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ALEXITHYMIA AND RISK OF DEATH IN MIDDLE-AGED MEN

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Abstract—We prospectively examined the association between alexithymia and risk of death over an average follow-up time of nearly 5.5 years in 42- to 60-year-old men ($N=2297$) participating in the Kuopio Ischemic Heart Disease Risk Factor Study (KIHD). Alexithymia, impairment in identification, processing, and verbal expression of inner feelings, was assessed by the validated Toronto Alexithymia Scale (TAS). In age-adjusted survival analyses, men in the highest alexithymia quintile had a twofold greater risk of all-cause death ($p<0.001$) and a threefold greater risk of death from accidents, injury, or violence ($p<0.02$) relative to the men in the three lowest alexithymia quintiles. There was little evidence for confounding by behavioral factors (smoking, alcohol consumption, physical activity), physiological risk factors (LDL, HDL, body mass index, hypertension), socioeconomic status, marital status, perceived health, prior diseases and diagnoses, depressive symptoms or social connections. Consistent and even stronger associations between alexithymia and all-cause death were found in a healthy subgroup ($N=1650$). Why difficulties in dealing with emotions associate with increased mortality remains unclear. Our findings suggest that the association is independent from the effect of well-known behavioral, biological, and psychosocial risk factors. Copyright © 1996 Elsevier Science Inc.

Keywords: Alexithymia; Cohort study; Emotions; Epidemiology; Mortality; Population studies.

INTRODUCTION

Previous research has shown that alexithymia, impairment in identification, processing, and verbal expression of inner feelings [1, 2], associates cross-sectionally with many somatic syndromes and disorders, such as hypertension [3], rheumatoid arthritis [4], diabetes [5], chronic pain [6, 7], obesity [8] and various gastrointestinal problems [9, 10]. Todarello and coworkers have observed associations of alexithymia with breast cancer [11] and lymphocytic functions in cervical neoplasia [12] in patients who were unaware of their disease status. Eating disorders [13, 14], as well as substance abuse [15-17] and heavy drinking [18] have also been linked to alexithymic characteristics.

Does alexithymia underline, exacerbate, or even cause somatic health problems? From the epidemiologic point of view, addressing the issues of etiology and causality in a true follow-up setting has not been possible, because previous studies, with

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few exceptions [11, 19, 20], have been cross-sectional and have provided little information on potentially important confounding variables such as smoking, alcohol use, and prior or existing diseases. Another obstacle has been the operationalization of alexithymia; it has been difficult to interpret and compare the results from studies that examine the relationship between alexithymia and health due to the variation in ways of measuring alexithymia. The assessment methods have included the MMPI alexithymia scale [6], the Schalling-Sifneos Personality Scale [3, 8, 10–12, 15], The Beth Israel Questionnaire [4, 7, 10], projective tests [8], and the Toronto Alexithymia Scale [4, 7, 13, 14, 16–18]. The Toronto Alexithymia Scale (TAS) [21, 22] can be viewed as the first psychometrically well validated and reliable method to assess alexithymic characteristics.

The aim of the present study was to examine prospectively the association between alexithymia and risk of death from all causes in a population-based sample of middle-aged Finnish men who have participated in the Kuopio Ischemic Heart Disease Risk Factor Study (KIHD) [23]. The KIHD study is specifically designed to investigate previously unestablished but theoretically promising risk factors of ischemic heart disease and early death. As such, it includes a large number of behavioral, clinical and psychosocial assessments allowing examination of a variety of possible confounders.

METHOD

Study population

The participants in the Kuopio study (KIHD) were randomly selected from the general population in two cohorts [23]. Of 3433 eligible men aged 42, 48, 54, or 60 who resided in the town of Kuopio and surrounding rural communities, 198 were excluded because of death, serious disease, or migration away from the area. The total sample numbered 2682 (participation rate 82.9%). The medical and behavioral baseline examinations were conducted between March 1984 and December 1989. Alexithymic characteristics were assessed via questionnaire in May 1988, or during the baseline examination for those who entered the study later. Sociodemographic and other background characteristics of the sample have been described earlier [23–25]. The present analysis is based on 2297 respondents for whom complete information on both mortality and alexithymia score was available.

