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Sense of Coherence, Smoking Status, Biochemical Cardiovascular Risk Factors and Body Mass in Blue Collar Workers—Short Report

Anna Najder, MA[1]

Abstract

The crucial cause of cardiovascular disorders is atherosclerosis developed by abnormal cholesterols levels or disorders affecting blood glucose. One of the best-known cardiovascular risk factors is also tobacco smoking. Simultaneously, sense of coherence (SoC) as a personal resource motivating to managing one's own health behaviors, such as avoiding tobacco smoking, was reported to be protective against coronary heart disease. Such association was observed in white-collar workers but not in blue-collar workers. According to the above, the present article aims to establish relationships between SoC, smoking behaviors, biochemical markers (BM): lipids and glucose levels and body mass index (BMI) in blue-collar workers.

Sense of Coherence Questionnaire (SOC-29), fasting blood test, and BMI were used to assess such relationships. The study group consisted of 304 Polish males working 8-hr shifts in a 4-brigade rotating system.

The analysis revealed that SoC level did not differ depending on smoking behavior. The analysis also showed no differences in BMI and BM depending on SoC. Concerning smoking status, the study group was divided into three subgroups which differed regarding triglycerides and glucose levels.

The present findings considering SoC indicate that any psychological construct should not be studied separately because probably only some sets of different features may influence one's behavior and BM as well.

Keywords

sense of coherence, tobacco use, cardiovascular risk factors, blue-collar workers

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Introduction

Cardiovascular diseases (CVD) are the most common death risks in western societies, thus researchers try to establish predictors and facilitators of good health to effectively prevent CVD. One of the best-known cardiovascular risk factors (CRF) is tobacco smoking. Smoking significantly increases the risk of acute coronary events including heart attacks and cardiovascular death (Zhu, Guo, & Hong, 2016). Quitting smoking does not necessarily mean comparable health indices to those achieved by never-smokers (Dicker, Feldman, Leventer-Roberts, & Benis, 2016).

Some efforts have been made to establish factors of maintaining and recovering health. As a consequence, psychological resources have been proved to foster beneficial behaviors for health and well-being. Since Antonovsky developed his salutogenic approach, considerable attention

has been paid to sense of coherence (SoC). Strong SoC is believed to associate with healthy lifestyle and fewer atherosclerotic risk factors. Individuals with the strongest SoC are less likely to be overweight, have higher fasting blood sugar level, dyslipidemia, and metabolic syndrome (Morita et al., 2014).

The present article reports preliminary findings on the associations between personal resources, lifestyle factors, and CRF in blue-collar shift workers, namely, SoC,

[1]Department of Health and Work Psychology, Nofer Institute of Occupational Medicine, Łódź, Poland

Corresponding Author:
Anna Najder, MA, Department of Health and Work Psychology, Nofer Institute of Occupational Medicine, ul. Św. Teresy od Dzieciątka Jezus 8, 91-348 Łódź, Poland
Email: anna.najder@imp.lodz.pl

smoking status, lipids and glucose blood concentration, and body mass index (BMI).

Body Mass Index and Biochemical Markers of CVD

The crucial cause of CVD is atherosclerosis developed by increased BM: total cholesterol (TC) and low-density lipoproteins (LDL-cholesterol, LDL-C) (Piepoli et al., 2016a), lower high-density lipoproteins level (HDL-cholesterol, HDL-C) (Catapano et al., 2011; Perk et al., 2012), or disorders affecting blood glucose (Mancia et al., 2013). Combination of abnormal lipids concentration is strongly associated with CVD but increased levels of LDL-C, TC and triglycerides (TG) are also significant independent CVD risk factors (Catapano et al., 2011; Perk et al., 2012; Piepoli et al., 2016b).

Another crucial CRF is excessive body weight (the most often measured with body mass index, BMI) resulting in increased insulin resistance, blood pressure, and lipid disorders (Davin, Vollenweider, Waeber, Paccaud, & Marques–Vidal, 2012). Overweight/obese individuals suffer from endothelial dysfunctions, heart failures, coronary artery diseases, atrial fibrillation, or systolic and diastolic dysfunctions (Perk et al., 2012). Severe obesity is also associated with abnormalities of cardiac structure and function (Benotti, Bistrain, Benotti, Blackburn, & Forse, 1992).

