependent variable and the alexithymia variables were alternately independent variables. In the second set, the MBI-GS score was still the dependent variable but this time the alexithymia variables were mediating variables. In the third set, the BDI score was the dependent variable and the alexithymia variables independent while the burnout variable was the mediator. Socio-demographic and health-related factors were treated as covariates (age and years of education as continuous variables). The conditions of mediation outlined by Baron and Kenny (1986) were met in these analyses. Significance levels were set at a two-tailed  $p$  value of  $< 0.05$  throughout the study.

#### *4.4.3 Study III*

The means of the TAS-20 total scores, the three TAS subscale scores and the 15D scores were calculated performing adjusted Wald tests for the equality between the groups in comparison (sex, age, marital status, education, income, ICD-10 diagnoses, functional capacity, M-CIDI depression; and 15D for the dichotomized TAS-20). The data were weighted to take into account the sampling design. A significance level  $p < 0.05$  was used in these analyses.

The distribution of the 15D scores was skewed and demonstrated a ceiling effect at full health, ruling out the standard linear regression methods. When the normality assumptions are violated, quantile regression methods (e.g. censored least absolute deviations (CLAD) regression) are a robust alternative (Austin 2002, Saarni et al. 2006). Quantile regression methods are based on minimizing least absolute deviations, whereas standard regression models are based on minimizing least squares (Austin 2002, Powell 1984). In practice, the non-normality of 15D has been shown to be statistically insignificant and the CLAD results very close to the results obtained with traditional Tobit regression (Saarni et al. 2006). The three CLAD analyses were conducted with the 15D score as a dependent variable. In the first analysis the TAS-20 total score, in the second analysis the DIF, DDF and EOT scores, and in the third analysis dichotomized alexithymia were the alexithymia variables. All the analyses included sex, age, marital status, education, income, M-CIDI depression, the three-class variable for ICD-10 somatic diagnoses and the three-class variable for functional capacity as confounders. Categorical variables were transformed into a set of dummy variables by the statistical software. The resulting coefficients were interpreted

as estimates of the change in median 15D score, associated with change in the independent variables. The confidence levels were set at 99% in these analyses. CLAD analyses accounted for the sampling design by using weights and a two-stage bootstrapping, in which the sampling design was accounted for by sampling the primary sampling units in the first stage and individuals in the second stage.

#### *4.4.4 Study IV*

The medians of the SCL SOM score were calculated and compared performing Kruskal-Wallis tests for the equality between the groups (sex, age, marital status, education, income, ICD-10 somatic diagnoses, M-CIDI depression, M-CIDI anxiety and dichotomized TAS-20).

Then raw correlations between SCL SOM and the alternating alexithymia variables were calculated. In order to test for possible independent associations between the SCL SOM score and the alternating alexithymia variables, structural equation models (SEM) were specified and analysed. The models included all influences of the health-related and socio-demographic variables on both the SCL SOM score and the alexithymia variables (TAS-20, DIF, DDF and EOT scores, respectively). In order to test the hypothesis of the independent association between SCL SOM score and the alternating alexithymia variables, these were allowed to covary in each model. As the distribution of the SCL SOM score was quite skewed, the natural logarithm transformed SCL SOM score was used in the SEM analyses. Significance level was set at  $p < 0.05$ .

#### *4.4.5 Statistical software*

In Study I, computations were carried out using the STATA statistical package, version 8.0 ([www.stata.com](http://www.stata.com) a). In Studies II-IV, the STATA statistical package, version 9 ([www.stata.com](http://www.stata.com) b) was used. In addition, in Study IV, the SEM analyses were performed with the SAS System's CALIS procedure using the SAS statistical software, version 9.1 ([www.sas.com](http://www.sas.com)).

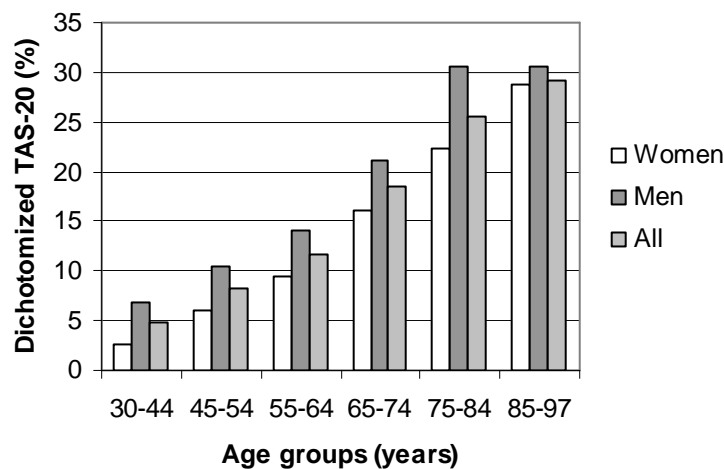
## 4.5 Ethical approval

Approval of the Ethics Committee of Epidemiology and Public Health in the Hospital District of Helsinki and Uusimaa was obtained for the Health 2000 Study.

## 5. RESULTS

### 5.1 Prevalence of alexithymia and its associations with socio-demographic and health-related variables in general population (Study I)

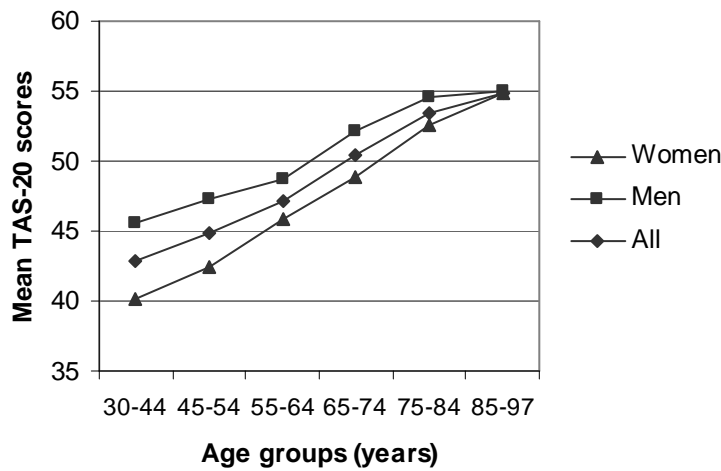
Of the total sample of 5454 participants, 9.9% were alexithymic according to the dichotomized TAS-20. Men (11.9%) were more commonly alexithymic than women (8.1%), the difference being significant ( $p < .001$ ). The prevalence of alexithymia grew steadily with increasing age (Figure 2). In the youngest group, 4.7% were alexithymic, while in the oldest group, 29.3% were alexithymic. For women, the corresponding figures were 2.7% and 28.8%, and for men the figures were 6.8% and 30.5% respectively.



**Figure 2.** Prevalence of alexithymia in different age groups.

The mean TAS-20 score for the whole sample was 45.8. For women it was 43.9 and for men 47.8. The difference between sexes was statistically significant. No sex differences between the scores of DIF subscales were found, but the scores of both the DDF and the EOT subscales were significantly higher for men than for women. The mean TAS-20 increased significantly with age (Figure 3) in the whole sample ( $p < .001$ ) and in the subsamples of men ( $p < .001$ ) and of

women ( $p < .001$ ). In the full regression models for all subjects and for men and women separately, age was also independently associated with alexithymia.



**Figure 3.** Association between mean TAS-20 scores and age.

In bivariate analyses, higher TAS-20 scores were also significantly associated with marital status, with lower levels of education and income, with poorer perceived health, with chronic illness, with earlier diagnosed psychiatric disorders, and depression measured with the BDI. The significance of these associations was on  $p < .001$  level for all variables in the whole sample and separately in the groups of men and women. As to the marital status, the scores were highest in the groups of widowed and unmarried subjects and lowest in the group of divorced/separated subjects for the whole sample and for women separately. For men, the mean TAS-20 score was lowest in the group of married subjects. In the whole sample the difference between divorced/separated and married/cohabiting participants was  $45.3 - 44.3 = 1.0$  point. For women the difference was 1.1 points and for men it was -.6.

In full regression models with the TAS-20 score as dependent variable and the categorical variables as dummy variables, chronic illness and earlier diagnosed psychiatric illness were not significant for the whole sample and women separately. In the model for men alone, perceived health was likewise not significant.

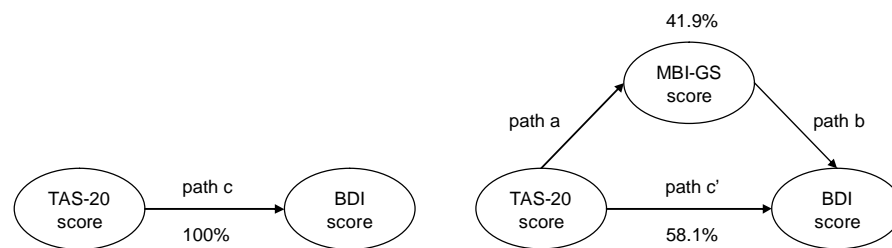
## 5.2 Alexithymia and occupational burnout in working population (Study II)

The prevalence of alexithymia was 5.6% in the sample of 3322 working people. In this population, men were more commonly alexithymic than women

(7.6% vs. 3.8%) the difference being significant ( $p < .001$ ). Occupational burnout was found in 27.8% of subjects. Of the participants, 25.3% were suffering from mild burnout and 2.5% from severe burnout. Occupational burnout was significantly associated with alexithymia. Of the subjects with mild or severe burnout, 13.0% were alexithymic while the corresponding figure for those without burnout was 2.8% ( $p < .001$ ).

Alexithymia and its three dimensions, alternately, were significantly associated with occupational burnout in logistic regression models with socio-demographic and health-related variables as confounders. TAS-20, DIF, DDF and EOT were in 10-point increments in these analyses. The odds ratios (OR) and 95% confidence intervals (in parentheses) in full models were as follows: TAS-20 OR = 1.61 (1.47-1.75),  $p < .001$ ; DIF OR = 3.40 (2.80-4.14),  $p < .001$ ; DDF OR = 2.52 (2.04-3.12),  $p < .001$ ; and EOT OR = 1.32 (1.10-1.58),  $p = .003$ .

Sobel-Goodman mediation analyses (Figure 4) with all confounders were performed in order to analyse the possible mediating effects between alexithymia (total score and the three dimensions alternately), depression and occupational burnout.



**Figure 4.** Illustration of a Sobel-Goodman mediation model with TAS-20 score as an independent variable, BDI score as a dependent variable and MBI-GS score as a mediating variable. The effect of TAS-20 on BDI is mediated by 41.9% via MBI-GS leaving a 58.1% direct effect of TAS-20 on BDI. Confounders in the models are not shown.

When alexithymia was an independent variable, depression a mediating variable and burnout a dependent variable, TAS-20, DIF, DDF and EOT had a direct effect on burnout as well as an indirect effect mediated through depression (percentages of total effect that were mediated through depression: in the model with TAS-20 45.4%, with DIF 48.1%, with DDF 45.7% and with EOT 27.4%). The effect of depression on occupational burnout was primarily direct and mediated by alexithymia only to a small extent (percentage of total effect mediated through TAS-20 was 10.0%, through DIF 14.8%, through DDF 6.8% and through EOT 0.5%). When alexithymia was an independent variable, burnout a mediating variable and depression an independent variable, alexithymia had a direct effect on depression and also an indirect effect mediated

through burnout (in the model with TAS-20 41.9%, with DIF 34.0%, with DDF 44.9% and with EOT 85.7%).

### 5.3 Alexithymia and health-related quality of life in general population (Study III)

The association between alexithymia and HRQoL was first analysed by comparing the 15D scores in alexithymic and non-alexithymic groups. The mean 15D score in the non-alexithymic group was .93 (95% CI .92-.93) while in the alexithymic group it was .82 (95% CI .81-.83). The difference was statistically significant ( $p < .001$ ).

The associations between HRQoL and the scores of TAS-20, DIF, DDF and EOT, and dichotomized alexithymia were analysed with three separate CLAD analyses with age, marital status, education, income, ICD-10 somatic diagnoses, M-CIDI depression and functional capacity as confounders. In the first analysis TAS-20 score was significantly negatively ( $p < .001$ ) associated with 15D. A one-point increase in the TAS-20 score was reflected as a .0019 decrease in the 15D score. In the second analysis, DIF score was significantly negatively ( $p < .001$ ) associated with 15D while DDF or EOT scores were not. In this analysis, a one-point increase in the DIF score accounted for a .0058 decrease in the 15D score. Finally, in the analysis with the dichotomized TAS-20, belonging to the alexithymic group was reflected as a .0613 point decrease in the 15D score. The negative association between dichotomized TAS-20 and 15D was significant ( $p < .001$ ).

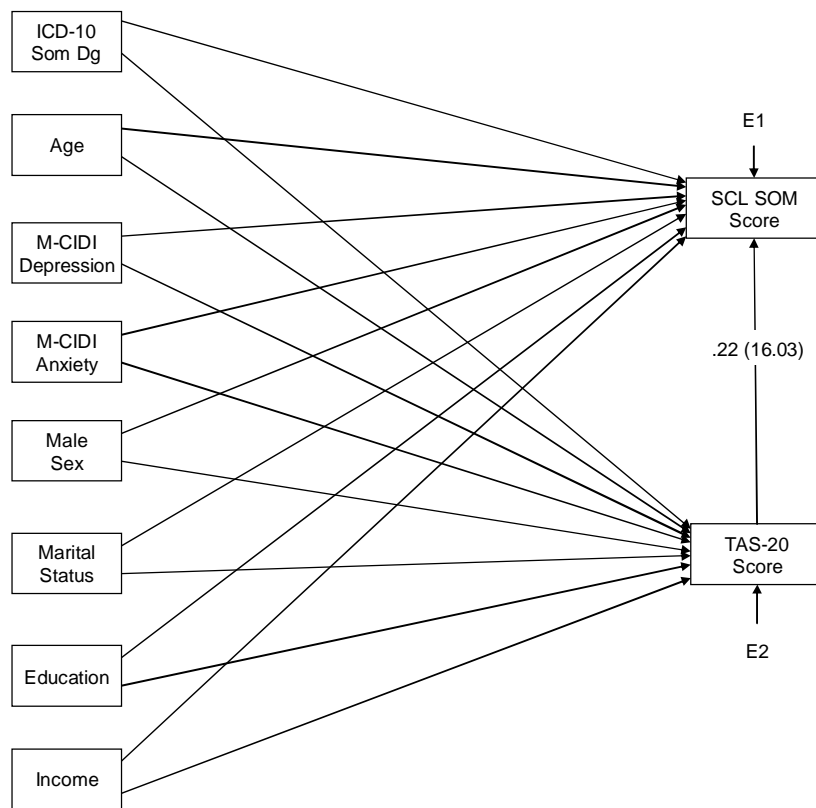
### 5.4 Alexithymia and somatization (somatic symptom reporting) in general population (Study IV)

The distribution of SCL SOM scores in alexithymic and non-alexithymic groups was compared using the Kruskal-Wallis test for differences between groups. The median SCL SOM score in the non-alexithymic group was 19 and in the alexithymic group it was 24. The difference was statistically significant ( $p < .001$ ).

In order to test the hypothesis of alexithymia being independently associated with somatic symptom reporting, analyses using structural equation modelling (SEM) were performed (Figure 5). In the SEM analyses, the scores of TAS-20, DIF, DDF and EOT were alternately alexithymia variables, and all confounders were controlled for. All alexithymia variables were significantly associated with SCL SOM ( $p < .001$ ). Their correlations with SCL SOM, as depicted by standardized path coefficients, differed notably between each other. The correlation between TAS-20 and SCL SOM was .22, between DIF and SCL



SOM .29, between DDF and SCL SOM .13, and between EOT and SCL SOM .06.



**Figure 5.** Illustration of a structural equation model with TAS-20 as an alexithymia variable. Covariances between the exogenous variables are not shown in the model. The interpretation of a standardised path coefficient between the TAS-20 score and the SCL SOM score is here a correlation (*t*-value in parentheses).



## 6. DISCUSSION

### 6.1 Prevalence and socio-demographic correlates of alexithymia in general population

#### *6.1.1 Prevalence of alexithymia and mean TAS-20 scores*

The 10% prevalence of alexithymia found in Study I was practically the same as the prevalence found by both Honkalampi et al. (2000b) and Franz et al. (2007) (see Table 1). The age range of the present study, however, was wider than that of Honkalampi et al. and Franz et al. In addition, Brosig et al. (2004) obtained a 10% prevalence figure for their sample with a very wide age range when using the abridged TAS-26 with a cut-off score calculated using the mean cut-off value of the TAS-20. The 12% prevalence figure by Salminen et al. (1999), who used the TAS-20, does not substantially differ from these results. Therefore, it seems quite plausible that, measured with the TAS-20, every tenth individual in adult general population can be deemed alexithymic, especially in Finland.

When compared to the mean TAS-20 scores shown in Table 1, the figures obtained in Study I came closest to those proposed by Parker et al. (2003). The mean score for the whole sample was 45.8 in Study I while it was 45.6 in the study by Parker et al. the difference being only .2 points. Similarly, for men the difference was  $47.8 - 47.3 = .5$  points and for women it was  $43.9 - 44.2 = -.3$  points. As Study I was the most comprehensive one so far regarding generalizability to an adult general population, the rounded normative mean TAS-20 scores for adult samples, taken together with the recommendations by Parker et al. (2003), could be 46 for both sexes together and 44 for women. For men the situation is somewhat more complicated as with rounding two figures emerge: 47 and 48. However, these mean scores give quite usable estimates for comparative purposes in future studies.

#### *6.1.2 Alexithymia and gender*

The gender difference found in Study I was statistically significant with 8% of women and 12% of men scoring  $\geq 61$  on the TAS-20. The gender difference in the mean TAS-20 score was likewise significant. The earlier findings concerning gender differences have been quite varied (see Section 2.5.1.1 and Table 1). However, in those four earlier studies conducted on the Western hemisphere

with the TAS-20 on large population or community samples comprising predominantly adults and being therefore most comparable which each other and with Study I, the prevalence figures and/or mean TAS-20 scores were statistically significantly higher for men than for women (Salminen et al. 1999, Honkalampi et al. 2000b, Parker et al. 2003, Franz et al. 2007). In three of these studies, the gender differences between the three factors of the TAS-20 were also assessed; in all of them both DDF and EOT scores were significantly higher for men while there was no difference in DIF scores between genders (Salminen et al. 1999, Parker et al. 2003, Franz et al. 2007). This was also the pattern found in Study I. Thus, as to gender differences, the most comparable studies indicated that men are slightly more commonly alexithymic than women, men and women are equally capable of identifying their feelings, but women are marginally more able to describe their feelings and less prone to externally oriented thinking. It should, however, be noted that in these large samples statistical significance is reached with relatively small differences in absolute values.

It has been suggested that different parental attitudes towards male and female children as well as other sex-related cultural differences may play a role in sex differences associated with alexithymia (see Section 2.2.2). Some authors have suggested that, during development, men are at a disadvantage compared to women as far as intimacy and empathy are concerned, which leads them to experience a narrowing of verbal emotional expressiveness (Wester et al. 2002). Culture-bound gender role socialisation may also have negative effects on men. Carpenter and Addis (2000) proposed that gender differences in alexithymia may be related to “restrictive emotionality”, which would be a consequence of male gender role socialisation. Emotional restriction is defined as difficulty understanding, dealing with and expressing emotion (Polce-Lynch et al. 1998). Polce-Lynch et al. (1998) found in their qualitative study that boys restricted emotional expression from early adolescence to late adolescence while girls increased emotional expression during the same period. However, Wester et al. (2002) proposed that the generally lower verbal ability demonstrated by men, instead of emotional deficits, would account for the *misperception* that men experience greater levels of alexithymia.

Another explanation for gender the differences elicited by a personality scale is social desirability bias, which may lead men and women to endorse gender-relevant traits (Costa et al. 2001). In case of DDF and EOT this could mean that, while being as capable as women of identifying their inner feelings (DIF), men do not find it as appropriate as women to express their feelings to others (DDF) and also prefer to report a more action-directed manner in dealing with emotions and problems as opposed to succumbing to rumination (EOT).