Outcome

All-cause mortality, including deaths due to diseases, injuries, suicides, and homicides, were ascertained by linkage to the national death registry. All deaths that occurred between the assessment of alexithymia and December 31, 1993 were included ($N=132$). Of these, 27 were classified as "external deaths" (suicides, homicides, injury deaths, accidental poisonings) based on the ICD-9 codes 800 and above. The average follow-up time for the participants was 5.3 years.

Assessment of alexithymia

The 26-item version of the Toronto Alexithymia Scale (TAS) [21] was used to assess alexithymia. The TAS has been validated both in other general adult populations [26, 27] and in this study population [24, 28, 29]. The original four-factor construct [21] was closely replicated in our previous validation study [24] and the scores were shown to be stable over time [24]. Cross-validation with a clinical interview [24] and other measures [24, 28] further suggested the validity of the measure. The distribution of the TAS was approximately normal with a skewness of -0.018 , a mean of 67.7 (SD 10.9), and a range from 33 to 107. The ranges for the five quintiles each constituting approximately one fifth of the study population were 33–58 (first), 59–64 (second), 65–70 (third), 71–77 (fourth), and 78–107 (fifth quintile). The first three quintiles (60.0% of the study population) were grouped together and defined as "nonalexithymic." Those men who were in the fourth quintile (20.9%) were considered "moderately alexithymic," and the men in the highest quintile (19.1%) formed a "highly alexithymic" group. Thus, the highest quintile included men who clearly scored above the cutoff score of 74, which has been widely used as an empirically established cutoff point for identifying alexithymic individuals.

Covariates

Comprehensive information on medical history, health status, and behavioral lifestyle of the participants was obtained at the baseline examination. The participants were asked about their self-perceived health in the questionnaire; diagnosed health conditions were reported on a list of 31 chronic and acute conditions. Of these, we used 17 major conditions for the present analyses. Both highest educational degree and reported personal income over the past 12 months were used as indicators of socioeconomic position [30]. Smoking status was categorized as never, former, or current. The assessment of alcohol use, in grams per week, was based on the quantity–frequency recall method using the Nordic Alcohol Consumption Inventory [18, 31]. The combined index of intensity and duration of leisure time physical activity was calculated and expressed in metabolic units (METs) [32]. To control for obesity, we measured body mass index as weight in kilograms divided by height in meters squared. The measurement of blood pressure and separation of lipoprotein fractions from unfrozen plasma samples were carried out according to standard epidemiologic guidelines, and the determination of hypertension followed the WHO definition [33]. Different aspects of social connections were assessed in the questionnaire. We utilized the social connection scales that have shown to predict mortality in the KIHHD study: (Participation in organizations, Quality of relationships, and Availability of social support) [34]. The results reported here use organizational participation as the cofactor, which had the strongest effect on the alexithymia coefficients; modeling with other social connection variables did not alter the results or the conclusions. Some studies have shown moderate correlations between alexithymia score and depression, although there is controversy surrounding this issue [35–37]. To check possible confounding by depression, we included the MMPI depression subscale with *t*-score conversion [38] in our analyses.

Statistical analyses

The association between levels of alexithymia and death from all causes was assessed with the Cox proportional hazards model [39], a multivariate method that models the relation between a set of explanatory variables (risk factors) and the outcome and takes into account the individually different follow-up times of each participant. We examined age-adjusted models with two dummy variables representing the fourth (“moderately alexithymic”) and fifth (“highly alexithymic”) quintile of the TAS score. The 60% of men with the lowest alexithymia scores (“nonalexithymics”) were the reference group. We also fitted separate age-adjusted models in which behavioral risk factors (smoking, alcohol use, physical activity), socioeconomic factors (income and education), biophysiological parameters (LDL, HDL, body mass index, hypertension), social connections, health status (prior diagnoses and perceived health), and depression were included one set at a time. Finally, we examined the relationships in a full model which included all the covariates. To further address the issue of confounding from existing chronic disorders, we performed additional analyses on the subgroup of men ($N=1650$) who reported no history of ischemic heart disease, stroke, or cancer.

