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Journal of Psychosomatic Research 58 (2005) 513–521

Journal of Psychosomatic Research

The associations of emotion regulation and dysregulation with the metabolic syndrome factor

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Abstract

Objective: Emotion regulation has been associated with good, and dysregulation with poor subjective health; but it is unclear if emotion regulation is related to metabolic syndrome. **Methods:** Associations between the metabolic syndrome factor (systolic and diastolic blood pressure, waist circumference, high-density lipoprotein, triglycerides, and glucose), emotion regulation (the strategies of repair and maintenance, self-perceived emotion regulation) and dysregulation (emotional ambivalence); and subjective health (self-rated health and psychosomatic symptoms) were studied using a structural equation modelling (SEM) approach. The participants (96 women, 85 men) were drawn from the Jyväskylä Longitudinal Study of Personality and Social Development (JYLS). **Results:** High repair was associated directly to the low metabolic syndrome factor, while high maintenance, high self-perceived emotion regulation, and low emotional ambivalence were related indirectly to the low metabolic syndrome factor through good subjective health. **Conclusions:** Successful emotion regulation may have an association not only with the subjective experience of health, but also with physiological regulation systems, leading to a reduced risk for metabolic syndrome.

Keywords: Metabolic syndrome; Emotion regulation and dysregulation; Subjective health

Introduction

Metabolic syndrome, consisting of insulin resistance, abdominal obesity, hypertension, dyslipidemia, and microalbuminuria, is a well-known risk factor for cardiovascular disease and diabetes [1]. The discoveries of neuro-endocrinal responses to emotion regulation offer grounds for assuming that emotion regulation may play a role in the development of metabolic syndrome. Physiological responses to emotion regulation include the hypothalamic–pituitary–adrenal (HPA) axis [2,3] and the autonomic nervous system [2–8], which have been considered as likely factors establishing the underlying mechanisms for metabolic syndrome [9–11]. The activation, or inhibition, of these systems by emotion regulation may lead to changes in some of the components of metabolic syndrome and therefore increase, or decrease, the risk for it. In this study, we investigated the relation of emotion regulation and dysregulation to the metabolic syndrome factor.

Associations between emotion regulation and subjective health, and between subjective health and metabolic syndrome provide an additional view of the role of subjective health in the pathway between emotion regulation and metabolic syndrome. Emotion regulation, through its function in repairing a negative emotion in a more positive direction has been associated with low levels of self-reported physical symptoms [12,13], good general health, increased vitality, and fewer limitations imposed by pain [14]. In contrast, emotion dysregulation, manifested by emotional ambivalence, was linked to increased physical symptoms and psychological distress [15,16]. Moreover, a high level of self-reported physical symptoms, low quality of life with regard to its physical aspects [17], and distress [18] were related to high incidence of metabolic syndrome. In the light of these findings, there seems to be a possibility that good subjective health protects individuals from metabolic syn-

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doi:10.1016/j.jpsychores.2005.02.004

drome. Whether subjective health also has a role in the relationship between metabolic syndrome and emotion regulation is unclear.

The ongoing Jyväskylä Longitudinal Study of Personality and Social Development (JYLS; [19,20]) provided an opportunity to investigate these connections. We expected emotion regulation to be positively, and dysregulation negatively associated with the low metabolic syndrome factor and with good subjective health. Furthermore, good subjective health was assumed to be related to the low metabolic syndrome factor. We expected that the same connections would be found in men and women, although men—at least in European cohorts—have a higher prevalence of metabolic syndrome [21,22]. No sex differences in the strategies of repair (used for repairing negative emotions) and maintenance (used for maintaining the current emotion), or emotional ambivalence have been reported, although emotion regulation, in general, is more characteristic of women [23,24], and some differences between men and women have been observed, with respect of the emotion regulation strategies they use [25,26]. Women tend to report more physical symptoms than men do [27–30], but in Finland, sex differences in physical symptoms have declined during the last decade [31], and we have not found any sex differences in psychosomatic symptom reports previously [32].

Methods

Participants

This study was part of the JYLS study. The original sample of three hundred sixty-nine 8-year-old children, born in 1959, was drawn from 12 randomly selected second-grade school classes from both urban and suburban areas of the medium-sized town of Jyväskylä in Central Finland in 1968. The present study was based on data waves at ages 36 and 42, when the participants were personally interviewed by specially trained interviewers. At age 42, a medical examination, with laboratory tests, was additionally performed between January 2001 and September 2001.

The participants in the present study were 85 men and 96 women, none of whom suffered from serious illnesses. Full data concerning their health and their emotion regulation and dysregulation at ages 36 and 42 were available for all of them. Two potential participants were excluded from the analyses because of cytostatic treatment, one participant because of untreated hyperthyroidism, and one because of unstable Type 1 diabetes.

The women were more highly educated than the men: 45% of the women and 24% of the men were secondary-school graduates [$\chi^2(3)=10.8$, $P<.05$]. Consequently, men were more often blue-collar workers (56% of men and 10% of women) and women more often lower white-collar workers [68% of women and 17% of men; $\chi^2(2)=56.5$, $P<.01$], but there were no sex differences among the higher white-collar workers (27% of men and 22% of women). In terms of marital status, 19% of the participants were single, 64% were married, and 16% were divorced, without sex differences. The sample turned out to be representative of the age cohort born in 1959, when data on marital status and employment provided by Statistics Finland (2001) were used as criteria. In the length of education, the male participants did not differ from their age cohort. Female participants, however, had a slightly longer education than women in their age cohort, as a consequence of which female participants were slightly more often in lower white-collar occupations and less often in blue-collar occupations than were women in their age cohort group. A difference did not exist in higher white-collar occupations.

Variables

Metabolic syndrome

A one-factor model of metabolic syndrome at age 42 was constructed with structural equation modelling (SEM) approach using the following six variables. *Systolic (SBP) and diastolic (DBP) blood pressures* were measured twice, using a standard mercury sphygmomanometer in a sitting position after a 15-min rest, measurement taken from the right arm, to the nearest 2 mm Hg. The second measurement was used in the analyses. *Waist circumference* was measured midway between the lowest rib margin and the iliac crest. The blood samples for measurements of *high-density lipoprotein (HDL cholesterol)*, *triglycerides*, and *plasma glucose* were taken after an overnight fast at each participant's local health centre and were sent to the Central Finland Clinical Laboratory in Jyväskylä for analysis. They were determined by enzymatic methods using an automatic analyzer equipment (Hitachi 917, Tokyo, Japan) and reagents from Boehring, Mannheim, Germany, for HDL cholesterol (HDL/LDL-C Plus Kit No.1930648) and glucose (GLU Kit No. 1876899), and from Roche, Basel, Switzerland, for triglycerides (TG GPO-PAP Kit No. 1730711).

Participants having three or more of the following criteria were defined as having metabolic syndrome as suggested by Ford et al. [33]: blood pressure 130/85 or more, triglycerides $\geq$1.7 mmol/l, plasma glucose $\geq$6.1 mmol/l, waist circumference over 102 cm for men and over 88 cm for women, and HDL cholesterol under 1.04 mmol/l for men and 1.29 mmol/l for women.

Emotion regulation

Emotion regulation was indexed by the self-rated cognitive emotion regulation strategies of repair and maintenance, and by self-perceived emotion regulation. The emotion regulation strategies of repair and maintenance were measured at ages 36 and 42, with items taken from the Meta-Regulation Scale (MRS; [34]). Repair was a sum score of the items "I am imagining something nice to