Naturally, there are several studies indicating neurobiological sex differences in emotional processing (see Section 2.2.3). As Lumley and Sielky (2000) suggested, the most extreme explanation would be that alexithymia in men is largely a manifestation of biological factors while in women it is a consequence of psychological traumata. On the other hand, as Costa et al. (2001) pointed out, in order to be purely biological in origin, gender differences in personality traits

should be the same in every culture. As this is obviously not the case, it may be justified to presume that psycho-social and cultural factors also have an influence on the gender differences found in alexithymia. Hence, the gender differences found in Study I may not be universal in nature but rather a manifestation of a complex developmental process characteristic of Finnish and possibly of some other Western cultures. A biological determinant that may, however, cause differences in the geographical distribution of alexithymia is the genetic predisposition to it. So far, there are no comparable genetic studies on alexithymia.

### *6.1.3 Alexithymia and age*

One of the main findings in this study was the obvious association of alexithymia with increasing age. In contrast to this finding, there are also studies showing an association with younger age (Parker et al. 2003, Säkkinen et al. 2007, Moriguchi et al. 2007) or no association at all (Parker et al. 1989, Franz et al. 2007). When different dimensions of alexithymia are concerned, the associations with age in the earlier studies are even more complex (see Section 2.5.1.1).

Normal ageing causes a gradual decline in the mental processes relating to so-called frontal tasks which is attributed, among other things, to the disproportionate effects of ageing on the prefrontal regions (Calder et al. 2003). There is evidence that increased age produces a progressive reduction in the recognition of fear and anger (Calder et al. 2003). Gunning-Dixon et al. (2003) found with fMRI that, during an emotion discrimination task, younger adults activated the amygdala and surrounding temporo-limbic regions while older adults activated the left frontal regions. Fischer et al. (2005) showed, also with fMRI, that, during a task involving perception of negative facial affect, younger adults activated the right amygdala/hippocampus region to a greater extent than older adults, who demonstrated greater activation in the right anterior-ventral insular cortex. It has also been shown that young and old adults remember emotional faces differently (Grady et al. 2007). Grady et al. (2007) suggested that “the complex interplay of emotion and cognitive processes may change over life span”. Hence, it is possible that neurobiological changes, especially in the frontal and prefrontal areas as well as the amygdala and other limbic regions, are reflected in an age-related increase of alexithymia levels in older age. This might explain the result of this study as well as those of the studies by Lane et al. (1998b), Salminen et al. (1999) and Honkalampi et al. (2000b). In a way, age-related increase in alexithymia could represent a certain type of “organic alexithymia” (see Section 2.2.3).

Neurobiological changes, however, may not be the only explanation as levels of alexithymia do not increase in all populations as a function of age (Parker et al. 1989, Gunzelmann et al. 2002, Brosig et al. 2004, Franz et al. 2007). Furthermore, in a Japanese community sample of people aged 14 to 84 years, the TAS-20 total scores as well as the DIF and the DDF scores *decreased* linearly

from teenage to age 30, after which the scores did not change significantly (Moriguchi et al. 2007). EOT, however, behaved differently: Moriguchi et al. found an almost linear positive correlation between age and EOT scores while both Gunzelmann et al. (2002) and Brosig et al. (2004) also found a positive association between age and EOT. Furthermore, it is worth noting that Säkkinen et al. (2007) found a decrease in TAS-20 total scores in their sample of 12 to 17-year-old teenagers. Both Moriguchi et al. (2007) and Säkkinen et al. (2007) suggested that the decrease in the levels of alexithymia was due to psychological maturation from teenage onwards. As to the increase in EOT scores, Moriguchi et al. (2007) proposed that this result may reflect an age-related tendency to lose interest in seeking out novelty.

If age-related increase in levels of alexithymia is not completely attributable to neurobiological changes, cohort phenomena may be considered. These are likely to be quite culture-bound and reflect differences, for example, between Eastern and Western ways of living (see Section 2.2.2). Even more specifically, every country has its own history that shapes the lives of different generations. During the 1900s, Finnish society underwent a rapid urbanization. In a Finnish sociological study Roos (1987), investigating autobiographies, found that different generations born during the twentieth century described their lives very differently. Those born during the three earliest decades of the century hardly ever dealt with human relations and interaction in their autobiographies. Those born during or after World War II were the generation migrating from rural areas to the towns. In dramatic contrast to the earlier generations, they tended to focus on human interaction much more commonly than their seniors. Interestingly, Lane et al. (1998b) proposed that the positive correlation between age and alexithymia in their community sample of people aged 18 to 80 years reflects “progressively increased psychological mindedness and attentiveness to internal emotional states in North America during the course of the twentieth century”.

The family structures and rearing patterns changed markedly during the twentieth century in Finland (Jallinoja 1985). The average number of children in families diminished and the significance of the nuclear family increased. At the same time family functions changed (Hatland 2001). Towards the latter half of the twentieth century, Finland developed into a Nordic welfare state (Rostgaard and Lehto 2001). A comprehensive social security and healthcare system was extended to practically the whole population. Today, in the Nordic welfare states the level of income inequality and relative poverty rates among typically vulnerable groups appear to be lower than in quite many other countries (Kautto et al. 2001). The introduction of maternity and child welfare clinics after the Second World War facilitated the systematic counselling of families with children, including the assessment of parenting. Changes in rearing attitudes were reflected in the 1983 law banning corporal punishment of children (Ministry of Justice 1983). At the same time as the transition from an agrarian into an urban society, a comprehensive school reform took place; the common school was regarded a welfare structure (Ahonen 2002).

Hence, improved physical and mental healthcare, increased financial security of families, more individual and child-centred rearing patterns with possibly less violence, and education-related increase in general knowledge may also have had a beneficial impact on how children develop their abilities to regulate emotions. As has been shown earlier, emotional and physical neglect as well as abuse in childhood are related to alexithymia (Berenbaum 1996, Zlotnick et al. 2001, Guttman and Laporte 2002, Frewen et al. 2006; Joukamaa et al. 2008). A difference between rural and urban upbringing has also been found, possibly indicating the influence of the traditional Finnish life-style that does not encourage emotional expression (Joukamaa et al. 2003, Joukamaa et al. 2007). Furthermore, an association between greater number of siblings and alexithymia has been reported (Joukamaa et al. 2003).

In addition to these hypotheses, one could speculate about whether the vastly expanded mass media has had any influence on levels of alexithymia in different generations. It has been claimed that media experience has an emotive effect on individuals (Jones 1993). The ample supply of foreign films and TV programmes (especially of Anglo-American origin) in the last few decades may have introduced new patterns of communication to Finnish people, thereby changing the ways they perceive and describe feelings.

However, because of the cross-sectional design of this study, it is not possible to say whether the level of alexithymia tends to increase with age or whether the association between alexithymia and older age is a reflection of a cohort effect. One aspect in favour of the cohort explanation as well as of cultural differences in the etiology of alexithymia is that all three studies showing a clear association between alexithymia and higher age in large adult population samples come from Finland (Salminen et al. 1999, Honkalampi et al. 2000b, Study I).

#### *6.1.4 Alexithymia and marital status*

In Study I, divorced or separated subjects had the lowest TAS-20 mean score in the whole sample as well as in the female group. In contrast to these, in the group of men, married or cohabiting subjects had the lowest TAS-20 mean score and divorced or separated subjects the second lowest score. However, the difference between married/cohabiting and divorced/separated men was only  $47.9 - 47.3 = .6$  points; in other words, a negligible finding. In the whole sample as well as in the group of women, the differences were also small: for all 1.0 point and for women 1.1 points. In all groups, widowed subjects had the highest TAS-20 mean scores and unmarried subjects had the second highest scores. The association between marital status and alexithymia was studied in seven studies presented in Table 1. In three studies no association was found (Joukamaa et al. 1996, Salminen et al. 1999, Honkalampi et al. 2000b). Two studies with adult populations reported an association between alexithymia and living without a partner (Brosig et al. 2004) or living alone or being divorced (Franz et al. 2007). As a variable, marital status does not necessarily reflect the real status of an

individual's relationships. However, it gives a robust estimate of these. The class "unmarried" is of especial interest as it may be a signal of difficulties in establishing intimate relations. Several investigators have reported that alexithymia is associated with difficulties in human relationships or with behaviours that may cause difficulties in bonding (Taylor et al. 1996, Troisi et al. 1996, Grabe et al. 2001, Troisi et al. 2001, Wastell and Taylor 2002, Wearden et al. 2003, Montebanocci et al. 2004, Picardi et al. 2005b, Spitzer et al. 2005b, Moriguchi et al. 2006, Vanheule et al. 2007a, Müller et al. 2008). It is quite possible that these difficulties, such as insecure attachment styles, interpersonal hostility and avoidance as well as shyness with strangers and interpersonal indifference, are reflected in the association between alexithymia and being unmarried. Alternatively, being unmarried may be such a burden to an individual that he or she demonstrates higher levels of alexithymia as a defence. With a cross-sectional design the causality cannot be established.

### *6.1.5 Alexithymia and socio-economic status*

The association between alexithymia and lower socio-economic situation, including educational level, was the most unambiguous finding in the earlier studies with population or community samples (see Section 2.5.4). This was also the finding in Study I: alexithymia was associated with both lower level of education and with lower income. Salminen et al. (1999) argued that the educational level of an individual reflects the social status, values and emotional atmosphere in the family of origin implying that lower levels of education point to a less favourable developmental background. Joukamaa et al. (2007) showed in an adolescent population sample that alexithymia was indeed associated with lower vocational education of mother and also with social class of parents other than white-collar worker. It has also been found that alexithymia is associated with maternal (Lumley et al. 1996a, Fukunishi and Paris 2001, Grabe et al. 2008b) and paternal (Grabe et al. 2008b) alexithymia. Thus, the general atmosphere and socio-economic situation of the childhood family as well as the alexithymic characteristics transferring from one generation to another could form an interwoven background pattern explaining the association between alexithymia and lower education. Furthermore, it was not assessed in Study I how many people had dropped out of vocational education, for example. It should be noted that Parker JDA et al. (2005) found alexithymia to be associated with impaired coping with stress during the transition from school to university and with poorer academic achievement. Thus, alexithymic features may also be a risk factor for unsuccessful studies and possibly for dropping out of educational establishments.

The impact of intelligence on educational success is naturally an aspect that needs to be addressed. There are, however, only few studies on the association between alexithymia and intelligence. Parker et al. (1989), studying a community sample, found that alexithymia was unrelated to vocabulary skills and



intellectual ability. However, in a student sample, Bagby et al. (1986) earlier detected a significant correlation between alexithymia and both verbal and full-scale intelligence quotient scores but not between alexithymia and abstract intelligence. In a sample of male combat veterans, alexithymia was associated with deficits in developmental verbal skills (Lamberty and Holt 1995). Furthermore, Duchesneau (1996) reported an association between alexithymia and poorer visual perception. Tuminaro and Pallone (2003) found alexithymia to be related to poorer verbal intelligence but not with abstract intelligence in an all-male sample comprising “normals” and “anti-social” and “adventurous” risk-takers. Moreover, poorer verbal cognitive abilities were associated with DIF in a study comparing patients with panic disorder to healthy controls (Galderisi et al. 2008). Thus, there seems to be some evidence indicating an association between alexithymia and lower levels of intelligence which may also have an effect on education. On the other hand, it is also conceivable that education gives an individual better facilities for verbalizing and analysing feelings. As pointed out earlier, younger generations in Finland are less alexithymic than older generations. There may be a relationship between reduced alexithymia and the development of common school. In the 1960s, a comprehensive public school reform was carried out in Finland. The common comprehensive school was seen as an instrument of social justice ensuring equal educational opportunity for all young people (Ahonen 2002).

It is generally assumed that there is a correlation between level of education and income. Hence, the effect of alexithymia on income may be mediated through a lower educational level. This, however, was not assessed in Study I and thereby remains a speculation. In addition, in most lines of work good interpersonal skills are an advantage for successful career development. Therefore alexithymia-related problems in personal relationships may be one explanation for being less successful when success is measured in terms of income. In some earlier studies alexithymia has also been associated with unemployment (Kokkonen et al. 2001, Brosig et al. 2004, Franz et al. 2007). In Study I being unemployed was not a variable. It is, however, possible that some of those with low income were unemployed. Again, secondary alexithymia cannot be ruled out in a cross-sectional study. Thus, there is a possibility that higher levels of alexithymia among those with lower income are a reflection of emotional distress associated with financial difficulties causing a defence-like numbing of emotions. If comprehensive data on the associations between alexithymia, career development and disparities in income are to be gathered, longitudinal designs are needed.

## 6.2 Alexithymia and occupational burnout

Alexithymia and occupational burnout were associated with each other. Of the alexithymia dimensions, DIF had the highest OR in the full logistic regression

model. This indicates that especially the difficulties in identifying feelings may be a risk factor for burnout. DDF had the second highest OR suggesting that difficulties in describing feelings to other people could also be of importance with regard of burning out at work. Externally oriented thinking was also significantly associated with occupational burnout, but the OR was notably lower than that of the other alexithymia dimensions.

In the only earlier study on alexithymia and occupational burnout, De Vente et al. (2006) found that patients with work-related stress were more alexithymic than healthy controls. They measured alexithymia and burnout on two occasions. One of their results was that the absolute stability of DIF and DDF and the relative stability of DIF were lower in the patient group. This led the authors to conclude that alexithymia, co-occurring with burnout, is a state-dependent phenomenon.

In a cross-sectional study it is not possible to draw definitive conclusions as to whether alexithymia is truly a predisposing factor to occupational burnout or whether it is a secondary phenomenon occurring with or as a consequence of burnout. There are, however, some statistical methods that are used to modelling the putative pathways of different effects. One of these is the Sobel-Goodman mediation method (Baron and Kenny 1986, MacKinnon et al. 2002). The mediation analyses indicated that the effect of alexithymia on occupational burnout was partly mediated by depression and, on the other hand, the effect of alexithymia on depression was partly mediated by burnout. These results suggest that alexithymia may be a predisposing factor for both occupational burnout and depression. In some cases, alexithymia would first predispose an individual to burnout and, consequently, the individual with burnout would develop depression. In other cases, the causality would be the other way round: alexithymia would first predispose an individual to depression and the depressive individual would then burn out at work. As depression has been shown to be a risk factor for occupational burnout (Ahola et al. 2005), and alexithymia has been associated with depression in earlier studies (e.g., Honkalampi et al. 2000b), a possible effect of depression on burnout via alexithymia was explored. In these analyses, the effect of depression on burnout was mostly direct and mediated through alexithymia variables only to a small extent. The results of these Sobel-Goodman mediation analyses could be interpreted so that it is unlikely that depression predisposes working subjects to alexithymia. Given all the above-mentioned analyses, it seems plausible that alexithymia, as a personality construct, is a predisposing factor for both occupational burnout and depression.

Burnout has been defined as a prolonged response to chronic stressors on the job and develops via dysfunctional coping strategies (Maslach et al. 2001, Schaufeli and Bakker 2004). Alexithymia, for its part, has been associated with impaired coping with stress (Parker et al. 1998, Fukunishi et al. 1999b, Parker JDA et al. 2005) and with less effective problem orientation and problem solving (Ciarrochi et al. 2003). Therefore, it is possible that alexithymia is a predisposing factor to burnout due to inadequate coping with occupational stress.

Low support and interpersonal cooperation as well as a deteriorated organisational climate also contribute to the development of occupational burnout (Kalimo et al. 2003). Moreover, it has been shown that employees in human service work, in which contacts with other people constitute the major part of the task, are especially vulnerable to a client-centred form of burnout (Maslach and Jackson 1981, Maslach et al. 2001). This indicates the importance of being able to capitalise upon interpersonal support and relationships, and of being able to deal with interpersonal situations on the job. It has been suggested that cold and socially avoidant behaviour characterises the interpersonal style of alexithymic people (Spitzer et al. 2005b), and that they face problems when predicting and responding to the complexity of intimate social situations (Wastell and Taylor 2002). Insecure attachment styles (Troisi et al. 2001, Hexel 2003, Montebanocci et al. 2004) may be one factor underlying these features. It has been proposed that alexithymia may reduce social support at work because of alexithymic individuals' impaired ability to build intimate relationships, or because they are not able to utilise social support due to difficulties in identifying emotions of other people (Kojima et al. 2003). It is thus conceivable that alexithymia impairs the individuals' capacity to receive and benefit from social support and makes them more susceptible to interpersonal difficulties at work.

### 6.3 Alexithymia and health-related quality of life

Alexithymia was associated with poorer HRQoL even when depression, somatic diagnoses, functional capacity and socio-demographic variables were controlled for. Of the alexithymia dimensions, only DIF was significantly associated with HRQoL. As a .02-.03 point change in the 15D score is considered clinically noteworthy, these results were also clinically significant: a 10-point increase in the TAS-20 score was reflected in a .02 decrease in the 15D score and a 10-point increase in the DIF score was reflected in a .06 point decrease in the 15D. Moreover, belonging to the alexithymic group (TAS-20 score  $\geq 61$ ) was associated with a substantial difference in the 15D scores: alexithymic individuals had 15D scores .06 points lower than the non-alexithymic subjects.

According to earlier studies, alexithymia is associated with less satisfaction with life (Fukunishi et al. 1999a, Honkalampi et al. 1999, Honkalampi et al. 2000b, Valkamo et al. 2001a, Valkamo et al. 2001b, Le et al. 2002, Honkalampi et al. 2004b, Mattila et al. 2007) and with poorer overall quality of life (Henry et al. 2006), although a contradictory result has also been published (Weinryb et al. 1997). The association between alexithymia and HRQoL has been studied in a few, relatively small clinical samples with various medical conditions (Fukunishi 1990, Wise et al. 1990, Verissimo et al. 1998, Grassi et al. 2004, Pucheu et al. 2004). In all these studies, alexithymia was linked with poorer HRQoL. The results of Study III were in line with these studies and also with the two earlier

studies on alexithymia and HRQoL in non-clinical samples (Salminen et al. 2002, Modestin et al. 2005).

Empirical evidence indicates that alexithymia is associated with neuroticism (e.g., Deary et al. 1997, Luminet et al. 1999, Lundh and Simonsson-Sarnecki 2001), negative affectivity (e.g., Bagby et al. 1994b, Lundh and Simonsson-Sarnecki 2001), depression (e.g., Honkalampi et al. 2000b) and anxiety (e.g., Bagby et al. 1994b, Lundh and Simonsson-Sarnecki 2001). The 15D has three items concerning primarily mental well-being, namely *mental function*, *depression* and *distress*. Thus, it is possible that alexithymia and these dimensions of HRQoL are related to each other. There is also evidence that, when quality-of-life ratings and perceived health status are compared, people give greater emphasis to mental health than to physical functioning (Smith et al. 1999). Therefore, the mental health problems associated with alexithymia may be reflected on HRQoL even though depression and anxiety, measured with the M-CIDI, were controlled for in the SEM analyses.

The 15D includes seven dimensions that are predominantly physical in nature, namely *mobility*, *vision*, *breathing*, *eating*, *speech* and *elimination*. Five 15D items can be seen as belonging to either physical and mental domains, or social domain: *sleeping*, *discomfort and symptoms*, *vitality*, *sexual activity* and *usual activities*. As there is a theoretical connection between the alexithymia construct and psychosomatic symptomatology (e.g., Sifneos 1973, Taylor 1997a, De Gucht and Heiser 2003), the association between alexithymia and somatic items of the 15D is plausible. There are also findings implying that alexithymia may affect illness behaviour through cognitive and social mechanisms and so contribute to somatic symptoms (Lumley et al. 1996b). Moreover, there is a possibility that alexithymia is a predisposing factor for poorer health: alexithymic individuals with maladaptive coping strategies may be prone to engage in unhealthy behaviour, for example binge eating and alcohol abuse (Parker et al. 1998). As an ultimate health risk, alexithymia has been shown to predict increased risk of death (Kauhanen et al. 1996). As to the possible difficulties in social life and resulting poorer HRQoL, there is evidence that alexithymia is associated with different kinds of problems in social interaction (see Section 2.1.8).