RESULTS

We had full information on the alexithymia score, age, marital status, smoking status, follow-up time and outcome for a total of 2297 men. Of these, information about income was missing in 32 men (1.4%), about low-density lipoprotein (LDL) in 49 men (2.1%), about high-density lipoprotein (HDL) in 36 men (1.6%), and about the depression score in 46 men (2.0%). For all other covariates the proportion of missing values was under 1%. Because the number of missing values was low, but due to the large number of covariates, restricting the analyses to respondents with no missing data would lead to unnecessary loss of power. Instead, mean values were used for missing continuous variables. For education we used the mode category, for income the third quintile, and for hypertension the conservative lower risk value (no hypertension).

Age-adjusted mortality

There were 132 deaths from any cause during the follow-up time. Of these, 27 (20.4%) were due to external causes. Table I shows the number of deaths and the associated crude mortality rates at the three levels of alexithymia.

Table I.—All-cause mortality and external causes of death at the three levels of alexithymia in 42–60-year-old Finnish men ($N = 2297$)*

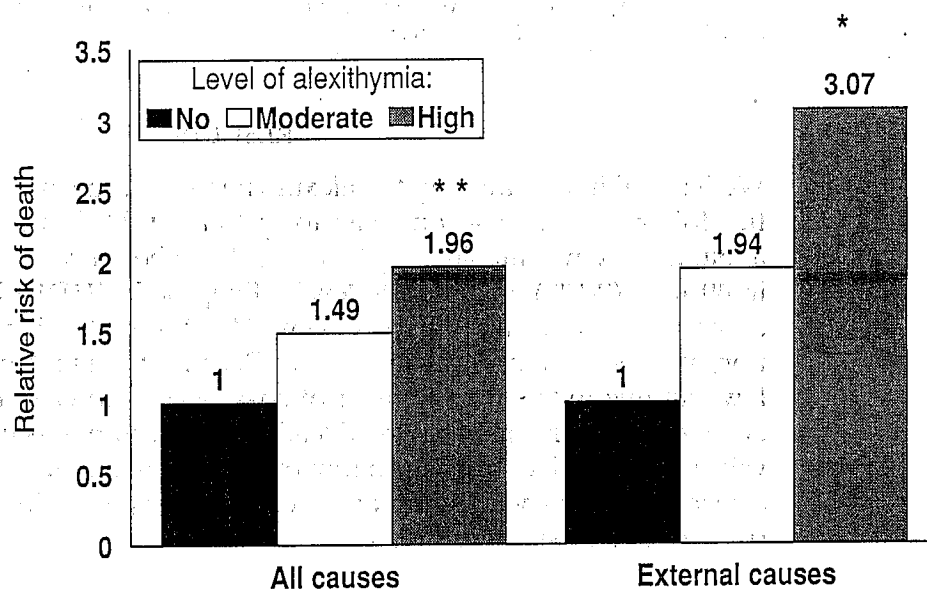
Level of alexithymia	N (%)	All-cause mortality		External causes of death	
		Deaths	Crude mortality rate per 1000	Deaths	Crude mortality rate per 1000
Nonalexithymics (reference group)	1374 (60.0)	60	44	10	7
Moderate alexithymia	486 (20.9)	33	67	7	14
High alexithymia	438 (19.1)	39	89	10	23

* Nonalexithymics = the quintiles 1–3 of the TAS score; Moderate alexithymia = the fourth quintile of the TAS; High alexithymia = the fifth quintile of the TAS.

The age-adjusted Cox model indicated that the men in the highest quintile of the alexithymia score were at significantly increased risk of dying from any cause [RH 1.96 (95% CI=1.31–2.94)] as compared to the reference group. For the men in the fourth quintile, the risk of death relative to the nonalexithymic group was 1.49 (95% CI=0.98–2.28). For external causes of death, the relative risks were even higher: for the men in the fifth quintile it was 3.07 (95% CI=1.28–7.38), and for the men in the fourth quintile it was 1.94 (95% CI=0.74–5.09), as compared to the reference group. The age-adjusted relative risks of death from any cause and from external causes at each alexithymia level are shown in Fig. 1.

Adjustment for covariates

The relationship between alexithymia and death from any cause was somewhat attenuated after adjustment for socioeconomic position, behavioral and biological



** $p < 0.001$ * $p < 0.05$

Fig. 1. Age-adjusted relative risk of death from all causes and from external causes (injuries, suicides, violence) in middle-aged Finnish men, by level of alexithymia.

Table II.—Relative risks (with 95% confidence intervals) of all-cause mortality by the level of alexithymia

Adjusted for:	Nonalexithymic reference group (TAS quintiles 1–3)	Moderately alexithymic (TAS quintile 4)	Highly alexithymic (TAS quintile 5)
Age	1.0	1.49 (0.98–2.28)	1.96 (1.31–2.94)†
Age, behavioral risk factors ^a	1.0	1.35 (0.88–2.08)	1.75 (1.17–2.62)†
Age, income, education	1.0	1.42 (0.92–2.18)	1.82 (1.20–2.74)†
Age, health status, ^b perceived health	1.0	1.47 (0.96–2.24)	1.72 (1.15–2.59)†
Age, biological risk factors ^c	1.0	1.48 (0.97–2.27)	1.90 (1.27–2.85)†
Age, marital status, social connections ^d	1.0	1.40 (0.91–2.14)	1.72 (1.14–2.60)†
Age, depression	1.0	1.49 (0.98–2.29)	1.96 (1.30–2.96)†
Every covariate (full model)	1.0	1.32 (0.85–2.04)	1.54 (1.01–2.36)*

^a Smoking, alcohol use, leisure-time physical activity.

^b Sum of 17 diagnoses and conditions.

^c LDL, HDL, hypertension, body mass index.

^d Participation in organizations.

* $p < 0.05$.

† $p < 0.01$.

risk factors, social connections and marital status, prior diagnoses and perceived health, or depressive symptoms (Table II). However, the relative risk between the highest alexithymia quintile and the three lowest quintiles remained significant in every model including the full model. The largest decreases in the relative risk estimates for high alexithymia were observed when prior diseases and perceived health were included (–25% drop in the excess risk). A similar decrease (–25%) was observed when marital status and social connections were added. In the full model the reduction in the excess risk was –43.8%.

Table III shows the adjusted relative risks of external death as estimated by Cox models with the same sets of covariates. The models did reveal some confounding from the covariates; the magnitude of the relative risk was diminished but remained statistically significant between the fifth quintile and the three lowest quintiles in ev-

Table III.—Relative risks (with 95% confidence intervals) of death from external causes by the level of alexithymia

Adjusted for:	Nonalexithymic reference group (TAS quintiles 1–3)	Moderately alexithymic (TAS quintile 4)	Highly alexithymic (TAS quintile 5)
Age	1.0	1.94 (0.74–5.09)	3.07 (1.28–7.38)*
Age, behavioral risk factors	1.0	1.71 (0.64–4.55)	2.70 (1.12–6.53)*
Age, income, education	1.0	1.72 (0.65–4.56)	2.62 (1.07–6.41)*
Age, health status, perceived health	1.0	1.91 (0.73–5.04)	2.74 (1.13–6.65)*
Age, biological risk factors	1.0	1.94 (0.74–5.12)	2.96 (1.23–7.13)*
Age, marital status, social connections	1.0	1.80 (0.68–4.76)	2.70 (1.10–6.62)*
Age, depression	1.0	2.00 (0.76–5.25)	3.31 (1.36–8.06)†
Every covariate (full model)	1.0	1.65 (0.61–4.47)	2.30 (0.91–5.80)

* $p < 0.05$.

† $p < 0.01$.