The connections between alexithymia and different domains of HRQoL remain, however, speculative as they were not specifically studied. The main finding of Study III was the clear association between overall HRQoL and alexithymia. Thus, it is possible that sometimes poorer HRQoL is associated with difficulties in emotional processing rather than explicitly with health problems and circumstantial factors. The results of this study suggest that alexithymia should be taken into account when assessing HRQoL as alexithymic people seem to be inclined to report poorer HRQoL than other people with otherwise similar health-problems. It has been shown that alexithymia may have a negative impact on the patient-therapist relationship by evoking negative reactions in caregivers (e.g., Ogrodniczuk et al. 2005, Rasting et al. 2005). Consequently, if not recognised, there is a risk that the combination of

alexithymia-related difficulties in the patient-caregiver relationships and the alexithymia-related reporting of poorer HRQoL will have a deleterious effect on patients' status in health care. Even though alexithymic characteristics have been, so far, considered to be difficult to modify (Taylor 2000), people with strong alexithymic features may benefit from the caregivers' understanding of their special difficulties when dealing with their health problems. In addition, there may be situations in scientific studies on HRQoL where alexithymia should be controlled for as a confounder.

## 6.4 Alexithymia and somatization

All alexithymia variables were associated with higher somatic symptom reporting even when somatic diseases, depressive and anxiety disorders, and socio-demographic factors were controlled for. The SEM analyses revealed a highly significant but weak correlation between SCL SOM and TAS-20, DIF and DDF respectively. Although the association between SCL SOM and EOT was significant as well, the correlation between these two variables was virtually negligible. The correlations and their order were quite similar to those reported in the quantitative review by De Gucht and Heiser (2003).

As to the theory of how alexithymia is associated with somatization, it has been proposed that alexithymia may be associated with somatization by way of focusing on or amplifying the somatic sensations associated with emotional arousal, or by misinterpreting these as symptoms of disease (Taylor et al. 1991, Taylor 1997a, De Gucht and Heiser 2003, Taylor and Bagby 2004, Waller and Scheidt 2006). It has also been suggested that the failure to experience complex emotional states is associated with exaggerated or dysregulated autonomic activation (Waller and Scheidt 2006). There is, however, little data confirming this theory, and negative findings concerning associations between autonomic nervous function and alexithymia have been reported (Taylor 2000, Virtanen et al. 2003). A schematic illustration on the putative associations between emotions, somatic symptoms, alexithymia and somatization is given in Figure 1.

The numerous earlier studies on the associations between alexithymia and somatization have been criticized for not having controlled for the essential confounders, such as common psychopathology and medically explained symptoms (De Gucht and Heiser 2003). Moreover, they have mostly been conducted in clinical or student samples (De Gucht and Heiser 2003). These shortcomings have made extrapolating the findings into general population problematic. This was the first time the association between alexithymia and somatization, operationalized as somatic symptom reporting, was established in a large, nationally representative non-clinical sample of both young and old adults. The validity of the results was enhanced by the fact that, contrary to most surveys, the Health 2000 Study used a thorough physical examination and a structured mental health interview to verify the diagnoses.

As somatization is considered an important aspect in public health (Escobar et al. 1987, Kroenke 2001, Barsky et al. 2005, Kroenke and Rosmalen 2006) and an issue of subjective suffering, it is essential to identify the factors that contribute to it. The findings of Study IV indicate that alexithymia may be one of these, albeit possibly not a very strong one, that increase the risk for somatization in general population.

## 6.5 Findings of the present dissertation reflected against the alexithymia concept

In addition to what has been discussed in connection with the specific findings of Studies I to IV, there are a few notions concerning the alexithymia concept in general. Most contemporary alexithymia researchers consider alexithymia to be a relatively stable personality trait that may have wide-ranging (negative) effects on health and subjective well-being. However, as was outlined in the review of the literature, there are some contradictory theories criticising the idea of alexithymia being an independent entity and a personality trait. It has, for example, been argued that alexithymia may not be more than a covariate of other health problems (e.g. Rief and Broadbent 2007). Nevertheless, the findings from the studies in the present dissertation seem to support the assumption that alexithymia is a personality trait with independent significance in symptom formation.

Firstly, even though the distribution of TAS-20 scores was not explicitly reported, the distribution was reasonably normal, which can be indirectly inferred from the fact that the TAS-20 score was used as a dependent variable in the linear regression analyses in Study I. The normal distribution of TAS-20 scores was in line with earlier studies (Salminen et al. 1999, Franz et al. 2007) and this finding further supports the theory of alexithymia being a dimensional personality construct rather than a categorical (on-off) phenomenon (Bagby and Taylor 1997a).

Secondly, even though the study design was cross-sectional, the results of the statistical analyses in Study II lend support to the hypothesis that alexithymia may be a predisposing factor to mental health problems rather than merely a consequence of these. Hence, according to the mediation analyses, the effect of *alexithymia proper* instead of *alexithymoid regression* may explain the relationship between alexithymia and occupational burnout as well as alexithymia and depression, at least in the Finnish general population.

Thirdly, as it was possible to control for the most common mental disorders and somatic diagnoses, the “pure” association between alexithymia and HRQoL (Study III) and somatization (Study IV) could be assessed. The findings from these studies imply that alexithymia may have an independent role in different kinds of symptom formation. Another notion concerning the independent association between alexithymia and somatic symptom reporting relates to the

cognitive-developmental model for the organisation of emotional experience (Lane and Schwartz 1987, Lane et al. 1997, Taylor et al. 1997a, Lane et al. 1998a). In alexithymia, adult people may describe their emotions according to the lowest levels of emotional awareness (Lane and Schwartz 1987). At the lowest level, that is, the sensorimotor reflexive level, alexithymic individuals either have no ability to describe their emotions or describe only bodily sensations. The association between alexithymia and somatization may reflect this verbal tendency.

All in all, none of the findings from Studies I-IV were contradictory to the theoretical definition of alexithymia being a personality trait. On the contrary, they seem to support it. In conclusion, the studies in this dissertation shed light on some specific questions concerning alexithymia but also further support the theoretical underpinnings of the alexithymia concept.

## 6.6 Limitations and strengths of the study

The cross-sectional design was a limitation as it was not possible, with the exception of the mathematical interpretations, to establish whether the associations between alexithymia and different study outcomes indicated that alexithymia was a predisposing factor for these or that alexithymia was a consequence of various burdensome conditions. The ability of a self-report scale to detect alexithymia has been questioned. Had it been possible to arrange, a face-to-face interview for assessing alexithymia could have been preferable. However, there was no valid alexithymia interview available at the time of the Health 2000 field study. Moreover, in large population surveys a self-report scale is more feasible. Some of the variables were quite crude (for example the “ICD-10 somatic diagnoses”). There were also a few self-report variables (such as “chronic illnesses” and “earlier diagnosed psychiatric disorders” in Studies I and II) whose validity can be questioned, as always is the case with data gathered by this kind of variables. However, they served as confounders and probably increased rather than decreased the credibility of the results.

The Health 2000 Study was a vast effort to explore the overall health of Finnish general population. The sampling design made it possible to generalize the results to represent the whole adult population. In contrast to numerous earlier studies, this was the first time in alexithymia research when the effect of essential confounders, such as socio-demographic variables and different health variables, could be controlled for in a population sample. In addition to self-report scales, mental health was assessed with a standardised structured interview in Studies III and IV. This was clearly an advantage, as more objective diagnoses were thus available. Concerning the somatic health of the participants, both subjective and physician verified data was also available. The Health 2000 organisation ensured the high quality of the data gathered. The wide age range of the participants was also a strength. This way it was possible to detect the linear

age-related increase in both the prevalence and level of alexithymia in the Finnish population.



# 7. CONCLUSIONS AND IMPLICATIONS FOR THE FUTURE

## 7.1 Conclusions

Every tenth individual in Finland is alexithymic when a TAS-20 score of  $\geq 61$  is the definer. Men are more commonly alexithymic than women. As to the three dimensions of alexithymia, there were no differences between men and women in difficulty identifying feelings, whereas the scores of difficulty describing feelings and externally oriented thinking were higher for men. A linear association between alexithymia and age was found: the higher the age, the higher the TAS-20 scores. Alexithymia was also associated with being unmarried or widowed, with lower levels of education and with lower income levels. The results of Study I were not comparable with all earlier community and population studies on alexithymia, which may indicate culture-bound differences in the levels and associations of alexithymia.

Alexithymia was associated with occupational burnout even when essential confounders were controlled for. Mediation analyses implied that alexithymia may be a predisposing factor for both burnout and depression. All three dimensions of alexithymia were significantly related to burnout but difficulties identifying feelings and difficulties describing feelings were the strongest denominators of the association between alexithymia and occupational burnout. People with alexithymic characteristics may have difficulties in dealing with stressors on the job while having a diminished capacity to benefit from social support.

The independent association between alexithymia and health-related quality of life could be established when controlling for somatic and mental health and for socio-demographic variables. The difference in 15D scores for alexithymic and non-alexithymic subjects was clinically noteworthy. The results indicate that a psychological trait, in this case alexithymia, may have a substantial impact on HRQoL measurements irrespective of objective health variables and circumstantial factors.

For the first time it was possible to establish the relationship between alexithymia and somatization in a large population sample controlling for all the essential health variables as well as socio-demographic variables. The findings were in line with those of most earlier studies. Alexithymia may be a predisposing factor for somatization, albeit possibly not a very strong one.

## 7.2 Clinical implications

The studies that the present dissertation was based on showed that alexithymia is a noteworthy factor in public health care. It seems to be associated with conditions that are very common in the everyday practice of general practitioners and occupational health workers as well as in psychiatric settings such as consultation-liaison psychiatry. As has been shown in earlier studies, alexithymia may be difficult to modify and it may have a deleterious effect, for example, on the patient-doctor relationship (see Section 2.4.3). When this is accompanied with complaints of poor HRQoL or unexplained somatic symptoms, an alexithymic patient may be classified as a “difficult patient” and may, in the worst case, be denied the appropriate care.

It is important to recognise alexithymia and to attempt to find appropriate strategies to help this group of patients. The task begins with acknowledging and dealing with one’s own feelings evoked by an alexithymic patient. There are so far unfortunately very few guidelines for treating patients with strong alexithymic characteristics but these are obviously needed. In future, specific therapeutic approaches for alexithymic patients should be developed both in primary care and in specialised settings. This could involve both clinical projects and scientific studies.

## 7.3 Implications for future studies

In addition to the unquestionably necessary studies on different treatment options for alexithymic patients, more prospective and longitudinal studies on alexithymia are needed. The findings concerning occupational burnout, HRQoL and somatization should be replicated in prospective designs. Only that way is it possible to confirm the role of alexithymia as a predisposing and sustaining factor for burnout, poorer HRQoL and somatization. As to the significant association with higher age, prospective studies are also needed to determine whether levels of alexithymia increase with age or whether this is a cohort phenomenon.

The etiology of alexithymia is not fully known. It is possible that psychosocial and neurobiological aspects could be united in one theory but more interdisciplinary studies on this issue are needed. In the same vein, gene x environment studies are of importance in establishing the possible genetic mechanisms contributing to susceptibility to alexithymia.

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# ORIGINAL COMMUNICATIONS

## Age is strongly associated with alexithymia in the general population

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### Abstract

**Objective:** We studied the prevalence of alexithymia, its distribution in different age groups in a wide age range, its association with sociodemographic and health-related variables, and its co-occurrence with depression. **Methods:** The study forms part of the Health 2000 Study. The original sample comprised 8028 subjects representing the general adult population of Finland. Alexithymia was measured with the 20-item Toronto Alexithymia Scale (TAS-20), and depression was measured with the 21-item Beck Depression Inventory. Altogether, 5454 participants filled in

TAS-20 in their mother tongue. **Results:** The prevalence of alexithymia was 9.9%. Men (11.9%) were more commonly alexithymic than women (8.1%). Alexithymia was associated with male gender, increasing age, low educational level, poor perceived health, and depression. **Conclusions:** The findings were in line with earlier population studies. For the first time, it was possible to analyze the prevalence of alexithymia in a wide age range (30–97 years). International comparative studies are needed.

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**Keywords:** Alexithymia; Epidemiology; General population; Personality; Prevalence; Sociodemographic variables

### Introduction

In the early 1970s, Sifneos [1] coined the term *alexithymia*. Alexithymia means “no words for feelings” and refers to a personality construct characterized by impoverishment of fantasy, poor capacity for symbolic thought, and inability to experience and verbalize emotions. Increasing evidence shows that alexithymia is associated with several medical conditions and various psychopathological syndromes [2] and mental disorders [3,4]. It is thought to reflect a deficit in the cognitive processing of emotion, and alexithymics are thought to lack the capacity for the mental representation of emotions [5–7]. These

deficiencies are believed to cause an inability to regulate emotions and affect, and therefore to predispose alexithymic individuals to both psychological and somatic symptoms. According to previous studies, since alexithymia is more prevalent among depressed individuals and since alexithymia scores decrease as depression is alleviated, it has been claimed that alexithymia is associated with level of depression and may be a state-dependent phenomenon [8–10]. On the other hand, several studies have yielded evidence on both the absolute stability and the relative stability of alexithymia, suggesting that alexithymia is a personality trait [4,11–15].

It is quite surprising that the epidemiology of alexithymia has been the subject of only a handful of papers. Three research groups have studied the epidemiology of alexithymia in different kinds of samples of working-age populations, all of them in Finland [16–18]. Two studies have focused on elderly people [19,20]. Lane et al. [21] studied both working-age and elderly people. Alexithymia was

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associated with male gender in four earlier epidemiological studies [16–18,21], with low educational level in four studies [16–18,21], with low social status in four studies [16–18,21], with psychological problems in three studies [17,19,20], and with singleness in one study [18]. The prevalence figures for alexithymia were quite similar across studies on working-age populations, with the prevalence being 9–17% among men and 5–10% among women. In elderly populations, the prevalence of alexithymia was notably higher.

All studies mentioned above differ from each other on several aspects. Disparities in size, age range, and stratification of the samples make it difficult to generalize the findings to adult general populations. The aim of our study was to determine the prevalence of alexithymia and its distribution in different age groups, the sociodemographic and health-related factors associated with it, and its co-occurrence with depression in a representative sample of the whole Finnish adult population.

## Method

### Sample

Our study is a part of the Health 2000 Study. The gathering of data took place in Finland in 2000–2001 [22]. A large national network coordinated by the National Public Health Institute was responsible for the planning and execution of this multidisciplinary epidemiological survey. It was designed according to the concept of a two-stage stratified cluster sampling and comprised adults aged 30 years and above. The age limit was set at 30 years because the prevalence of somatic diseases is low in younger age groups. The study design has been described in detail elsewhere [22,23]. The strata included all five Finnish university hospital districts, each containing approximately 1 million inhabitants. Altogether, 80 health center districts, 16 from each university hospital region, were selected for participation in the study by systematic sampling, thus forming 80 clusters. From each area, a random sample of subjects was drawn from the national population register. The nationally representative sample comprised 8028 persons. Of these, 6770 participated in a health examination after an interview. The interview was used to gather basic background and sociodemographic information, and information on health-related factors. After the health examination, the participants were given a questionnaire, the 20-item Toronto Alexithymia Scale (TAS-20). Those 5454 subjects who received it in their mother tongue and returned it completed were included in our substudy.

### Measures

Alexithymia was assessed using the Finnish or the Swedish (the two official languages of Finland) version of

TAS-20, depending on the mother tongue of the subjects. Among the different methods for measuring alexithymia, TAS-20 is most widely used and is presumably the most carefully validated. Its internal consistency, test–retest reliability, and convergent, discriminant, and concurrent validity have been demonstrated to be good [24–27]. The psychometric properties of both the Finnish version [28] and the Swedish version [29] of TAS-20 have proven to be satisfactory. In accordance with the recommendation of the developers, the cut point for alexithymia was also used: subjects scoring >60 were defined as alexithymic cases [30]. In addition, TAS-20 consists of three subscales, which reflect the three main facets of the alexithymia construct: the DIF subscale assesses difficulties in identifying feelings, the DDF subscale concerns difficulty in describing feelings, and the EOT subscale reflects concrete externally oriented thinking or preoccupation with details of external events.

To assess the level of depression, the Finnish or the Swedish version of the 21-item Beck Depression Inventory (BDI) was used. A BDI score of <10 was considered to indicate cases without depression, while total scores of 10–18 and >18 were taken to indicate mild depression and moderate/severe depression, respectively [31].

Age was categorized into a six-class variable: 30–44, 45–54, 55–64, 65–74, 75–84, and 84–97 years. A three-class variable describing level of education was combined from two variables containing information on basic education and information on vocational education. No vocational training beyond a vocational course or an on-the-job training with no matriculation examination was classified as “basic education.” Completing vocational school and passing the matriculation examination but having no vocational training beyond a vocational course or on-the-job training was defined as “secondary education” regardless of basic education. “Higher education” comprised degrees from higher vocational institutions, polytechnics, and universities. Total years of education was used as a continuous variable. The financial situation of the subjects was assessed by inquiring about the monthly income of the household in which they lived. The variable was divided into three categories: ≤10,000 FIM, 10,001–20,000 FIM, and >20,000 FIM (≤1680.7, 1680.8–3361.3, and >3361.3€), with the categories being roughly of the same size. As part of the interview, the subjects were asked to assess their subjective health on a five-class scale ranging from *good* to *poor*. For statistical purposes, the classes *good* and *fairly good* and the classes *fairly poor* and *poor* were combined, thus yielding a three-class variable. Self-reported data on any chronic illness, handicap, or other ailment that had reduced the participants’ working or functional capacity for at least 3 months were also gathered in the interview. The answer was rated *yes* or *no* regardless of the number of illnesses. In the same way, the interviewees were asked whether they had ever had a psychiatric disorder diagnosed by a physician.

### Statistical methods

At first, the reliability of TAS-20 and of the three subscales was assessed by internal consistency, as measured by Cronbach's  $\alpha$  coefficient. The means of TAS-20 total scores and of the three subscales for the whole sample and for both sexes were then calculated by adjusted Wald test for the equality of the groups in comparison. The prevalence of alexithymia was calculated with the dichotomous alexithymia variable by two-way analyses of frequency tables. Statistical testing was carried out by a Wald test for Pearson statistics. To assess the correlation coefficients for bivariate analyses, Spearman's  $\rho$  for each pair of variables was calculated. In addition, to obtain the odds ratio (OR) for the association of alexithymia and depression, a logistic regression analysis with dichotomous alexithymia as a dependent variable and with three-class depression as an independent variable was performed. The mean TAS-20 scores were compared with sociodemographic and health-related variables and with the six age groups. To control for

confounding factors, separate regression analyses for all subjects and for both sexes were performed with TAS-20 total score as a response variable, entering the sociodemographic and health-related factors simultaneously as explanatory variables. In these analyses, education, as well as the BDI score, was used as a continuous variable (total years of education). Because of the two-stage cluster sampling, the data were weighted in statistical analyses when applicable. The significance level  $\alpha=.05$  ( $P<.05$ ) was used throughout the study. Computations were carried out using the STATA statistical package, version 8.0 [32].

### Results

Cronbach's  $\alpha$  coefficients were  $\geq .70$  for TAS-20 and the subscales, except for the EOT subscale for the whole sample (.67) and for men (.57). The mean TAS-20 score for the whole sample was 45.8 (43.9 for women and 47.8 for men;  $P<.001$ ). No sex differences between the scores of DIF

Table 1  
TAS-20 total scores (mean and 95% CI; adjusted Wald test for the equality of TAS-20 in different groups)

Variable	All subjects			*	Women			*	Men			*
	Mean	95% CI	<i>n</i>		Mean	95% CI	<i>n</i>		Mean	95% CI	<i>n</i>	
Age (years)												
30–44	42.9	42.4, 43.3	1941	*	40.2	39.6, 40.8	1035	*	45.6	44.9, 46.2	906	*
45–54	44.8	44.3, 45.3	1457		42.4	41.7, 43.0	763		47.3	46.5, 48.1	694	
55–64	47.2	46.5, 47.9	958		45.8	44.9, 46.7	515		48.7	47.7, 49.7	443	
65–74	50.4	49.6, 51.1	639		48.9	47.8, 50.1	355		52.1	50.8, 53.4	284	
75–84	53.4	52.2, 54.6	348		52.6	51.2, 54.1	222		54.6	52.7, 56.5	126	
85+	54.9	53.0, 56.8	111		54.9	52.9, 56.9	84		55.0	50.5, 59.5	27	
Marital status												
Unmarried	46.9	45.9, 48.0	608	*	43.5	42.3, 44.8	299	*	49.9	48.6, 51.1	309	*
Married/cohabiting	45.3	44.9, 45.6	3857		43.1	42.7, 43.6	1972		47.3	46.9, 47.8	1903	
Divorced/separated	44.3	43.3, 45.3	523		42.0	40.8, 43.2	333		47.9	46.4, 49.5	190	
Widowed	51.0	49.9, 52.2	448		51.1	49.9, 52.3	370		50.8	48.2, 53.4	78	
Level of education												
Basic	49.7	49.2, 50.1	2014	*	48.5	47.9, 49.1	1112	*	50.9	50.2, 51.6	902	*
Secondary	45.7	45.2, 46.2	1789		43.4	42.6, 44.1	836		47.6	47.0, 48.2	953	
Higher	41.2	40.7, 41.6	1648		39.4	38.8, 40.0	1023		43.8	43.0, 44.5	625	
Income level												
Low	48.9	48.4, 49.5	1688	*	47.4	46.6, 48.1	1045	*	51.3	50.5, 52.1	643	*
Middle	45.5	45.0, 45.9	2049		42.8	42.2, 43.4	1058		48.1	47.5, 48.7	991	
High	42.6	42.1, 43.0	1563		40.4	39.7, 41.0	775		44.6	43.9, 45.2	788	
Perceived health												
Good or fairly good	43.6	43.3, 44.0	3474	*	41.5	41.0, 42.0	1919	*	46.0	45.5, 46.4	1555	*
Average	48.7	48.1, 49.3	1398		47.3	46.5, 48.1	739		50.1	49.2, 51.0	659	
Fairly poor or poor	52.3	51.2, 53.4	570		51.4	50.0, 52.8	310		53.3	51.7, 54.9	260	
Chronic illness												
No	43.6	43.2, 44.0	2686	*	41.4	40.9, 42.0	1411	*	45.8	45.3, 46.3	1275	*
Yes	48.0	47.5, 48.4	2766		46.2	45.6, 46.8	1562		50.0	49.4, 50.6	1204	
Psychiatric disorder												
No	45.3	45.0, 45.6	4744	*	43.3	42.9, 43.7	2532	*	47.4	47.0, 47.9	2212	*
Yes	49.0	48.1, 50.0	709		47.6	46.4, 48.8	442		51.1	49.8, 52.5	267	
Depression												
No (BDI<10)	43.6	43.3, 43.9	3881	*	41.1	40.7, 41.6	1986	*	45.9	45.5, 46.3	1895	*
Mild (BDI=10–18)	50.0	49.3, 50.6	1063		48.0	47.1, 48.8	651		52.8	51.8, 53.9	412	
Severe (BDI>18)	55.0	53.8, 56.2	389		52.9	51.5, 54.3	259		58.7	56.8, 60.7	130	

\*  $P<.001$ .



subscales were found, but the scores of both the DDF and the EOT subscales were significantly higher for men than for women.

#### Alexithymia and age

Alexithymia was found in 9.9% of all subjects. The mean TAS-20 score for these participants was 65.5 [95% confidence interval (95% CI)=65.1, 65.8], while the corresponding figure for nonalexithymic subjects was 43.6 (95% CI=43.3, 43.9). Men (11.9%) were more commonly alexithymic than women (8.1%); the difference was significant. The sex difference remained after adjusting for confounding factors. In bivariate analyses, age was significantly associated with alexithymia. The prevalence of alexithymia grew steadily with increasing age. In the youngest group, 4.7% were alexithymic, while in the oldest group, 29.3% were alexithymic (Spearman's  $\rho=0.20$ ). For women, the corresponding figures were 2.7% and 28.8% ( $\rho=0.23$ ); for men, the figures were 6.8% and 30.5% ( $\rho=0.17$ ), respectively. The total TAS-20 score increased significantly with age in the whole sample and in the subsamples of men and women (Table 1). In full regression models for all subjects and for men and women separately, age was also independently associated with alexithymia (Table 2).

#### Sociodemographic variables

Marital status was significantly associated with alexithymia, with alexithymia being most pronounced in the groups of unmarried and widowed respondents ( $\rho=0.03$ ). In full regression models, the association between marital status and alexithymia remained significant.

Level of education was negatively associated with alexithymia both in bivariate analyses ( $\rho=-0.19$ ) and in regression analyses for all subjects. In the group with basic education, 16.5% of subjects were alexithymic, while in the group with higher education, 3.3% were alexithymic. In regression analyses for all subjects and for women and men, the combined years of education were also negatively associated with alexithymia.

TAS-20 scores were highest in the group with the lowest income level. The association was significant for all subjects and separately for the two sexes. Regression analyses indicated the same association.

#### Health-related variables and depression

Both chronic illness and earlier diagnosed psychiatric disorder were significantly associated with alexithymia when comparing the mean TAS-20 scores in bivariate analyses. In regression analyses, neither of these variables

Table 2

Demographic and other correlates of alexithymia (measured by TAS-20) according to separate regression models, regression coefficients, 95% CIs, and *P* values

Variable	All subjects			Women			Men		
	Coefficient	95% CI	<i>P</i>	Coefficient	95% CI	<i>P</i>	Coefficient	95% CI	<i>P</i>
Sex									
Female	0								
Male	4.92	4.40, 5.45	<.001						
Age (years)	0.07	0.04, 0.09	<.001	0.08	0.05, 0.11	<.001	0.06	0.02, 0.09	.003
Marital status									
Unmarried	3.07	1.96, 4.20	<.001	2.87	1.40, 4.32	<.001	1.31	0.12, 2.50	.031
Married/cohabiting	2.67	1.68, 3.67	<.001	3.51	2.20, 4.83	<.001	0		
Divorced/separated	0			0			-1.68	-3.09, -0.27	.020
Widowed	3.51	2.08, 4.94	<.001	4.01	2.32, 5.71	<.001	-0.63	-3.29, 2.04	ns
Education (years)	-0.57	-0.64, -0.50	<.001	-0.64	-0.74, -0.54	<.001	-0.46	-0.56, -0.35	<.001
Income level									
Low	1.29	0.40, 2.18	.004	1.38	0.14, 2.63	.029	1.26	0.04, 2.49	.043
Middle	0.78	0.17, 1.38	.012	0.34	-0.55, 1.24	ns	1.34	0.48, 2.19	.002
High	0			0			0		
Perceived health									
Good or fairly good	0			0			0		
Average	1.0	0.31, 1.68	.004	1.08	0.15, 2.00	.022	0.85	-0.22, 1.93	ns
Fairly poor or poor	0.99	-0.02, 0.82	ns	0.90	-0.59, 2.38	ns	1.05	-0.42, 2.52	ns
Chronic illness									
No	0			0			0		
Yes	-0.26	-0.82, 0.29	ns	-0.55	-1.36, 0.25	ns	0.05	-0.68, 0.79	ns
Psychiatric disorder									
No	0			0			0		
Yes	0.13	-0.74, 1.00	ns	0.43	-0.66, 1.51	ns	-0.32	-1.60, 0.97	ns
Depression	0.51	0.47, 0.56	<.001	0.50	0.44, 0.56	<.001	0.53	0.45, 0.61	<.001
Constant	39.46	37.34, 41.59	<.001	39.17	36.23, 42.11	<.001	45.67	43.07, 48.28	<.001

remained significant. Subjectively perceived health was significantly associated with alexithymia in bivariate analyses. The association was also significant in a separate regression analysis for women, but not for men. Depression was significantly associated with alexithymia in both bivariate analyses and regression analyses. Of nondepressed subjects, 5.0% were alexithymic, while of all depressed subjects, 21.9% were alexithymic. Moderately or severely depressed individuals (BDI >18) were six times more commonly alexithymic than those who were not depressed (5.0% vs. 35.5%; mild depression: OR=3.86, 95% CI=3.14, 4.75; moderate or severe depression: OR=10.40, 95% CI=8.01, 13.51).

## Discussion

The main findings of the present study were (a) the presence of sex difference in the prevalence of alexithymia and (b) the association of alexithymia with increasing age, low level of education, and poor perceived health. As far as we know, this was the first study on alexithymia that dealt with a sample representing the adult population aged 30 years and older in one country. Moreover, this was the first study with such a wide age range.

In this study, the prevalence of alexithymia was slightly smaller than those in two earlier studies [16,21] but was identical to the result of Honkalampi et al. [17]. It was also found in four earlier studies [16–18,21] that men were more commonly alexithymic than women. In two other earlier studies both focusing on elderly people, gender was not a significant factor [19,20]. There were no sex differences in the DIF subscale, but the scores of both the DDF and the EOT subscales were higher for men, which has been the result of a few earlier studies, too [16,26]. According to these findings, men can identify their feelings as easily as women, but they have greater difficulty in describing them. Men also tend to rely more commonly on externally oriented thinking. With our methods, it is not possible to conclude whether these sex differences are of biological origin, psychological origin, or both.

One of our main findings was the strong association of alexithymia with increasing age. In three previous studies, a significant association between age and alexithymia was found [16,17,21], whereas in one study, no such association was found [20]. The Health 2000 Study was nonetheless the first survey wherein it was possible to determine the association between age and alexithymia in such a large and nationally representative sample comprising both working-age and very old people.

During the 1900s, the Finnish society underwent rapid urbanization. In a Finnish sociological study, Roos [33], while investigating autobiographies, found that different generations born during the 20th century described their lives very differently. Those born during the three earliest decades of the century hardly ever dealt with human

relations and interactions in their autobiographies. Those born during or after World War II comprised the generation that migrated from rural areas to towns. In dramatic contrast to earlier generations, they tended to focus on human interactions much more commonly than their seniors. Possibly the differences in upbringing, social environment, and other early experiences were the etiological reasons for differences in the prevalence of alexithymia between the older and the younger populations in our sample. It has been shown that alexithymia is related to early trauma [34–36], nonoptimal parenting styles [35,37], insecure childhood attachment relationships [38], and, in a Finnish study, rural upbringing [39]. On the other hand, studies on cognitive and neurobiological–emotional processing indicate age-related alterations [40–42]. It should also be noted that the cognitive functioning of the participants was not controlled for. However, only completely filled TAS-20 scales were included in the present study, thus allowing a certain degree of control for at least the more severe impairments of cognitive functions. Prospective studies are needed to establish whether alexithymia tends to increase with age or whether there are some cohort factors distinguishing the different age groups.

The level of education and the level of income were negatively associated with alexithymia. The association between alexithymia and low level of education has also been a finding in four earlier studies [16–18,21]. Because of the cross-sectional design of our study, we cannot draw any conclusions as to whether alexithymic individuals, in general, are not as education-minded as nonalexithymic individuals, or whether education per se—giving facilities to verbalize and thus to better recognize and communicate emotions—is a protecting factor against developing alexithymic personality traits. Prospective studies are needed to answer this question.

Of the health-related factors, perceived health, chronic ailments, previously diagnosed psychiatric disorder, and current depression measured with the BDI were all significantly associated with alexithymia in bivariate analyses. With our methods, it is not possible to make any assumptions as to whether this was because alexithymia as a trait had been a predisposing factor to depression or because alexithymia was a state phenomenon accompanying depression.

In earlier studies, findings on the association of alexithymia with somatization have been contradictory. On the one hand, alexithymia has been associated with somatization and overemphasized reporting of somatic symptoms [43,44]; however, there is evidence of the two phenomena being unrelated to each other [45,46]. In our analyses, the subjective perception of health remained significant in regression analyses for all subjects and women separately, but not for men. The more objective health factors (chronic illness and previously diagnosed psychiatric disorder) were not significant in regression analyses. These results imply that there is at least a moderate association between alexithymia and subjective perception of general health.

We conducted our study by using TAS-20 as a measure of alexithymia. In recent years, there have been some criticisms of TAS-20. These criticisms have focused especially on the difficulty in replicating the factor structure of TAS-20 and the association of TAS with negative affectivity [47,48]. Lane et al. [5] questioned the ability of TAS-20 to detect the most severe cases of alexithymia. Moreover, Shedler et al. [49] found that a certain number of people appeared normal on standard mental health scales but were found to be psychologically distressed on clinical evaluation. However, TAS-20 is the most widely used measure of alexithymia and is, so far, the only alexithymia scale validated in Finnish.

In conclusion, alexithymia is found, on average, in every tenth individual in the Finnish adult population. It is associated with male gender, older age, lower educational level, poor perceived health, and depression. Because of the high prevalence of alexithymia, we find it important to take these associations into account when assessing the mental health and the general health of patients in different population groups. The recognition of alexithymia in health care is a source of concern because it may adversely affect doctor–patient relationships [50] and client attachment to a therapist [51]. Specific clinical approaches may be needed in managing the health problems of those people with strong alexithymic personality traits. So far, this has been the largest population study on alexithymia worldwide and is the fourth study to be conducted in Finland. Further comprehensive population studies on alexithymia in other countries are needed.

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## Alexithymia and occupational burnout are strongly associated in working population

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### Abstract

**Objective:** The relationship between alexithymia and occupational burnout has not previously been studied. We investigated the association between alexithymia and occupational burnout in a representative nationwide population health study. **Methods:** This study was a part of the Finnish Health 2000 Study. The nationally representative sample comprised 3322 employees aged 30–64 years. Alexithymia was measured with the 20-item Toronto Alexithymia Scale (TAS-20) and occupational burnout with the Maslach Burnout Inventory-General Survey. Sociodemographic and health-related

variables including depression were treated as confounders in the logistic regression analyses, which were performed alternately with TAS-20 total score and the scores of the three TAS-20 factor scales as alexithymia variables. **Results:** Alexithymia and its three facets were significantly associated with occupational burnout even when controlled for confounding factors. **Conclusions:** Even though both alexithymia and depression are associated with burnout, alexithymia may be an independent risk factor for occupational burnout.

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**Keywords:** Alexithymia; Epidemiology; General population; Occupational burnout; Personality

### Introduction

In the early 1970s Sifneos [1] coined the term *alexithymia*. *Alexithymia* means literally “no words for feelings” and refers to a personality construct characterized by impoverishment of fantasy, a poor capacity for symbolic thought, and difficulties in experiencing and verbalizing emotions. Alexithymia is thought to reflect a deficit in the cognitive processing of emotion, and alexithymics are thought to lack the capacity for mental representation of emotions [2–4]. These deficiencies are believed to cause an inability to

regulate emotions and affects and, therefore, to predispose the alexithymic individuals to both psychological and somatic symptoms. Alexithymia is, by definition, considered a stable personality trait [1,5].

Alexithymia has been shown to be associated with several medical conditions and mental health problems such as depression, some anxiety disorders, and substance abuse [5,6]. The association between alexithymia and depression has been a subject of some debate. According to some previous studies, alexithymia is more prevalent among the depressed, and alexithymia scores decrease as depression is alleviated. Therefore, it has been claimed that alexithymia is associated with the level of depression and may be a state-dependent phenomenon [7–9]. On the other hand, several studies have yielded evidence on both the absolute and the relative stability of alexithymia, in accordance with the

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original theoretical definition that alexithymia is a personality trait [6,10–16]. The prevalence figures of alexithymia in working-age populations have been 9–17% for men and 5–10% for women in four studies, three of which were conducted in Finland [17–20]. On population level, alexithymia is associated with older age, male sex, lower socioeconomic status, fewer years of education, single marital status, and poorer perceived health [17–20].

Occupational burnout is an important health and organizational issue in modern work life [21,22]. It is defined as a prolonged response to chronic stressors on the job [23]. It is a state of exhaustion in which one is cynical about the value of one's work (cynicism) and doubtful of one's capacity to perform (lack of professional efficacy) [24]. It is mainly predicted by job demands but also by lack of job resources [25]. Discrepancy between the expectations and values of a motivated employee and the reality in unfavourable working conditions is thought to lead to burnout via dysfunctional ways of coping [26]. Difficulties in working conditions, such as diminished support from superior, cooperation and autonomy, as well as deteriorated organisational climate have been found to predispose to occupational burnout. Sense of coherence, strong self-esteem and sense of competence are individual characteristics that seem to prevent workers from burning out [27]. Occupational burnout has been shown to be related to age, gender, marital status, and education [26,28]. There is also a strong association between burnout and depression [29] and physical illnesses [30]. Furthermore, burnout has predicted medically certified sick-leave absences due to mental disorders and physical diseases [31,32].

As far as we know, there are no previous studies on the associations between alexithymia and occupational burnout in working populations. In this study, we analysed the associations between alexithymia and occupational burnout in a representative population sample. We hypothesised that alexithymia and burnout were positively related.

## Method

### *Study design and data collection*

This study was a part of a multidisciplinary epidemiological health survey, the Health 2000 Study [33,34]. The nationally representative sample comprised 8028 persons aged  $\geq 30$ . A large national network coordinated by the National Public Health Institute was responsible for the planning and execution of the field study. The study was designed according to the concept of a two-stage stratified cluster sampling [33]. The strata were all the five Finnish university hospital districts, each containing approximately one million inhabitants. Altogether, 80 health centre districts, 16 from each university hospital region, were selected by systematic sampling to participate in the study, thus forming 80 clusters. From each area, a random sample of subjects was drawn from the national population register.

The data collection phase started in September 2000 and was completed in June 2001, during which period, a total of 7415 subjects (92%) attended at least one phase of the study. The subjects were interviewed at home (Phase 1) where they were given a questionnaire to be returned at the clinical health examination (Phase 2). During the interview, the respondents were given an information leaflet, and their written informed consent was obtained.

### *Material*

Of the total sample, 5871 persons were of working age (<65 years old). Of this base population, 5152 were interviewed (88%), 4935 returned the questionnaire (84%), and 4827 (82%) participated in the health examination. On the basis of the home interview, 4021 working-aged participants were in gainful employment and not on maternity or parenting leave. Of these, 303 were excluded because of more than one missing item in each dimension of the burnout inventory, reducing the study population to 3718 persons. Those with one missing value per burnout dimension were included, and the missing value was replaced by the mean of the existing values on that dimension of that respondent. After the home interview, the subjects were given another questionnaire to be returned afterwards. It included the 20-item Toronto Alexithymia Scale (TAS-20) and the 21-item Beck Depression Inventory (BDI). The final sample included those 3322 participants who had received the TAS-20 in their mother tongue and returned it completed and whose Maslach Burnout Inventory-General Survey (MBI-GS) was acceptable. Details of the methodology of the project have been published elsewhere [34,35].

### *Measures*

#### *Alexithymia*

The level of alexithymia was assessed using the Finnish or Swedish (the two official languages of Finland) version of the TAS-20 depending on the mother tongue of the subjects. Among the different methods for measuring alexithymia, the TAS-20 is the most widely used and, presumably, the most carefully validated. Its internal consistency, test-retest reliability, as well as convergent, discriminant, and concurrent validity have been demonstrated to be good [36–39]. The psychometric properties of both the Finnish version [40] as well as the Swedish version [41] of the TAS-20 have proven to be satisfactory. According to the recommendation by the developers of the scale, the cut point for alexithymia was also used: TAS-20 total scores  $>60$  were defined as alexithymic cases [42]. In addition, the TAS-20 consists of three factor scales, which reflect the three main facets of the alexithymia construct: factor scale DIF assesses difficulties in identifying feelings, factor scale DDF concerns difficulty in describing feelings, and factor scale EOT reflects concrete externally oriented thinking or a preoccupation with the details of external events. The

Cronbach's alpha coefficients were .84 for both TAS-20 and DIF, .74 for DDF, and .69 for EOT in the present study.