Table IV.—Relative risks (with 95% confidence intervals) of all-cause mortality (67 cases) by the level of alexithymia in men with no prior coronary heart disease, stroke, or cancer diagnosis ($N = 1650$)

Adjusted for:	Nonalexithymic reference group (TAS quintiles 1–3)	Moderately alexithymic (TAS quintile 4)	Highly alexithymic (TAS quintile 5)
Age	1.0	1.80 (1.00–3.25)*	2.46 (1.39–4.35)†
Age, behavioral risk factors	1.0	1.71 (0.95–3.09)	2.25 (1.27–3.99)†
Age, income, education	1.0	1.66 (0.92–3.01)	2.17 (1.22–3.89)†
Age, health status, perceived health	1.0	1.82 (1.01–3.28)*	2.34 (1.32–4.15)†
Age, biological risk factors	1.0	1.82 (1.01–3.29)*	2.27 (1.28–4.02)†
Age, marital status, social connections	1.0	1.73 (0.96–3.14)	2.23 (1.25–4.00)†
Age, depression	1.0	1.78 (0.99–3.21)	2.35 (1.31–4.19)†
Every covariate (full model)	1.0	1.72 (0.94–3.14)	1.83 (1.00–3.35)‡

* $p < 0.05$.

† $p < 0.01$.

‡ $p = 0.051$.

ery separate model. Adjustment for income and education decreased the excess risk between the highest and the lowest alexithymia group by -21.7% and adjustment for smoking, alcohol use, and physical activity by -17.9% . A reduction of -17.9% was also seen after adjustment for marital status and social connections. The only other variable besides high alexithymia that significantly predicted mortality from external causes was income, which had an inverse relationship with the outcome ($p < 0.05$). In the full model none of the explanatory variables was significantly related to the risk of death from external causes. The relative risk between the highest and the lowest alexithymia groups reached marginal statistical significance; the excess risk reduction was -37.2% .

Analyses in the healthier subgroup

There were 67 deaths among those ($N=1650$) who reported no prior diagnoses of coronary heart disease, cancer, or stroke. The associations between alexithymia and all-cause mortality were generally stronger in this healthier subgroup than in the total sample (Table IV). Relative to the lowest three alexithymia quintiles, men in the fourth quintile had a 1.80-fold (95% CI=1.001–3.25) higher risk, and men in the highest quintile a 2.46-fold (95% CI=1.39–4.35) higher risk of all-cause death during the follow-up. Again, the magnitude of the estimates was affected by adjustment for the covariates (-43.2% reduction in the excess risk in the full model), but the relative risk between the fifth TAS quintile and the nonalexithymic reference group remained statistically significant in every separate model and was marginally significant ($p=0.051$) in the full model with all covariates.

DISCUSSION

We found a quite strong association between high level of alexithymia and the risk of death in middle-aged Finnish men during the average follow-up time of almost 5.5 years. In particular, the risk of death from external causes, such as injury,

suicide, and homicide, was increased in the highly alexithymic men as compared to the nonalexithymics. Although the absolute numbers of external deaths were quite small, the association remained statistically significant after controlling for various sets of covariates.

Diagnosed diseases at the baseline did not explain the observed relationship. The magnitude of the association was even stronger in a healthier subgroup; for instance, in men who had no major cardiovascular diseases or diagnosed cancer at the start of the follow-up.

It has been suggested that depression may predict risk of mortality from coronary heart disease and other cardiovascular diseases [40, 41]. On the other hand, there is some, although incongruent, evidence from earlier studies showing association between alexithymic characteristics and symptoms of depression [35, 36]. Thus, depression could be a potential confounder of the observed relationship. However, the association between high alexithymia and increased risk of death was not remarkably altered following adjustment for depressive symptoms, measured by the MMPI-D scale. This lack of confounding suggests that alexithymia is related to mortality independently of depression. Furthermore, we have previously found that depression is unrelated to all-cause mortality in the KIH D study [42].