### Occupational burnout

Burnout was measured with the MBI-GS [24]. This is a validated 16-item questionnaire with sound psychometric qualities [43–45]. It measures the three dimensions of burnout: exhaustion (five items), cynicism (five items), and (lack of) professional efficacy (six items). The items were scored on a 7-point frequency rating scale ranging from 0 (never) to 6 (daily). High scores on exhaustion and cynicism and low scores on professional efficacy are indicative of burnout. The items of professional efficacy were reversed for the analysis (lack of professional efficacy). To get an indicator of burnout as a three-dimensional syndrome [46], we employed the weighted sum score of the dimensional scores created by Kalimo et al. [27]. Coefficients were formed by weighting each dimension so that the scores corresponded to the original response scale ( $0.4 \times \text{exhaustion} + 0.3 \times \text{cynicism} + 0.3 \times \text{lack of professional efficacy}$ ). The score 0–1.49 is considered to indicate no burnout, and the scores 1.5–3.49 and 3.5–6 are considered to indicate mild burnout syndrome and severe burnout, respectively. For statistical analyses, we combined the classes “mild burnout” and “severe burnout,” thus yielding a dichotomous variable “no burnout” and “burnout.” In the present study, Cronbach's alpha coefficient for the MBI-GS was .87.

### Sociodemographic factors

The distributions of the sociodemographic characteristics of the participants are shown in Table 1. Age was categorized into a three-class variable: 30–39, 40–49, and 50–64 years. Marital status was divided into four categories: single, married/cohabiting, divorced/separated, and widowed. A three-class variable describing the level of education was combined from two variables containing information on basic education and on vocational education. No vocational training beyond a vocational course or on-the-job training with no matriculation examination was classified as basic education. Completion of vocational school as well as passing the matriculation examination but having no vocational training beyond a vocational course or on-the-job training was defined as secondary education regardless of basic education. Higher education comprised degrees from higher vocational institutions, polytechnics, and universities. The financial situation of the subjects was assessed by inquiring the monthly income of the households in which they lived. The variable was divided into three categories:  $\leq 10000$  FIM, 10 001–20 000 FIM, and  $>20000$  FIM ( $\leq 1680.7$  €, 1680.8–3361.3 €, and  $>3361.3$  €).

### Health-related factors

The following health-related variables were treated as confounding factors: perceived health, presence of a chronic illness, history of mental disorder, and current depressive

Table 1  
Characteristics of the study participants

Characteristics	<i>n</i>	Adjusted % <sup>a</sup>
Gender		
Female	1720	49.4
Male	1602	50.6
Age		
30–39 years	1134	33.3
40–49 years	1192	35.5
50–64 years	996	31.2
Marital status		
Single	389	11.7
Married/cohabiting	2575	77.6
Divorced/separated	311	9.3
Widowed	47	1.4
Level of education		
Basic education	744	22.8
Secondary education	1254	37.9
Higher education	1324	39.3
Income level		
Low	500	15.2
Middle	1365	41.9
High	1400	43.0
Perceived health		
Good or fairly good	2540	76.1
Average	658	20.1
Fairly poor or poor	123	3.8
Chronic illness		
No	2132	64.1
Yes	1188	35.9
Psychiatric disorder		
No	2987	90.0
Yes	335	10.0
Depression		
No (BDI < 10 points)	2673	80.9
Yes (BDI $\geq$ 10 points)	636	19.1

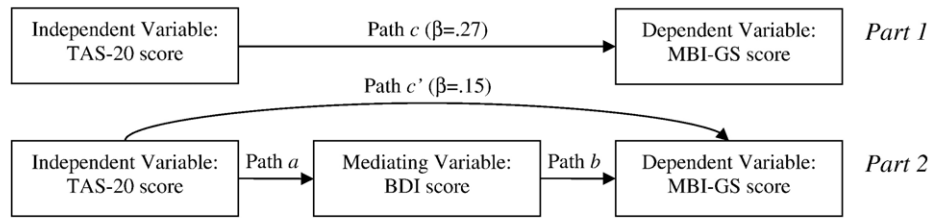
<sup>a</sup> Adjusted for the two-stage stratified cluster sampling.

symptoms. The distributions of the health-related characteristics of the participants are shown in Table 1. As part of the interview, the subjects were asked to assess their subjective health on a five-class scale ranging from “good” to “poor.” For statistical purposes, some of the classes were combined thus yielding a three-class variable “good or fairly good,” “average,” and “fairly poor or poor.” The subjects were also asked whether they had suffered from any physical or mental chronic illness, handicap, or other ailment that reduced their working or functional capacity for at least 3 months (yes/no). If the answer to the previous question was affirmative, lifetime mental disorders were assessed by asking whether a physician had ever confirmed a diagnosis of mental disorder (yes/no). To assess the level of depression, the Finnish or Swedish version of the 21-item BDI was used. A total BDI score of less than 10 points was considered to indicate cases without depression and  $\geq 10$  points cases with depression [47].

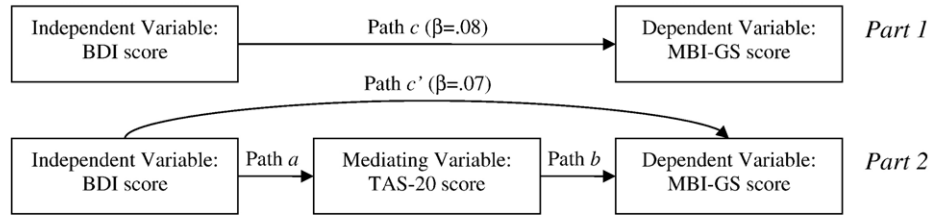
### Statistical methods

The prevalences of alexithymia, occupational burnout, and depression were calculated with dichotomous TAS-20,

Model A1



Model B1



Model C1

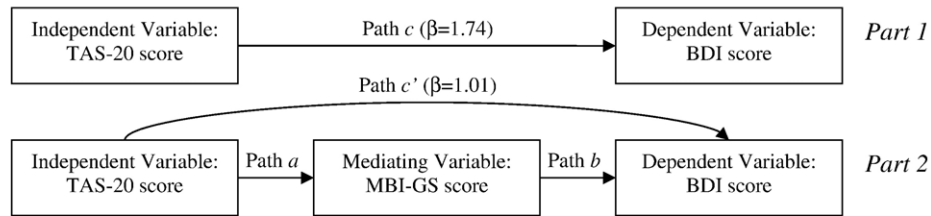


Fig. 1. Illustration of the Sobel-Goodman mediation method. Diagrams of mediational Models A1, B1, and C1 show path models of total effect (Part 1) and mediated effect (Part 2) of the independent variables on the dependent variables. Betas ( $\beta$ ) represent the regression coefficients for the independent variables (total effect: Path  $c$ ; residual effect: Path  $c'$ ). Sociodemographic and health-related variables as covariates in all the analyses.

MBI-GS, and BDI by cross tabulation. The statistical analyses were performed both before and after adjusting for the weights and the associations found between the variables remained essentially identical. Spearman's correlation coefficients were calculated to assess the correlations between dichotomous TAS-20, MBI-GS, and BDI. As the BMI-GS score was skewed, we chose to employ the logistic regression approach for the hierarchical multivariate analyses. However, full linear regression models with all the variables (alexithymia varia-

bles, BDI, MBI-GS, age, and years of education as continuous variables and other variables as categorical) produced residuals distributed approximately normally. Binary logistic regression analysis was performed with dichotomized burnout as a response variable, entering TAS total score as an explanatory variable (Model I). The next step was to add sociodemographic variables into the model (Model II). Model III was constructed by adding health-related factors to Model II. Finally, Model IV was attained by adding depression to the

Table 2

Dichotomous burnout explained by TAS-20 total score and the three factor scale scores in 10-point increments in separate logistic regression models and with confounding variables according to Models II–IV, ORs, and 95% confidence intervals (95% CI)

	TAS total score		DIF		DDF		EOT	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Model I <sup>a</sup>	1.92	1.78–2.08	5.88	4.94–6.99	3.61	3.00–4.34	1.51	1.29–1.78
Model II <sup>b</sup>	1.96	1.81–2.13	5.63	4.72–6.72	3.70	3.05–4.48	1.44	1.21–1.72
Model III <sup>c</sup>	1.86	1.71–2.03	4.75	3.97–5.70	3.51	2.87–4.30	1.44	1.20–1.73
Model IV <sup>d</sup>	1.61	1.47–1.75	3.40	2.80–4.14	2.52	2.04–3.12	1.32*	1.10–1.58

All ORs:  $P < .001$  except \* $P = .003$ .

<sup>a</sup> Odds Ratios unadjusted.

<sup>b</sup> Odds Ratios adjusted for sociodemographic factors.

<sup>c</sup> Odds Ratios adjusted for sociodemographic and health-related factors.

<sup>d</sup> Odds Ratios adjusted for sociodemographic, health-related, and depressive symptoms.



previous model. The same procedures were performed with the three TAS factor scales (DIF, DDF, and EOT) replacing TAS total score alternately with the scores of these scales. In

order to report the odds ratios (ORs) for continuous alexithymia scores (TAS-20, DIF, DDF, and EOT) in 10-point differences, we multiplied the scores by 0.1. Weighting

Table 3

Mediational models and Sobel-Goodman Mediation Tests for alexithymia (TAS-20, DIF, DDF, and EOT scores<sup>a</sup>), burnout (MBI-GS score), and (CCP) depression (BDI score)

The 3 regression steps <sup>b</sup> of each model <sup>c</sup>		Adjusted $R^2$	Independent variable		Mediating variable		Sobel-Goodman Mediation Tests for each model		
Model			$\beta$	$P$	$\beta$	$P$	$z$	$P$	% <sup>d</sup>
A1	1. MBI-GS score (dv) regressed on TAS-20 score (iv)	.22	.27	<.001			15.12	<.001	45.4
	2. BDI score (mv) regressed on TAS-20 score (iv)	.28	1.74	<.001					
	3. MBI-GS score (dv) regressed on BDI score (mv) and TAS-20 score (iv)	.37	.15	<.001	.07	<.001			
A2	1. MBI-GS score (dv) regressed on DIF score (iv)	.25	.68	<.001			17.69	<.001	48.1
	2. BDI score (mv) regressed on DIF score (iv)	.33	4.95	<.001					
	3. MBI-GS score (dv) regressed on BDI score (mv) and DIF score (iv)	.37	.35	<.001	.07	<.001			
A3	1. MBI-GS score (dv) regressed on DDF score (iv)	.20	.58	<.001			12.97	<.001	45.7
	2. BDI score (mv) regressed on DDF score (iv)	.26	3.65	<.001					
	3. MBI-GS score (dv) regressed on BDI score (mv) and DDF score (iv)	.36	.31	<.001	.07	<.001			
A4	1. MBI-GS score (dv) regressed on EOT score (iv)	.15	.16	<.001			2.56	.011	27.4
	2. BDI score (mv) regressed on EOT score (iv)	.21	.57	.010					
	3. MBI-GS score (dv) regressed on BDI score (mv) and EOT score (iv)	.35	.12	<.001	.08	<.001			
B1	1. MBI-GS score (dv) regressed on BDI score (iv)	.35	.08	<.001			8.79	<.001	10.0
	2. TAS-20 score (mv) regressed on BDI score (iv)	.23	.05	<.001					
	3. MBI-GS score (dv) regressed on TAS-20 score (mv) and BDI score (iv)	.37	.07	<.001	.15	<.001			
B2	1. MBI-GS score (dv) regressed on BDI score (iv)	.35	.08	<.001			9.99	<.001	14.8
	2. DIF score (mv) regressed on BDI score (iv)	.24	.03	<.001					
	3. MBI-GS score (dv) regressed on DIF score (mv) and BDI score (iv)	.37	.07	<.001	.35	<.001			
B3	1. MBI-GS score (dv) regressed on BDI score (iv)	.35	.08	<.001			7.33	<.001	6.8
	2. DDF score (mv) regressed on BDI score (iv)	.15	.02	<.001					
	3. MBI-GS score (dv) regressed on DDF score (mv) and BDI score (iv)	.36	.07	<.001	.31	<.001			
B4	1. MBI-GS score (dv) regressed on BDI score (iv)	.35	.08	<.001			2.12	.034	.5
	2. EOT score (mv) regressed on BDI score (iv)	.21	.004	.010					
	3. MBI-GS score (dv) regressed on EOT score (mv) and BDI score (iv)	.35	.08	<.001	.12	<.001			
C1	1. BDI score (dv) regressed on TAS-20 score (iv)	.28	1.74	<.001			14.70	<.001	41.9
	2. MBI-GS score (mv) regressed on TAS-20 score (iv)	.22	.27	<.001					
	3. BDI score (dv) regressed on MBI-GS score (mv) and TAS-20 score (iv)	.42	1.01	<.001	2.73	<.001			
C2	1. BDI score (dv) regressed on DIF score (iv)	.33	4.95	<.001			16.10	<.001	34.0
	2. MBI-GS score (mv) regressed on DIF score (iv)	.25	.68	<.001					
	3. BDI score (dv) regressed on MBI-GS score (mv) and DIF score (iv)	.44	3.27	<.001	2.48	<.001			
C3	1. BDI score (dv) regressed on DDF score (iv)	.26	3.65	<.001			12.88	<.001	44.9
	2. MBI-GS score (mv) regressed on DDF score (iv)	.20	.58	<.001					
	3. BDI score (dv) regressed on MBI-GS score (mv) and DDF score (iv)	.41	2.01	<.001	2.84	<.001			
C4	1. BDI score (dv) regressed on EOT score (iv)	.21	.57	.010			4.49	<.001	85.7
	2. MBI-GS score (mv) regressed on EOT score (iv)	.15	.16	<.001					
	3. BDI score (dv) regressed on MBI-GS score (mv) and EOT score (iv)	.39	.08	.676	3.05	<.001			

dv, dependent variable; iv, independent variable; mv, mediating variable.

<sup>a</sup> TAS-20, DIF, DDF, and EOT scores in 10-point increments.

<sup>b</sup> Step 1: dv regressed on iv; step 2: mv regressed on iv; step 3: dv regressed on both mv and iv.

<sup>c</sup> Sociodemographic and health-related variables as covariates in each step.

<sup>d</sup> Percentage (%) of total effect that is mediated.

adjustment and sampling parameters were used in the linear regression analyses and in the logistic regression analyses to correct possible bias caused by the complex sample survey data and the loss of participants.

In order to analyse the possible mediating effects between alexithymia, depression and occupational burnout, Sobel-Goodman mediation tests were performed [48]. According to Baron and Kenny [49], mediation occurs when the independent variable is significantly associated with the mediating variable, the mediating variable is significantly associated with the dependent variable, and the effect of the independent variable on the dependent variable is attenuated upon the addition of the mediating variable to the model. To test for mediation, three regression analyses are required: regressing the dependent variable on the independent variable (Step 1 in Table 3), regressing the mediating variable on the independent variable (Step 2 in Table 3), and regressing the dependent variable on both the independent variable and the mediating variable (Step 3 in Table 3). In these analyses TAS-20, DIF, DDF, and EOT as well as MBI-GS and BDI were continuous variables (the alexithymia variables in 10 point increments). In Models A1–A4 (see Fig. 1 and Table 3) and B1–B4, the MBI-GS score was a dependent variable. In Models C1–C4, the BDI score was a dependent variable. The TAS-20, DIF, DDF, and EOT scores were alternately either independent (Models A1–A4 and C1–C4) or mediating (Models B1–B4) variables. Sociodemographic and health-related factors were treated as covariates (age and years of education as continuous variables). The conditions of mediation, outlined by Baron and Kenny, were met in these analyses.

Significance levels were set at a two-tailed  $P$  value of  $<.05$  throughout the study. The computations were carried out using the STATA statistical package version 9 [50].

## Results

The prevalence of alexithymia was  $n=187$  (5.6%) for the whole sample. The gender difference was significant: 66 women (3.8%) and 121 men (7.6%) were alexithymic ( $\chi^2=21.56$ ,  $d.f.=1$ ,  $P<.001$ ). Mild occupational burnout was found in 840 (25.3%) of the subjects and severe occupational burnout in 84 (2.5%). Of the subjects with mild or severe burnout, 120 (13.0%) were alexithymic while 67 (2.8%) of those without burnout were alexithymic ( $\chi^2=130.45$ ,  $d.f.=1$ ,  $P<.001$ ). Depressive symptoms were found in 636 (19.2%) of the subjects; of these, 101 (15.9%) were alexithymic while 84 (3.1%) of the nondepressives were alexithymic ( $\chi^2=157.93$ ,  $d.f.=1$ ,  $P<.001$ ). In the nondepressive group, 549 (19.5%) had burnout. Of these, 44 (8.0%) were alexithymic, while the corresponding figure for those without burnout was 52 (2.3%) ( $\chi^2=44.06$ ,  $d.f.=1$ ,  $P<.001$ ). In the depressive group, 440 (64.4%) had burnout. Of these, 90 (20.5%) were alexithymic; the corresponding figure for those without burnout was 21 (8.6%) ( $\chi^2=16.05$ ,  $d.f.=1$ ,  $P<.001$ ).

The Spearman's correlation coefficient between dichotomous TAS-20 and dichotomous MBI-GS was .20; between dichotomous TAS-20 and dichotomous BDI, .22; and between dichotomous BDI and dichotomous MBI-GS, .40.

The findings of the logistic regression analyses are presented in Table 2. TAS total score as well as the scores of the three subscales were statistically significantly associated with burnout. The association remained significant after adjusting for the possible confounding factors. Results of the full linear regression analyses were essentially similar to these ( $P<.001$  for all the alexithymia variables in the alternate models).

The results of the Sobel-Goodman mediation tests are shown in Table 3. These results indicate that alexithymia has a direct effect on burnout as well as an indirect effect mediated by depression (Models A1–A4). The effect of depression on occupational burnout is primarily direct and is mediated by alexithymia only to a small extent (Models B1–B4). Alexithymia has both direct and indirect effect on depression when occupational burnout is a mediating factor (Models C1–C4). The effect of EOT on depression is mostly mediated by burnout (Model C4).

## Discussion

The main finding of the present study was the strong association of alexithymia with occupational burnout. According to the logistic regression analyses, the association between alexithymia and burnout seems to be driven primarily by DIF. Because of the cross-sectional design of our study, we cannot draw any conclusions as to whether alexithymia predisposes working population to occupational burnout or whether it is a secondary phenomenon occurring with burnout. However, because alexithymia, occupational burnout and depression were all correlated with each other, we conducted Sobel-Goodman mediation tests to find out whether depression mediated the effect of alexithymia on burnout, whether alexithymia mediated the effect of depression on burnout, and finally, whether burnout mediated the effect of alexithymia on depression. Even though any true causative conclusions cannot be drawn from a cross-sectional study, the mathematical findings indicate that in our sample alexithymia had both direct and indirect effect on occupational burnout and that this effect was partly mediated by depressive symptoms. On the other hand, the effect of depression on burnout was primarily direct. This could also be interpreted as meaning that alexithymia may predispose to depression but depression would not predispose to alexithymia. The third set of analyses with depression as a dependent variable showed that the effect of alexithymia on depression was mediated by burnout, and in the case of the EOT subfactor, the mediation was almost complete. This could mean that in working population, alexithymia predisposes to both depression and occupational burnout, which, for its part, further predisposes to

depression. In the present study the overall prevalence of alexithymia as well as the prevalences for men and women separately were lower than those found earlier for working-age populations. It should be noted, however, that our sample was limited exclusively to a working population.

Alexithymia has been associated with impaired coping with stress [51,52]. Fukunishi et al. [53] studied a sample of expatriates and found that alexithymia was associated with dissatisfaction with life abroad and with the perception of poor social support. They proposed that alexithymia is a predictor of adjustment difficulties. Parker et al. [52], studying a sample of first-year university students, found that alexithymia was linked with poorer academic achievement when compared with those without alexithymia. They stated that alexithymic students could not cope with the stressors of the transition from high-school to university as efficiently as the nonalexithymic students. *Burnout*, for its part, is defined as a prolonged response to chronic stressors on the job and develops via dysfunctional coping strategies [23,26]. Therefore, it is conceivable that alexithymia is a predisposing factor to burnout due to inadequate coping with occupational stress.

Kojima et al. [54] studied the associations of alexithymia, depression, and social support in a sample of Japanese workers. They found that while on the one hand alexithymia was associated with reduced social support, on the other hand, the degree of social support did not differentiate the level of depression in alexithymics, whereas those nonalexithymic individuals who received low support had significantly higher depression scores than those with high support. According to Kojima et al., alexithymia may directly reduce support because of the alexithymic individuals' impaired ability to build intimate relationships. They also proposed an alternative explanation: alexithymics may not be able to utilise social support because of their difficulties in recognising and responding appropriately to other people's emotions. It has been shown that alexithymia encompasses not only difficulties in identifying one's own feelings but also difficulties in identifying the emotions of others [2,55]. As has previously been established, low support and cooperation as well as a deteriorated organisational climate contribute to the development of burnout [27]. It is therefore possible that alexithymic personality features impair the individuals' capacity to receive and benefit from social support and, on the other hand, make them more vulnerable to interpersonal difficulties at work.

There is some evidence of alexithymia being associated with insecure attachment styles [56–58], which also may predispose alexithymic subjects to interpersonal problems. Troisi et al. [56] found that among individuals with insecure attachment styles, those with preoccupied or fearful patterns have higher levels of alexithymia than individuals with a dismissing pattern. Spitzer et al. [59] suggested that cold and socially avoidant behaviour characterises the interpersonal style of alexithymic individuals. Wastell and Taylor [60] stated that alexithymics are able to build up a good general

social knowledge but face problems when predicting and responding to the complexity of intimate social situations. Fukunishi and Koyama [61] found in their study on Japanese college students that alexithymic subjects were prone to emotional instability, cynical hostility, and anger. Previous studies have shown that employees in human service work, in which contacts with other people constitute the major part of the task and may become a particular source of stress, are especially vulnerable to the client-centred form of burnout [23,62]. Although the literature on alexithymia and burnout is new, the associations between emotional intelligence and burnout have been studied earlier. Emotional intelligence is conceptually near to alexithymia. According to Salovey and Mayer [63], emotional intelligence can be defined as “the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions.” Parker et al. [64] have shown that alexithymia and emotional intelligence are independent but strongly and inversely related constructs. Although the findings of the studies on the associations between emotional intelligence and job performance are contradictory [65], there are a few studies indicating that lower emotional intelligence is associated with occupational burnout in human service work [66,67]. Furthermore, emotional labour, i.e., managing and modifying emotions when the work role demands that certain expressions should be shown to customers, is a possible risk factor for emotional exhaustion [68] and occupational burnout [69]. Thus, alexithymia could be a risk factor for burnout, especially in human service work, which would be an interesting issue for future studies.

We conducted our study using the TAS-20 as a measure of alexithymia. In recent years there has been some criticism of the TAS-20. This has focused especially on the difficulties in replicating the factor structure of the TAS-20 and the associations of the TAS with negative affectivity [70–72]. Lane et al. [2] questioned the ability of the TAS-20 to detect the most severe cases of alexithymia. Suslow et al. [73] found that DDF seems to evaluate aspects of social shame rather than difficulties in symbolizing one's emotions. However, the TAS-20 is the most widely used measure of alexithymia and, so far, the only alexithymia scale validated in Finnish.

Alexithymia, depression, and occupational burnout were interrelated phenomena in our sample. Both alexithymia and depression were also independently associated with burnout. Because of our cross-sectional study design, it is not possible to establish what the sequence of the three events was. As suggested above, alexithymia may be a predisposing factor to occupational burnout through individual difficulties in coping with stress and dealing with interpersonal social situations. Naturally, we cannot rule out the possibility of alexithymia being a secondary phenomenon, a defence, resulting from prolonged mental stress and/or depression. Prospective studies in working populations are needed in order to shed light on this dilemma. However, it

seems appropriate to take into account the possibility that there is a subgroup of workers who may be at increased risk for occupational burnout because of their reduced capabilities in emotional processing. It could be of clinical importance to develop specific approaches in occupational health services to help these people to better adjust to the circumstances in which they work particularly in human service work.

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## **Alexithymia and Health-Related Quality of Life in General Population**

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## **Alexithymia and Health-Related Quality of Life in General Population**

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### **Abstract**

The relationship between alexithymia and health-related quality of life (HRQoL) was studied in a nationally representative population sample of 5,418 subjects aged 30-97 years. Alexithymia was measured with the 20-item Toronto Alexithymia Scale (TAS-20) and HRQoL with the 15D. Socio-demographic and health-related variables, including depression, functional capacity and physician verified somatic diagnoses, were treated as confounders in multivariate analyses. Alexithymia was significantly associated with lower HRQoL independently of other variables the association being clinically noteworthy. The TAS-20 subfactor Difficulties Identifying Feelings was the strongest common denominator between alexithymia and HRQoL. Alexithymia may be a predisposing factor to poorer HRQoL.

Alexithymia is a personality construct characterized by difficulties in experiencing and verbalizing emotions, impoverishment of fantasy and a poor capacity for symbolic thought.<sup>1-3</sup> It is thought to reflect a deficit in the cognitive processing of emotion, and alexithymic individuals to lack mental representation of emotions.<sup>4-6</sup> These deficiencies are believed to cause an inability to regulate emotions and affects and therefore to predispose alexithymic individuals to both psychological and somatic symptoms.

Alexithymic individuals may misinterpret the somatic sensations associated with emotional arousal as symptoms of disease;<sup>7</sup> in other words, they may have a tendency to somatize. The association between alexithymia, somatization and somatoform disorders has been corroborated by several studies even though there has been some inconsistency in the findings possibly because of the differing methodology used in different studies.<sup>7,8</sup> Alexithymia may be associated with somatization by way of misinterpreting the somatic sensations associated with emotional arousal as symptoms of disease.<sup>3,7,8</sup> It has also been conjectured that the failure to experience complex emotional states is associated with exaggerated or dysregulated autonomic activation.<sup>7</sup> On the other hand, alexithymia has also been associated with several medical conditions, such as inflammatory bowel disease,<sup>9</sup> essential hypertension,<sup>10</sup> migraine,<sup>11</sup> and diabetes mellitus.<sup>12</sup> Moreover, alexithymia has been found to be an independent risk factor for death in middle-aged men.<sup>13</sup>

The prevalence of alexithymia in working-age populations is 9%-17% for men and 5%-10% for women.<sup>14-17</sup> The prevalence figures of alexithymia in older age groups are notably higher, over 20% or even over 30% in the oldest populations.<sup>17-19</sup> Besides older age, alexithymia is also associated with male sex, lower socioeconomic status, fewer years of education, single marital status and poorer perceived health.<sup>14-17,20</sup>

Alexithymia has been shown to be associated with various mental disorders including depression.<sup>15</sup> According to some earlier studies, alexithymia is more prevalent among the depressed and alexithymia scores decrease as depression is alleviated. Therefore it has been claimed that alexithymia may be a state-dependent phenomenon.<sup>21-23</sup> On the other hand, several studies have yielded evidence on both the absolute and the relative stability of alexithymia, in accordance with the original theoretical definition that alexithymia is a personality trait.<sup>3,9,24-28</sup> Moreover, alexithymia is normally distributed in



the general population in both genders.<sup>14</sup> It is, however, reasonable to take depression into consideration in studies on alexithymia.

Health is an essential component of quality of life.<sup>29</sup> A growing trend is to measure the outcomes of health care multidimensionally including the subjective experience of the patient. Health economists require generic (non-disease-specific) single-dimensional utility measures to compare the costs and benefits of treating different diseases. The health-related quality of life (HRQoL) measurement aims to meet these demands.

Alexithymia has been associated with a lower overall quality of life (QOL) in general population,<sup>15,30</sup> in patients with coronary heart disease,<sup>31,32</sup> in patients with brain injury,<sup>33</sup> and in depressed out-patients.<sup>34</sup> A negative association between alexithymia and HRQoL has been found in unselected medically ill patients,<sup>35</sup> and in patients with inflammatory bowel disease,<sup>36</sup> with breast cancer,<sup>37</sup> and with end-stage renal disease.<sup>38,39</sup> In contrast to these, lack of alexithymia has been found to predict poorer postoperative QOL in ulcerative colitis patients.<sup>40</sup> It is, however, somewhat difficult to compare the results of these studies, as alexithymia and HRQoL were assessed with a variety of measures. Moreover, all the studies measuring HRQoL were conducted with relatively small (n=46-105) clinical samples.

As far as we know, only one congress abstract has been published dealing with the associations between alexithymia and HRQoL in a general population.<sup>41</sup> In a population sample of 1,285 subjects aged 18-64 years alexithymia, measured with the 20-item Toronto Alexithymia Scale (TAS-20), was significantly associated with poorer HRQoL measured with the RAND-36.<sup>41</sup> Alexithymic individuals had lower levels of physical functioning, more role limitations due to physical health, more limitations due to emotional problems, less energy, poorer emotional well-being, poorer social functioning, more pain and poorer general health than the nonalexithymic persons. However, confounding factors were not controlled for in this study. We studied the associations between alexithymia, measured with the TAS-20, and HRQoL, measured with a generic HRQoL measure, the 15D, in a nationally representative sample of 5,418 individuals in the age range 30-97 years. In the present study, socio-demographic variables, depression, functional capacity and physician verified somatic diagnoses were controlled for. We hypothesized that alexithymia were negatively associated with HRQoL independently of these confounders.

## **METHOD**

### **Study design and sample**

Our study is a part of the Health 2000 Study. The gathering of data took place in Finland in 2000 – 2001.<sup>42</sup> It was designed according to the concept of a two-stage stratified cluster sampling, and comprised adults aged 30 years and over. The age limit was set at 30 years because the prevalence of somatic diseases is low in younger age groups. The study design and base results have been described in detail elsewhere<sup>42,43</sup> and are available at [www.ktl.fi/health2000](http://www.ktl.fi/health2000). The strata were all the five Finnish university hospital districts, each containing approximately one million inhabitants. Altogether 80 health center districts, 16 from each university hospital region were selected by systematic sampling to participate in the study, thus forming 80 clusters. From each area, a random sample of subjects was drawn from the national population register with double-sampling of people over 80 years of age. The nationally representative sample comprised 8,028 persons. Of these, 6,770 participated in a health examination after an interview. The interview was used to gather basic background and socio-demographic information as well as information on health-related factors. After the health examination the participants were given a questionnaire including the TAS-20 and the 15D. Those 5,418 subjects (67.5% of the sample) who had received the questionnaires in their mother tongue and who returned the TAS-20 completed and the 15D acceptably filled in were included in our substudy.

### **Measures**

Alexithymia was assessed using the Finnish or Swedish (the two official languages of Finland) version of the TAS-20 depending on the mother tongue of the subjects. Among the different methods for measuring alexithymia, the TAS-20 is the most widely used and presumably the most carefully validated. Its internal consistency, test-retest reliability, as well as convergent, discriminant, and concurrent validity have been demonstrated to be good.<sup>44-48</sup> The psychometric properties of both the Finnish version<sup>49</sup> as well as the Swedish version<sup>50</sup> of the TAS-20 have proven to be satisfactory. The total score of the TAS-20 ranges between 20 and 100 points. According to the recommendation by the developers of the scale, the cut point for alexithymia was also used: subjects scoring  $\geq 61$  were defined as

alexithymic.<sup>51</sup> In addition, the TAS-20 consists of three subscales, which reflect the three main facets of the alexithymia construct: subscale DIF assesses difficulties in identifying feelings (seven items, score range 7-35), subscale DDF concerns difficulties in describing feelings (five items, score range 5-25) and subscale EOT reflects concrete externally-oriented thinking or a preoccupation with the details of external events (eight items, score range 8-40). In the present study the Cronbach's alpha coefficient was .85 for TAS-20, .86 for DIF, .72 for DDF and .67 for EOT.

HRQoL was measured with the 15D, available at [www.15d-instrument.net](http://www.15d-instrument.net). This includes 15 dimensions: mobility, vision, hearing, breathing, sleeping, eating, speech, elimination, usual activities, mental function, discomfort and symptoms, depression, distress, vitality, and sexual activity.<sup>52-54</sup> Each dimension has five grades of severity. In calculating the 15D health utility index (15D score), valuations elicited from the Finnish population using the multi-attribute utility method were used.<sup>53</sup> The 15D scores range between 1 (no problems on any dimension) and 0 (being dead). According to the author of the method a change of .02-.03 points in the health utility index or 15D score is considered clinically noteworthy.<sup>54</sup> The 15D compares favourably with similar instruments in most of the important properties.<sup>52-56</sup> Subjects with 12 or more completed 15D dimensions were included, and missing values were predicted with linear regression analysis using the other 15D dimensions, with age and sex as independent variables, as recommended by the author of the measure.<sup>52</sup> The number of participants with one to three missing values was 293 (5.4% of the sample).

### **Socio-demographic variables**

Age was categorized into a six-class variable: 30-39, 40-49, 50-59, 60-69, 70-79 and 80 years and over. Marital status was divided into four categories: single, married/cohabiting, divorced/separated and widowed. A three-class variable describing the level of education was combined from two variables containing information on basic education and on vocational education. No vocational training beyond a vocational course or on-the-job training with no matriculation examination was classified as basic education. Completion of vocational school as well as passing the matriculation examination but having no vocational training beyond a vocational course or on-the-job training was defined

as secondary education regardless of basic education. Higher education comprised degrees from higher vocational institutions, polytechnics and universities. The financial situation of the subjects was assessed by inquiring the monthly income of the households in which they lived. The variable was divided into three categories:  $\leq 10\,000$  FIM,  $10\,001 - 20\,000$  FIM and  $> 20\,000$  FIM ( $\leq 1680.7$  €,  $1680.8 - 3361.3$  € and  $> 3361.3$  €).

### **Depression, somatic diagnoses and functional capacity**

The comprehensive health examination included an assessment of 12-month prevalence of major depressive disorder or dysthymia,<sup>43</sup> using the Munich version of the Composite International Diagnostic Interview (M-CIDI)<sup>57</sup> with DSM-IV<sup>58</sup> criteria. The diagnoses were combined thus yielding a dichotomized variable for depression: no depression and depression (dysthymia and/or major depression).

Somatic diagnoses were given by physicians (altogether 10 of these) after physical examinations that included a standard clinical examination, measurements of height and weight, a 12-lead resting electrocardiogram, blood pressure measurements, spirometry, bioimpedance and heel bone density measurements, oral examination by a dentist, a variety of examinations of functional capacity (vision, hearing, reaction time, word memory, verbal fluency, hand grip strength, balance) and tests related to joint function and joint movements. The diagnoses were classified according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10).<sup>59</sup> The reliability of the somatic diagnoses was rated as ‘possible’ or ‘certain’ by the examining physicians. Only those diagnoses defined as ‘certain’ were included in our analyses. A three-class variable ‘ICD-10 somatic diagnoses’ was formed as follows: no somatic diagnoses, one somatic diagnosis, two or more somatic diagnoses.

In order to control for the severity of the diseases the examining physicians also assessed the health-related functional capacity of the participants with a four-class variable as follows: unimpaired, slightly impaired, considerably impaired, and almost totally or totally impaired functional capacity. This variable was reduced to a variable with three categories by combining the last two classes to a single category “severely impaired functional capacity”.

## **Statistical analyses**

The means of the TAS-20 total scores, the three TAS subscale scores and the 15D scores were calculated performing adjusted Wald tests for the equality between the groups in comparison (sex, age, marital status, education, income, ICD-10 diagnoses, functional capacity, M-CIDI depression; and 15D for the dichotomized TAS-20). The data were weighted to take into account the sampling design. A significance level  $p < 0.05$  was used in these analyses. The distribution of the 15D scores was skewed and demonstrated a ceiling effect at full health, ruling out the standard linear regression methods. When the normality assumptions are violated, quantile regression methods (e.g. Censored Least Absolute Deviations (CLAD) regression) are a robust alternative.<sup>60,61</sup> Quantile regression methods are based on minimizing least absolute deviations, whereas standard regression models are based on minimizing least squares.<sup>60,62</sup> In practice, the non-normality of 15D has been shown to be statistically insignificant and the CLAD results very close to the results obtained with traditional Tobit regression.<sup>61</sup> We conducted three CLAD analyses with the 15D score as a dependent variable. In the first analysis the TAS-20 total score, in the second analysis the DIF, DDF and EOT scores, and in the third analysis dichotomized alexithymia were the alexithymia variables. All the analyses included sex, age, marital status, education, income, M-CIDI depression, the three-class variable for ICD-10 somatic diagnoses and the three-class variable for functional capacity as confounders. The resulting coefficients are interpreted as estimates of the change in median 15D score, associated with change in the independent variables. The confidence levels were set at 99% in these analyses. CLAD analyses accounted for the sampling design by using weights and a two-stage bootstrapping, in which the sampling design was accounted for by sampling the primary sampling units in the first stage and individuals in the second stage. Computations were carried out using the Stata statistical package, version 9.1.<sup>63</sup>

## **RESULTS**

The means of the TAS-20, DIF, DDF, EOT and 15D scores in different groups are shown in Table 1. All the alexithymia variables and the 15D scores differed statistically

significantly ( $p < .001$ ) between the groups in comparison except for the DIF score between men and women.

Alexithymia and 15D were strongly associated. The results of the CLAD analyses are shown in Table 2. The TAS-20 and DIF scores as well as the dichotomized TAS-20 were significantly negatively associated with 15D while the DDF and EOT scores were not. M-CIDI depression, two or more ICD-10 diagnoses, impaired functional capacity, advanced age and lower income level were negatively associated with 15D in all analyses. Male sex was positively associated with 15D in the analysis with the TAS-20 score. Marital status and education were not significant in any of the models.

## **DISCUSSION**

The main finding of our study was the association between alexithymia and lower HRQoL even when depression, somatic diagnoses, functional capacity and socio-demographic variables were controlled for. Of the TAS-20 subscales, DIF was significantly associated with HRQoL while DDF and EOT were not. As a .02-.03 point change in the 15D score is considered clinically noteworthy,<sup>54</sup> the results of the regression analyses (Table 2) can be interpreted as follows: every 10 point increase in the significant alexithymia variables means a clinically noteworthy decrease in the 15D index (.02 for TAS-20 and .06 for DIF). Belonging to the alexithymic group assessed by the dichotomized TAS-20 is reflected as a .06 point difference in the 15D score. A decrease of .06 points on the 15D score is very substantial, as indicated by the fact that, two or more physician-verified ICD-10 diagnoses, slightly impaired functional capacity or age between 70 and 79 years were associated with smaller decreases of HRQoL in the analysis with the dichotomized TAS-20.

The 15D has three items concerning primarily mental well-being (mental function, depression, and distress). Therefore, it was to be expected that psychiatric disorders – here dysthymia and/or major depression- were reflected in the results. Moreover, it has been shown in earlier studies that negative affectivity<sup>64</sup> and depression<sup>65,66</sup> are associated with poorer HRQoL.

As a measure of HRQoL the 15D assesses a variety of dimensions that are predominantly physical in nature (mobility, vision, hearing, breathing, eating, speech, elimination). A few dimensions can be seen as belonging to both physical and mental domains or social domain (usual activities, discomfort and symptoms, vitality, sexual activity and sleeping). Alexithymia has been associated with somatization,<sup>7,67</sup> somatoform disorders,<sup>7,8</sup> and with poorer perceived health.<sup>17,18</sup> The concept of alexithymia encompasses the idea that alexithymic individuals may misinterpret the somatic sensations associated with emotional arousal as symptoms of somatic disease.<sup>7</sup> It has also been claimed that alexithymia may affect illness behavior through cognitive and social mechanisms and so contribute to somatic symptoms.<sup>68</sup> Thus, it is conceivable that alexithymic individuals' subjective conceptions of their overall health and different aspects of it are reflected on the HRQoL measures independently of objectively diagnosed ailments.