There may be important health conditions or psychiatric problems other than depression that we were not able to control for. But, to account for the observed relationship, these conditions should associate with alexithymia and also be strong predictors of mortality. Adjustment for 17 diagnoses in this study did little to alter the estimated relative risks, which argues against this possibility.

We have earlier reported that men with alexithymic features more often than others are unmarried, come from lower socioeconomic groups, have less education and tend to be socially isolated [25]. There is accumulating evidence in social epidemiology [43–45] that these factors are very important with respect to morbidity and mortality risk in almost all populations. Theoretically, alexithymic individuals may have less supportive environments because of their personality style [25], and the relative lack of social support would thus mediate, or modify, the alexithymia–mortality relationship. In the present study, however, socioeconomic background factors, and social support obtained from marriage or other social ties may only partially explain why the men with high alexithymia scores are at an increased risk of death. The alexithymic men in this sample reported using more alcohol than nonalexithymic men [18]. While alcohol is a known risk factor for many causes of death, adjustment for differences in drinking or in other behavioral and biological risk factors did not fully account for higher all-cause or external mortality. However, the cross-sectional measurement of alexithymia and other risk factors in the study does not permit a full exploration of the causal pathways which link these factors and alexithymia. Also, there may be residual confounding due to imprecise measurement and risk factor changes over time.

The association was stronger with external causes, even when alcohol and depressive symptoms were taken into account. Whether or not the alexithymic men are specifically prone to suicides, accidents or violent deaths remains unclear until the number of events in the follow-up becomes sufficient enough to permit such detailed analyses.

While there is a wide agreement that the core aspects of alexithymia are inability

to identify, process, and expressively label inner feelings [1, 2, 21, 22], it is possible that the TAS score may not adequately measure these characteristics. The TAS and its revised version [22] are in any case the most carefully validated measures of alexithymia and they are also feasible for population studies. This conclusion was reinforced by the cross-validation of the TAS with psychiatric interview and the Beth Israel Questionnaire in our sample [24].

The present study is the first prospective epidemiologic follow-up that set out to examine the association of alexithymic features with mortality in a nonclinical population. Our finding that high alexithymia score independently predicts mortality is very interesting. However, even the prospective study design is not sufficiently complex to truly explore causal mechanisms. We need more studies in different populations and better understanding of the natural history of alexithymia. The present results suggest that high score on the TAS scale may be considered as a marker of increased mortality risk, yet the mechanisms remain to be clarified.

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The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

Furthermore, it highlights the need for regular audits and reviews to identify any discrepancies or areas for improvement. This process should be conducted in a systematic and thorough manner to ensure the highest level of accuracy.

In addition, the document stresses the importance of clear communication and collaboration between all departments. This will help to ensure that everyone is working towards the same goals and objectives, and that any issues are resolved promptly.

Overall, the document provides a comprehensive overview of the organization's current state and outlines the key areas for focus and improvement. It is intended to serve as a guide for all employees and to ensure that the organization remains on track to achieve its long-term vision.

The second part of the document details the specific responsibilities and roles of each department. It provides a clear framework for how each team should operate and how they should interact with one another to ensure the most effective use of resources.

It also outlines the key performance indicators (KPIs) that will be used to measure the success of each department and the organization as a whole. These KPIs will be reviewed regularly to ensure that everyone is meeting their targets and contributing to the overall success of the organization.

Finally, the document concludes with a call to action, encouraging all employees to take ownership of their roles and to work together to achieve the organization's goals. It emphasizes that success is only possible if everyone is committed and working towards the same objectives.

The document is intended to be a living document, one that will be updated and revised as the organization's needs and goals evolve. It is the responsibility of all employees to ensure that the document remains relevant and effective in guiding the organization's operations.

In closing, the document expresses the organization's confidence in its employees and its commitment to providing a supportive and challenging work environment. It hopes that this document will serve as a valuable resource for all employees and help to drive the organization's success.

The document is signed by the CEO, who expresses their appreciation for the hard work and dedication of all employees. They encourage everyone to continue to strive for excellence and to work together to create a bright future for the organization.