The negative association between alexithymia and HRQoL seems to be driven primarily by the DIF subfactor. In a few earlier studies the DIF factor has been associated with somatization,<sup>7,67</sup> and somatoform disorders.<sup>7,69</sup> It has also been associated with increased health care utilization.<sup>70</sup> It seems that individuals with difficulties in identifying feelings are prone to misinterpret their somatic sensations. They also rate their health poorer than those without this characteristic. Our results suggest that alexithymic individuals with difficulties in identifying their feelings are at risk of reporting poorer HRQoL.

Due to the cross sectional design of our study, we cannot draw any affirmative conclusions as to whether alexithymia predisposes to poorer HRQoL or whether poor HRQoL predisposes to alexithymia. However, if alexithymia is considered to be a relatively stable personality trait one could assume that alexithymia is a risk factor for poorer HRQoL. Naturally, we cannot rule out the possibility of alexithymia being a secondary phenomenon, a defensive state reaction, resulting from prolonged mental stress and suffering caused by poorer health. This hypothesis is supported by some earlier studies.<sup>35</sup> There is also a third conceivable explanation: the association of alexithymia with some somatic diseases is reflected in poorer HRQoL. Prospective studies controlling for mental disorders and somatic diagnoses are needed in order to establish the causative pathways.

According to earlier studies alexithymia is associated with poorer HRQoL in various medical conditions.<sup>35-39</sup> Our findings concerning general population are consistent with the findings by Salminen et al.<sup>41</sup> The association of alexithymia with health is not only an issue of subjective suffering but may also contribute to health outcomes. There is evidence that alexithymic individuals, because of maladaptive coping strategies, may be prone to engage in unhealthy behavior, such as binge-eating or abusing alcohol.<sup>71</sup> On the other hand, alexithymia has been found to be associated with increased risk for death independently of other well-known risk-factors.<sup>13</sup> It has also been shown that alexithymia may have a negative impact on the patient-doctor relationship by evoking negative reactions in caregivers.<sup>72</sup> This, combined with reporting poorer HRQoL than other patients with otherwise similar health-problems, may have a deleterious effect on the patients' status in health-care. So far, alexithymic characteristics have been considered to be difficult to modify.<sup>2</sup> Beresnevaite<sup>73</sup> has, however, reported a promising result with coronary heart disease patients: group psychotherapy was superior in decreasing alexithymia compared with patient education.

Our study is based on a large, representative population survey. Contrary to most surveys, our study used a burdensome physical examination and a structured mental health interview to verify diagnoses. In relation to this, our response rate can be considered high. However, as in all surveys, those most ill were the most likely to drop out. We used advanced statistical modeling, survey-adjusted CLAD regression, to estimate the association between alexithymia and HRQoL. The CLAD procedure is generally less sensitive in finding statistically significant differences, i.e. it produces wider confidence intervals than standard linear or Tobit regressions,<sup>61</sup> emphasizing the robustness of our findings.

We conducted our study using the TAS-20 as a measure of alexithymia. In recent years there has been some criticism of the TAS-20. This has focused especially on the difficulties in replicating the factor structure of the TAS-20 and the associations of the TAS with negative affectivity.<sup>74,75</sup> It has also been noted that there are differences between the TAS-20 subfactors EOT having repeatedly been the most problematic of them.<sup>47</sup> On the other hand, in our study, the Cronbach's alpha for EOT, .67, was quite satisfactory in comparison to several other studies. Lane et al.<sup>4</sup> questioned the ability of the TAS-20 to



detect the most severe cases of alexithymia. Suslow et al.<sup>76</sup> found that DDF seems to evaluate aspects of social shame rather than difficulties in symbolizing one's emotions. However, the TAS-20 is the most widely used measure of alexithymia and so far the only alexithymia scale validated in Finnish. As to measuring HRQoL it has been found that in affectively disturbed people the scores may be influenced by affective bias, poor insight, and recent life events.<sup>77</sup> These methodological limitations are to be kept in mind when assessing the results of our study.

The study employed interviews which may have had some effect on the self reported data as the interviews and health examinations preceded the completion of the self-report scales. We also created quite a crude variable of the ICD-10 somatic diagnoses. It encompassed a wide variety and combinations of diagnoses that were obviously not comparable with each other in terms of severity and disease burden. To take into account this shortcoming we also employed physician verified assessments of the functional capacity of the participants. We find that for the purposes of this study these variables together enabled us to control for the health-status of the subjects and thus increased the credibility of the results.

In conclusion, our results suggest that alexithymia is strongly associated with poorer HRQoL, and that the TAS-20 subfactor DIF is the strongest common denominator between alexithymia and HRQoL. Alexithymia may have a direct impact on HRQoL, but it is also possible that alexithymia impacts HRQoL measurement via a somatization mechanism. In either case, it seems that poorer HRQoL may sometimes be associated with difficulties in emotional processing, not only with health problems and circumstantial factors. Because alexithymia is normally distributed in the general population,<sup>14</sup> at least some alexithymic features are quite common. Therefore, we deem it important to take alexithymia into consideration when assessing the HRQoL of various population groups, especially the elderly, as the prevalence of alexithymia is quite high in the oldest populations. Even though alexithymia as a personality construct may be relatively unamenable to change, people with strong alexithymic features may benefit from the caregivers' understanding of the special difficulties they have in dealing with their health problems.

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TABLE 1. Characteristics of the participants and the scores of TAS-20, DIF, DDF, EOT and 15D in different groups (Means and 95% Confidence Intervals, adjusted Wald-test for equality<sup>a</sup>)

Variable	N	% <sup>b</sup>	TAS-20 score		DIF score		DDF score		EOT score		15D score	
			Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
All subjects	5418	100.0	45.8	45.4-46.1	13.2	13.0-13.3	11.7	11.6-11.8	20.9	20.8-21.1	.91	.91-.92
Sex												
Men	2467	48.0	47.8	47.3-48.2	13.2	13.0-13.4	12.4	12.3-12.6	22.2	22.0-22.4	.92	.92-.92
Women	2951	52.1	43.9	43.5-44.3	13.2	13.0-13.4	11.0	10.8-11.1	19.7	19.5-19.9	.91	.91-.91
Age												
30-39 years	1292	23.7	42.4	41.9-42.9	11.9	11.7-12.2	10.6	10.4-10.8	19.8	19.5-20.1	.95	.95-.96
40-49 years	1368	25.5	44.1	43.5-44.7	12.8	12.5-13.0	11.3	11.1-11.5	20.0	19.8-20.3	.93	.93-.94
50-59 years	1213	24.0	45.7	45.1-46.3	13.2	12.9-13.5	11.7	11.5-11.9	20.7	20.4-21.0	.92	.91-.92
60-69 years	795	14.7	48.6	47.8-49.4	13.9	13.5-14.3	12.6	12.3-12.8	22.2	21.9-22.5	.89	.89-.90
70-79 years	458	9.2	52.0	51.1-52.9	15.3	14.8-15.8	13.2	12.9-13.5	23.5	23.1-23.8	.85	.84-.86
80 years +	292	2.9	54.3	53.2-55.4	16.2	15.6-16.8	13.7	13.2-14.1	24.4	24.0-24.9	.74	.72-.76
Marital status												
Unmarried	599	11.1	46.8	45.8-47.9	13.7	13.2-14.1	12.1	11.8-12.4	21.0	20.5-21.5	.92	.91-.92
Married/cohabiting	3854	72.2	45.3	44.9-45.6	12.9	12.7-13.1	11.5	11.4-11.6	20.8	20.7-21.0	.92	.92-.93
Divorced/separated	522	9.7	44.3	43.3-45.3	13.2	12.8-13.6	11.3	11.0-11.7	19.8	19.4-20.2	.90	.89-.91
Widowed	443	7.0	51.1	50.0-52.2	15.0	14.5-15.6	12.9	12.5-13.3	23.2	22.8-23.6	.84	.82-.85
Level of education												
Basic education	1993	36.2	49.7	49.2-50.1	14.4	14.2-14.7	12.5	12.4-12.7	22.7	22.5-22.9	.88	.88-.89
Secondary education	1778	33.4	45.7	45.2-46.2	12.9	12.7-13.2	11.6	11.5-11.8	21.1	20.9-21.3	.93	.92-.93
Higher education	1644	30.4	41.2	40.7-41.6	11.9	11.7-12.2	10.7	10.5-10.8	18.6	18.3-18.8	.94	.94-.94
Income level												
Low	1668	29.8	48.9	48.4-49.5	14.4	14.1-14.7	12.4	12.2-12.6	22.1	21.9-22.4	.88	.87-.88
Middle	2037	38.3	45.4	45.0-45.9	13.0	12.8-13.2	11.6	11.5-11.8	20.8	20.6-21.0	.92	.92-.93
High	1560	29.4	42.6	42.1-43.0	12.0	11.8-12.2	10.9	10.7-11.1	19.7	19.5-19.9	.94	.94-.95
ICD-10 somatic diagnoses												
0	3748	69.2	45.1	44.8-45.5	12.8	12.7-13.0	11.5	11.4-11.6	20.8	20.6-20.9	.93	.92-.93
1	1256	23.4	46.6	46.0-47.2	13.7	13.4-14.0	11.9	11.7-12.1	21.0	20.8-21.2	.90	.90-.90
2 or more	412	7.5	48.9	47.7-50.1	14.6	14.0-15.2	12.4	12.0-12.8	21.9	21.4-22.4	.85	.84-.86
Functional capacity												
Unimpaired	4082	76.7	44.5	44.1-44.8	12.6	12.4-12.7	11.4	11.2-11.5	20.5	20.4-20.7	.94	.94-.94
Slightly impaired	870	15.8	48.5	47.8-49.2	14.4	14.1-14.8	12.4	12.2-12.7	21.7	21.4-22.0	.86	.85-.87

Severely impaired	323	5.3	54.1	52.9-55.3	17.1	16.4-17.7	13.6	13.2-14.1	23.4	22.9-23.9	.76	.75-.78
M-CIDI depression												
No	4769	88.8	45.3	44.9-45.6	12.8	12.7-13.0	11.5	11.4-11.7	20.9	20.7-21.1	.92	.92-.93
Yes	334	6.1	48.8	47.7-50.0	16.4	15.8-17.0	12.6	12.2-13.0	19.8	19.3-20.3	.84	.83-.86
Dichotomized TAS-20												
nonalexithymic (<61)	4869	90.1									.93	.92-.93
alexithymic (≥ 61)	549	9.9									.82	.81-.83

<sup>a</sup>All between-group comparisons:  $p < .001$  except for DIF score between men and women  $p = .847$

<sup>b</sup>Adjusted for the two-stage stratified cluster sampling



TABLE 2. CLAD analyses with the 15D score as dependent variable (Regression Coefficients =  $\beta$ , 99% Confidence Intervals = 99% CI)

Variable	Analysis with TAS-20 total score		Analysis with DIF, DDF and EOT scores		Analysis with dichotomized TAS-20	
	$\beta$	99% CI	$\beta$	99% CI	$\beta$	99% CI
<b>Sex</b>						
Men	.0111	.0044;.0177 <sup>a</sup>	.0022	-.0048;.0093	.0050	-.0011;.0112
Women	ref		ref		ref	
<b>Age</b>						
30-39 years	ref		ref		ref	
40-49 years	-.0090	-.0163;-.0017 <sup>a</sup>	-.0075	-.0158;.0007	-.0073	-.0143;-.0002 <sup>a</sup>
50-59 years	-.0153	-.0239;-.0066 <sup>a</sup>	-.0149	-.0242;-.0056 <sup>a</sup>	-.0175	-.0262;-.0089 <sup>a</sup>
60-69 years	-.0238	-.0370;-.0106 <sup>a</sup>	-.0262	-.0398;-.0127 <sup>a</sup>	-.0264	-.0396;-.0132 <sup>a</sup>
70-79 years	-.0448	-.0646;-.0250 <sup>a</sup>	-.0445	-.0620;-.0270 <sup>a</sup>	-.0439	-.0669;-.0208 <sup>a</sup>
80 years +	-.0770	-.1108;-.0432 <sup>a</sup>	-.0878	-.1254;-.0503 <sup>a</sup>	-.0800	-.1123;-.0476 <sup>a</sup>
<b>Marital status</b>						
Unmarried	.0066	-.0099;.0231	.0061	-.0084;.0207	.0029	-.0100;.0157
Married/cohabiting	.0005	-.0138;.0148	.0007	-.0122;.0137	-.0007	-.0116;.0103
Divorced/separated	ref		ref		ref	
Widowed	.0098	-.0115;.0310	.0032	-.0165;.0229	.0018	-.0207;.0242
<b>Level of education</b>						
Basic education	.0059	-.0030;.0149	-.0017	-.0111;.0077	-.0046	-.0144;.0053
Secondary education	.0063	-.0007;.0132	.0024	-.0054;.0102	.0022	-.0052;.0095
Higher education	ref		ref		ref	
<b>Income level</b>						
Low	-.0146	-.0265;-.0027 <sup>a</sup>	-.0109	-.0216;-.0001 <sup>a</sup>	-.0145	-.0260;-.0029 <sup>a</sup>
Middle	-.0072	-.0139;-.0004 <sup>a</sup>	-.0044	-.0120;.0032	-.0071	-.0142;.00002
High	ref		ref		ref	
<b>ICD-10 somatic diagnoses</b>						
0	ref		ref		ref	
1	-.0046	-.0123;.0030	-.0056	-.0127;.0015	-.0053	-.0132;.0026
2 or more	-.0329	-.0509;-.0148 <sup>a</sup>	-.0279	-.0440;-.0118 <sup>a</sup>	-.0316	-.0498;-.0134 <sup>a</sup>
<b>M-CIDI depression</b>						
No	ref		ref		ref	
Yes	-.0576	-.0786;-.0365 <sup>a</sup>	-.0470	-.0630;-.0310 <sup>a</sup>	-.0626	-.0788;-.0464 <sup>a</sup>
<b>Functional capacity</b>						
Unimpaired	ref		ref		ref	
Slightly impaired	-.0463	-.0596;-.0331 <sup>a</sup>	-.0437	-.0586;-.0289 <sup>a</sup>	-.0497	-.0634;-.0360 <sup>a</sup>
Severely impaired	-.1133	-.1371;-.0894 <sup>a</sup>	-.1078	-.1350;-.0805 <sup>a</sup>	-.1183	-.1393;-.0974 <sup>a</sup>
<b>Alexithymia variables</b>						
TAS-20 score	-.0019	-.0024;-.0015 <sup>a</sup>				
DIF score			-.0058	-.0068;-.0048 <sup>a</sup>		
DDF score			.0002	-.0014;.0009		
EOT score			.0006	-.0003;.0014		
Dichotomized TAS-20 <sup>b</sup>					-.0613	-.0777;-.0449 <sup>a</sup>

<sup>a</sup>  $p < .001$ , <sup>b</sup> TAS-20  $\geq 61$  points

# Alexithymia and Somatization in General Population

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**Objective:** Even though the association between alexithymia and somatization seems plausible according to several studies with selected populations, it has not been verified in carefully controlled and nationally representative population studies. We conducted such a study to find out whether alexithymia is associated with somatization at population level. **Methods:** This study was a part of the Finnish Health 2000 Study. The nationally representative sample comprised 5129 subjects aged 30 to 97 years. Alexithymia was measured with the 20-item Toronto Alexithymia Scale (TAS-20) and somatic symptom reporting with the 12-item somatization scale derived from the Hopkins Symptom Checklist. Sociodemographic and health-related variables, including depressive and anxiety disorders, and physician verified somatic diagnoses, were treated as confounders in multivariate analyses. **Results:** Alexithymia was associated with somatization independently of somatic diseases, depression and anxiety and confounding sociodemographic variables. The TAS-20 factor scale "Difficulties Identifying Feelings" was the strongest common denominator between alexithymia and somatization. **Conclusions:** This was the first time the independent association between alexithymia and somatization was established in a large, nationally representative nonclinical sample of both young and old adults with and without mental disorders and somatic diseases. **Key words:** alexithymia, general population, somatization.

**TAS-20** = 20-item version of the Toronto Alexithymia Scale; **DIF** = difficulties identifying feelings; **DDF** = difficulties describing feelings; **EOT** = externally orientated thinking; **SCL-90** = Hopkins Symptom Checklist; **SCL SOM** = 12-item somatization scale derived from SCL-90; **M-CIDI** = Munich version of the Composite International Diagnostic Interview; **ICD-10** = International Statistical Classification of Diseases and Related Health Problems, 10th Revision; **DSM-IV** = Diagnostic and Statistical Manual of Mental Disorders, 4th edition; **SEM** = structural equation modeling.

## INTRODUCTION

Somatization has been defined in several ways, but what they all have in common is the presence of somatic symptoms that cannot be sufficiently explained by organic etiology (1–3). It ranges from mild over-reporting or amplification of somatic symptoms to a psychiatric disorder. Having multiple unexplained physical symptoms is very common in the general population (4). It has also been stated that at least one third of symptoms in primary care are medically unexplained (1–3). The prevalence of actual somatization disorders in the general population varies, probably due to different study criteria, from 2% to over 50% according to different studies (4,5). Somatization is associated with subjective distress and disability (2,3,6,7). It is also an important matter of public health because it commonly results in increased health-care utilization (2,3,6–8), increased costs (2,3,7), and high iatrogenic complication rates (9).

There are several theories explaining the phenomenon of somatization one of these being alexithymia (8,10,11). Alexithymia is a personality construct characterized by difficulties in experiencing and verbalizing emotions, impoverishment of

fantasy, and a poor capacity for symbolic thought reflected as a tendency toward externally oriented thinking (12–14). An essential assumption underlying alexithymia theory is that alexithymic individuals lack mental representations of emotions due to a deficit in the cognitive processing of these (15–17). This is thought to lead to a limited capacity to understand and regulate emotions (18). Alexithymia may be associated with somatization by way of focusing on or amplifying the somatic sensations associated with emotional arousal, or by misinterpreting these as symptoms of disease (10,14,18–20). It has also been conjectured that the failure to experience complex emotional states is associated with exaggerated or dysregulated autonomic activation (10). However, data confirming this theory are scarce, and negative findings concerning associations between autonomic nervous function and alexithymia have been reported (13,21). Furthermore, alexithymia may affect illness behavior through social mechanisms and so contribute to somatic symptoms (22).

The interest in the associations between alexithymia and somatization has been quite extensive. We performed a MedLine search with keywords *alexithymia* or *alexithymic*, and *somatoform/somatoform disorders (as subject heading)/somati(s/z)ation/somatosensory amplification/somatic symptom(s)/physical symptoms(s)/symptom reporting/medically unexplained symptom(s)*, and found out that 185 journal articles with some combination of these keywords have been published between the 1970s and fall 2007. In a few recent review articles (10,19,23), a large part of the findings of these studies have been summarized. Most of the earlier studies support the association between alexithymia and somatization, but there are also a few exceptions (for an exhaustive review of both positive and negative studies, see DeGucht and Heiser 2003 (19)). The majority of the studies were conducted with students or clinical patient samples, which makes generalizing the findings beyond these groups problematic. As far as we know, there are no earlier survey studies in general populations with both genders and a wide age range focusing specifically on the associations between alexithymia and somatization.

The authors of the reviews (10,19,23) have also pointed out some critical methodological aspects: in a substantial number of the earlier studies, medically explained symptoms, socio-

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## ALEXITHYMIA AND SOMATIZATION

demographic factors, and levels of psychopathology have not been controlled for. The results of the few studies partialling out anxiety and/or negative affectivity have been contradictory (10,24,25). Controlling for the confounders is important for several reasons. The concept of somatization requires ruling out medically explained symptoms. Both somatization and alexithymia are associated with common psychopathology such as depression and anxiety (3,8,13,14,26–28), and with different sociodemographic factors such as sex (6,7,29–31), age (4,31–33), marital status (7,27,29–31,34), and education (7,8,27,28,30,31). Alexithymia is also associated with several medical conditions (35–37). Without controlling for these confounders, it is not possible to deduce the nature of the association between alexithymia and somatic symptom reporting.

As the earlier studies have left open the question whether alexithymia is an independent determinant of somatization in the general population, thereby making the phenomenon more generalizable, we conducted a population study on a nationally representative sample of 5129 individuals in the age range of 30 to 97 years with physician verified somatic diagnoses, by interview verified depressive and anxiety disorders, and with sociodemographic factors as confounders. We hypothesized alexithymia to be positively and independently associated with somatization.

### METHODS

#### Study Design and Participants

Our study is a part of the Health 2000 Study. The gathering of data took place in Finland in 2000 to 2001 (38). It was designed according to the concept of a two-stage stratified cluster sampling, and comprised adults aged 30 years and over. The age limit was set at 30 years because the prevalence of somatic diseases is low in younger age groups. The study design and base results have been described in detail elsewhere (38,39). The strata included all five Finnish university hospital districts, each containing approximately one million inhabitants. Altogether 80 health center districts, 16 from each university hospital region, were selected by systematic sampling to participate in the study, thus forming 80 clusters. From each area, a random sample of subjects was drawn from the national population register with double sampling of people over 80 years of age. The nationally representative sample comprised 8028 persons. Of these, 6770 participated in a health examination after an interview. The interview was used to gather basic background and sociodemographic information, as well as information on health-related factors. Before the health examination, the participants filled in the 12-item somatization scale (SCL SOM) derived from the Hopkins Symptom Checklist (SCL-90). After the health examination, they were given a questionnaire including the 20-item Toronto Alexithymia Scale (TAS-20). Those 5129 subjects (63.9% of the sample) who had received the questionnaires in their mother tongue and returned both the SCL SOM and the TAS-20 completed were included in our substudy. Approval of the Ethics Committee of Epidemiology and Public Health in the Hospital District of Helsinki and Uusimaa was obtained for the Health 2000 Study.

#### Measures

Alexithymia was assessed using the Finnish or Swedish (the two official languages of Finland) version of the TAS-20 depending on the mother tongue of the subjects. Among the different methods for measuring alexithymia, the TAS-20 is the most widely used and presumably the most carefully validated. Its internal consistency, test-retest reliability, as well as convergent, discriminant, and concurrent validity have been demonstrated to be good (40–43). The psychometric properties of both the Finnish version (44) and the Swedish version (45) of the TAS-20 have proven to be satisfactory. According to the recommendation by the developers of the scale, the cutpoint for alexithymia was also used:

subjects scoring  $\geq 61$  were defined as alexithymic (46). In addition, the TAS-20 consists of three subscales, which reflect the three main facets of the alexithymia construct: factor scale DIF assesses difficulties in identifying feelings (seven items), factor scale DDF concerns difficulties in describing feelings (five items), and factor scale EOT reflects concrete externally oriented thinking or a preoccupation with the details of external events (eight items). In the present study, the Cronbach's alpha coefficient was 0.85 for both TAS-20 and DIF, 0.72 for DDF, and 0.67 for EOT.

Somatization was assessed with the SCL SOM, the 12-item subscale derived from the SCL-90, which is a widely used and valid questionnaire for overall symptomatology (47,48). The Finnish version of the SCL-90 has been validated, and its internal consistency as well as discriminant validity have been shown to be good (48). SCL SOM intends to measure self-reported intensity of somatic symptoms. The Cronbach's alpha coefficient for SCL SOM was 0.86 in the present study.

#### Sociodemographic Variables

The characteristics of the participants are shown in Table 1. Age was categorized into six classes: 30 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and  $\geq 80$  years. Marital status was divided into four categories: single, married/cohabiting, divorced/separated, and widowed. A variable with three categories describing the level of education was combined from two variables containing information on basic education and on vocational education. No vocational training beyond a vocational course or on-the-job training with no matriculation examination was classified as basic education. Completion of vocational school as well as passing the matriculation examination but having no vocational training beyond a vocational course or on-the-job training was defined as secondary education regardless of basic education. Higher education comprised degrees from higher vocational institutions, polytechnics, and universities. The financial situation of the subjects was assessed by inquiring the monthly income of the households in which they lived. The variable was divided into three categories:  $\leq 10,000$  FIM, 10,001 to 20,000 FIM, and  $>20,000$  FIM ( $\leq 1680.7\text{€}$ , 1680.8–3361.3€ and  $>3361.3\text{€}$ ).

#### Depression, Anxiety, and Somatic Diagnoses

The comprehensive health examination included an assessment of 12-month prevalence of major depressive disorder, dysthymia, and any anxiety disorder except for phobic anxiety (39), using the Munich version of the Composite International Diagnostic Interview (M-CIDI) (49) with DSM-IV (50) criteria. Major depression and dysthymia were combined thus yielding a dichotomized variable for depression: no depression/depression. Anxiety diagnoses were combined into a dichotomized variable no anxiety/anxiety.

Extensive anamnestic information of the health status of the participants was gathered before the health examination. Somatic diagnoses were confirmed by physicians after physical examinations that included a standard clinical examination, measurements of height and weight, a 12-lead resting electrocardiogram, blood pressure measurements, and tests related to joint function and joint movements (38). The diagnoses were classified according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) (51). The reliability of the somatic diagnoses was rated as "possible" or "certain" by the examining physicians. Only those diagnoses defined as "certain" were included in our analyses. We created a dichotomous variable (no diagnosis/one or more diagnoses) of the diseases of endocrine, nervous, circulatory, respiratory, digestive, and musculoskeletal system, and connective tissue as they may present with symptoms similar to those measured with the SCL SOM.

#### Statistical Analyses

The medians of the SCL SOM score were calculated and compared performing Kruskal-Wallis tests for the equality between the groups (sex, age, marital status, education, income, ICD-10 somatic diagnoses, M-CIDI depression, M-CIDI anxiety, and dichotomized TAS-20).

Then raw correlations between SCL SOM and the alternating alexithymia variables were calculated. To test for possible independent associations between the SCL SOM score and the alternating alexithymia variables, structural equation models (SEM) were specified and analyzed (Figure 1, models I–IV).

TABLE 1. Characteristics of the Participants and Median Scores of the SCL SOM<sup>a</sup> in Different Groups

	Subjects ( <i>n</i> )	Median	IQR	$\chi^2$ ( <i>df</i> ) <sup>b</sup>	<i>p</i>
All subjects	5129	19	8		
Sex				91.19 (1)	<.001
Men	2349	18	8		
Women	2780	20	10		
Age				428.10 (5)	<.001
30–39 yr	1268	17	6		
40–49 yr	1318	19	8		
50–59 yr	1158	20	9		
60–69 yr	720	21	10		
70–79 yr	407	23	11		
80 yr+	258	25	14		
Marital status				108.60 (3)	<.001
Unmarried	564	18	8		
Married/cohabiting	3679	19	8		
Divorced/separated	496	19	9		
Widowed	390	23	13		
Level of education				374.57 (2)	<.001
Basic education	1837	22	11		
Secondary education	1696	19	8		
Higher education	1594	17	6		
Income level				317.39 (2)	<.001
Low	1546	22	11		
Middle	1942	19	8		
High	1513	17	6		
ICD-10 somatic diagnoses <sup>c</sup>				182.95 (1)	<.001
No	4070	18	8		
Yes (1 or more)	1057	22	11		
M-CIDI depression <sup>d</sup>				100.41 (1)	<.001
No	4542	19	8		
Yes	312	24	11.5		
M-CIDI anxiety disorder <sup>e</sup>				65.98 (1)	<.001
No	4666	19	8		
Yes	195	24	13		
Dichotomized TAS-20 <sup>f</sup>				204.18 (1)	<.001
Nonalexithymic (<61)	4650	19	9		
Alexithymic (≥61)	479	24	12		

<sup>a</sup> SCL-90 somatization score.

<sup>b</sup> Kruskal-Wallis test for differences between groups.

<sup>c</sup> Diseases of endocrine, nervous, circulatory, respiratory, digestive, and musculoskeletal system, and connective tissue.

<sup>d</sup> M-CIDI depression = major depression or dysthymia diagnosed by the Munich version of the Composite International Diagnostic Interview.

<sup>e</sup> M-CIDI anxiety = anxiety disorders except for phobic anxiety diagnosed by the Munich version of the Composite International Diagnostic Interview.

<sup>f</sup> TAS-20 = 20-item Toronto Alexithymia Scale.

IQR = interquartile range.

The models included all influences of the health-related and sociodemographic variables on both the SCL SOM score and the alexithymia variables (TAS-20, DIF, DDF, and EOT scores, respectively). To test the hypothesis of the independent association between SCL SOM score and the alternating alexithymia variables, these were allowed to covary in each model.

As the distribution of the SCL SOM score was quite skewed the natural logarithm transformed SCL SOM score was used in the SEM analyses. The SEM models are presented in the Figure 1. All SEM analyses were conducted using the SAS System's CALIS procedure (52).

A significance level  $p < .05$  was used in the analyses. The Kruskal-Wallis tests were performed using the Stata statistical package, version 9 (53), and the SEM analyses using the SAS statistical software, version 9.1 (52).

## RESULTS

The medians of SCL SOM score differed statistically significantly ( $p < .001$ ) between all groups in comparison (Table 1). Higher SCL SOM scores were associated with female

gender, older age, being widowed, lower level of education and income, somatic diagnoses, depression, anxiety, and dichotomized alexithymia.

The results of the SEM analyses are shown in Figure 1. All alexithymia variables were significantly associated with somatic symptom reporting. The unadjusted raw correlation between SCL SOM score and TAS-20 score was  $r = 0.32$  and the adjusted standardized path coefficient (which here has an interpretation of a correlation) between SCL SOM score and TAS-20 score was  $\beta = 0.22$  (Model I). The same parameter estimates between SCL SOM score and DIF score were 0.39 and 0.29 (Model II), between SCL SOM score and DDF score 0.20 and 0.13 (Model III), and between SCL SOM score and EOT score 0.15 and 0.06 (Model IV), respectively.

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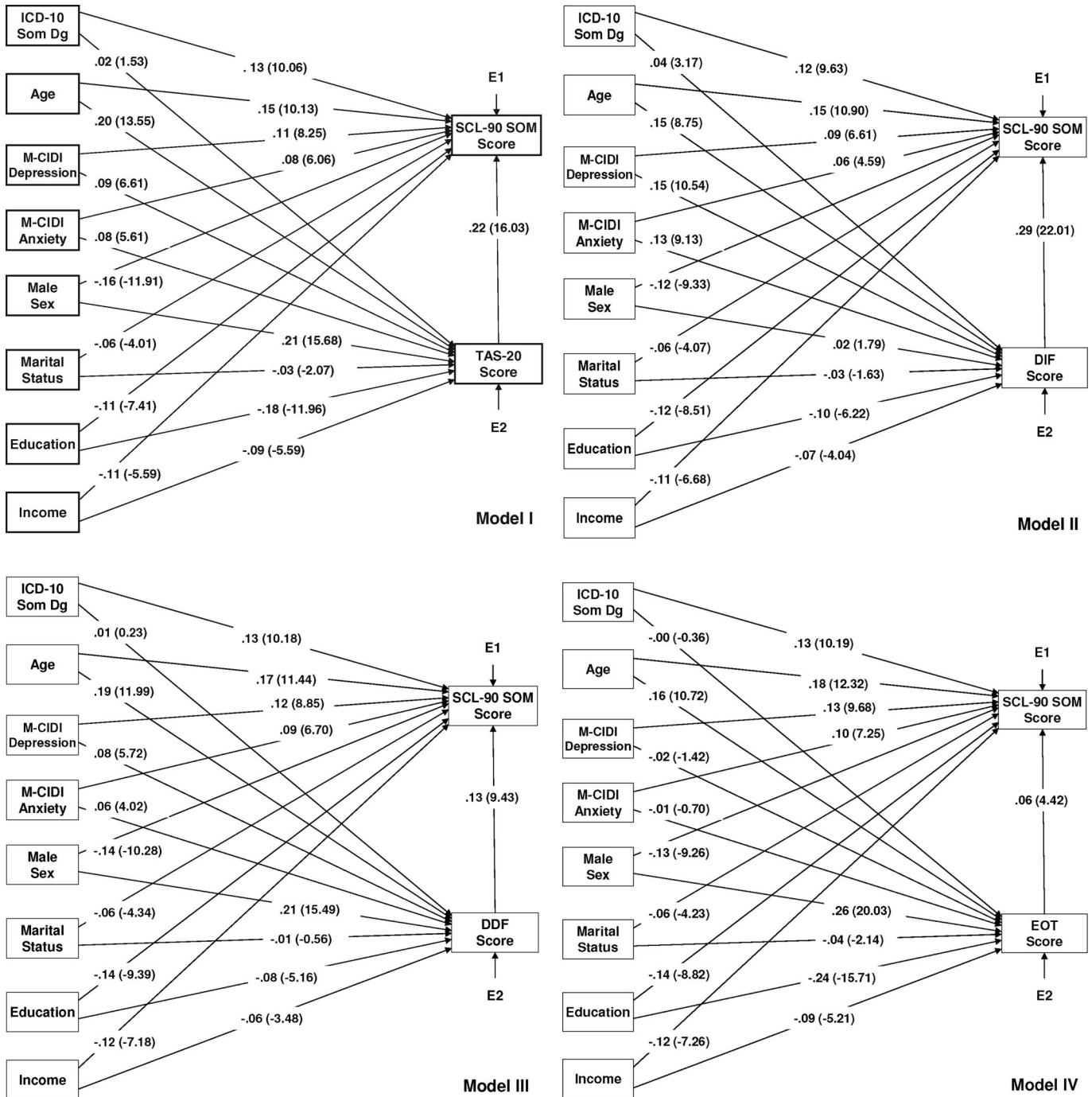


Figure 1. Structural equation models I-IV. Numbers printed on the single-headed arrows correspond to standardized path coefficients with *t* values in parentheses ( $t > 1.96$ :  $p < .05$ ;  $t > 2.58$ :  $p < .01$ ;  $t > 3.30$ :  $p < .001$ ). Note: the interpretation of the standardized path coefficients is here a correlation. Covariances between the exogenous variables are not printed in the models.

In addition, all health-related and sociodemographic variables were significantly associated with SCL SOM in every structural equation model. Older age, lower level of education, and lower income were significantly associated with all alexithymia variables. Having one or more ICD-10 somatic diagnoses was significantly associated with DIF score but not with TAS-20, DDF, and EOT scores. Depression and anxiety according to M-CIDI were associated with TAS-20, DIF, and DDF but not with EOT. Sex was significantly associated with

other alexithymia variables but not with DIF. Marital status was significantly associated with TAS-20 and EOT but not with DIF and DDF.

## DISCUSSION

We found that all alexithymia variables were associated with higher somatic symptom reporting in the general population even when physician verified somatic diseases, depressive and anxiety disorders, and sociodemographic factors were

controlled for. The independent associations between somatic symptom reporting and TAS-20, DIF, and DDF, respectively, were statistically significant but weak. Of the three factor scales of the TAS-20, DIF had a slightly stronger independent association with somatic symptom reporting than did general alexithymia. In the case of EOT, the independent association was statistically significant but without practical meaning.

In their quantitative review of studies on alexithymia and somatization, De Gucht and Heiser (19) calculated mean correlation coefficients between somatic symptom reporting and different alexithymia variables as follows: for general alexithymia  $r = 0.23$ , for DIF  $r = 0.35$ , for DDF  $r = 0.14$ , and for EOT  $r = -0.04$ . In other words, they found that the correlation between somatic symptom reporting and DIF was moderate, whereas the corresponding figures for general alexithymia and DDF indicated a weak association. The association between somatic symptom reporting and EOT was nonexistent. Our findings were quite similar to these and the order of the correlations was the same. In earlier studies, DIF has, indeed, repeatedly been the strongest dimension of alexithymia to be associated with somatization (19,25,54–59). The role of EOT has been commonly negligible (19). Lumley and Norman, however, found EOT to be related to a reduced likelihood of outpatient treatment and psychotherapy, but an increased likelihood of using preventive health service (60). All in all, our results concerning the TAS-20 factor scales were in accordance with the earlier studies.

This was the first time the association between alexithymia and somatization was established in a large, nationally representative nonclinical sample of both young and old adults. Contrary to most surveys, our study used a thorough physical examination and a structured mental health interview to verify diagnoses. Earlier, the association, or in some cases the absence of it, between alexithymia and somatization has mainly been demonstrated in clinical and student samples (10,19,23), largely without controlling for the essential confounding factors. Karvonen et al. (61) studied a 1002-subject sample of 31-year-old urban dwellers and found no association between somatization and alexithymia. Their study focused, however, on only one age group in one town. Hence, extrapolating the findings to general population has so far been quite problematic. As somatization is considered to be an important matter of public health (2,3,6,7), it is crucial to identify the factors that contribute to it. Our findings indicate that alexithymia may be one of the factors, albeit possibly not a very strong one, that increase the risk for somatization in general population.

Because of the cross-sectional design of our study, we cannot draw any conclusions as to whether alexithymia is a predisposing and sustaining factor for somatization or whether it is a secondary phenomenon accompanying aggravated somatic symptoms. In the present study, somatization was defined as the presence of somatic symptoms that cannot be sufficiently explained by a somatic disorder, and the symptoms were screened with a self-report scale. It should be noted that there is a risk of over-endorsement bias when somatic symptoms are elicited by a survey (2). The symptoms reported

may not cause any impairment in the subjects' lives or be of clinical relevance. However, this concerns both alexithymic and nonalexithymic individuals in our sample. In other words, it remains a fact that alexithymia was, for one reason or another, associated with higher symptom reporting, which may be an indication of alexithymia being a risk factor for somatization. There are few follow-up studies on alexithymia and somatization, and their results have been contradictory. Bach and Bach (62) performed a 2-year follow-up study on patients with medically unexplained symptoms and found a high alexithymia score to be predictive of an undifferentiated somatoform disorder at follow-up. De Gucht (63), following somatizing patients for 6 months, found that alexithymia remained substantially stable, whereas affective state dimensions changed significantly. Kooiman et al. (64) followed patients with medically unexplained physical symptoms (UPS) for 12 months. They found no association between the degree of alexithymia and UPS outcome. Prospective studies are needed to establish whether and to what extent alexithymia has predictive value for somatization.

We conducted our study using the TAS-20 as a measure of alexithymia. In recent years, there has been some criticism of the TAS-20. This has focused especially on the difficulties in replicating the factor structure of the TAS-20 and the associations of the TAS with negative affectivity (65,66). Lane et al. (15) questioned the ability of the TAS-20 to detect the most severe cases of alexithymia. Suslow et al. (67) found that DDF seems to evaluate aspects of social shame rather than difficulties in symbolizing one's emotions. However, the TAS-20 is the most widely used measure of alexithymia and so far the only alexithymia scale validated in Finnish. A new era is, however, beginning in alexithymia research. Bagby et al. (68) have created a new structured interview for alexithymia. In future studies, assessing alexithymia by interview may also give new insight to its association with somatization.

We could have conducted a SEM analysis by modeling the shared variance between DIF, DDF, and EOT as a latent variable, which may have been a statistically more appropriate approach to test our hypothesis. However, this operationalization has not been used in alexithymia research and consequently is hard to interpret. Therefore, we decided to conduct four separate analyses to facilitate the comparison between our findings and those from earlier studies. Otherwise, it would not have been possible to deduce what were the independent correlations between somatic symptom reporting and different alexithymia dimensions.

We created quite a crude variable of the ICD-10 somatic diagnoses. It encompassed a wide variety and combinations of diagnoses that were obviously not comparable with each other in terms of severity and symptom intensity. We find, anyhow, that it enabled us, to a certain degree, to control for medically unexplained symptoms, and thus increased the validity of our results.

In conclusion, we could establish an independent association between alexithymia and somatization, operationalized as elevated somatic symptom reporting, in a cross-sectional

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study design in a representative population sample comprising both young and old adults with and without somatic diseases. We could show that this association was independent of the most common mental disorders and sociodemographic factors. As alexithymia is quite a common phenomenon in general population, we deem it important to take it into account in health-care. Specific treatment strategies may be needed to help somatizing individuals with alexithymia to better deal with their symptoms and health-problems.

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