Smoking

Smoking is a greater risk factor of myocardial infraction than obesity in both active- and ex-smokers (Dicker et al., 2016). Interestingly, ex-smokers had higher BMI, whereas active-smokers had lower BMI than never-smokers (Kawada et al., 2010; Liao et al., 2016). Comparing to smokers, nonsmokers have more favorable lipid profile (Kar et al., 2016). Studies also report that the higher the nicotine level, the higher the concentration of TC and TG and lower HDL-C (Sanip, Suhaimi, Man, Rasool, & Yusoff, 2016) are presented. Smoking more than five cigarettes a day significantly increases also LDL-C (Prastyanto, Sitaresmi, & Julia, 2014). The crucial point is the fact that to some extent such changes are reversible because just one year after smoking cessation the risk of cardiovascular death is 50% lower compared to active-smokers (Kawecka-Jaszcz et al., 2007).

Sense of Coherence

SoC is a personal feature regarding beliefs about world, oneself, and one's own interpersonal relationships. SoC is a comprehensive orientation, expressing sense of confidence that the stimuli deriving from environment in the course of life are structured, predictable, and explicable. An individual of strong SoC is able to use available resources to meet demands posed by these stimuli and treat these demands as challenges worth one's engagement (Ogińska-Bulik & Juczyński, 2010). SoC is widely accepted to be associated with health-related general belief (El-Shahawy, Sun, Tsai, Rohrbach, & Sussman, 2015), playing a vital role in health improvement, protection, and recovery. It motivates to manage one's own health behaviors such as healthy diet, regular physical activity, or avoiding risky behaviors like smoking (Sęk & Pasikowski, 2001).

Strong SoC is associated with a 30% mortality reduction from CVD or cancer and with resilience to the risk of chronic diseases (Geulayov, Drory, Novikov, & Dankner, 2015; Surtees, Wainwright, Luben, Khaw, & Day, 2003). Although SoC is a good predictor of making successful lifestyle changes (Nilsen, Bakke, Rohde, & Gallefoss, 2015), for example, reducing alcohol consumption (Grevenstein, Bluemke, Nagy, Wippermann, & Kroeninger-Jungaberle, 2014), Lindmark, Hakeberg, and Hugoson (2011) studies revealed that SoC does not display significant relationships with smoking habits (Lindmark et al., 2011). Although Poppius Tenkanen, Kalimo, and Heinsalmi (1999) reported that SoC was protective against coronary heart disease in white-collar workers, such association was not observed in blue-collar workers (Poppius et al., 1999). The explanation of the aforementioned difference may be the results indicating several characteristics of men who tend to take care of own health: high socio-economic status, having managerial position, interesting job and money, fulfilment in life and what is especially important—belonging to such social group in which it is appropriate to take care of health (Cianciara, 2012). Blue-collar workers usually do routine, low-paid jobs being less skilled than white-collar workers. It is supposed that they have poorer personal resources in general therefore it is justified to verify whether the level of SoC is linked to smoking and other CRF in this group.

Aim

The present article aims to establish relationships between SoC, smoking behaviors, BMI, and BM in blue-collar workers. First question was whether individuals of various smoking history differ in SoC. Since SoC is believed to be associated with taking care of health, it was assumed that nonsmokers show the strongest SoC. As smoking cessation requires being resourceful, ex-smokers seem to show stronger SoC than active-smokers. Second, the article aimed to determine the differences between individuals of stronger and lower SoC as concerns their BMI and BM. Based on the previous research, it was assumed that stronger SoC is related to lower TC,

Table 1. Characteristic of the Research Group in Reference to Smoking Status.

Smoking status	N (%)	Age (years) M (SD), min.–max.	Years of smoking M (SD), min.–max.
Never-smokers	83 (27.3%)	44.0 (8.7), 25–60	n.a.
Active-smokers	95 (31.3%)	46.5 (8.8), 24–61	22.6 (10.1), 1–45
Ex-smokers	126 (41.4%)	46.9 (7.6), 26–59	14.5 (8.6), 1–36

Note. n.a. = not applicable.

Table 2. Differences in Biochemical Cardiovascular Risk Factors in Respect to Smoking Status.

Cardiovascular risk factors	Never-smokers [M (SD)]	Active-smokers [M (SD)]	Ex-smokers [M (SD)]	χ^2
TC (mg/dl)	208.67	221.62	219.19	0.67
LDL-C (mg/dl)	131.60	137.12	134.33	4.16
HDL-C (mg/dl)	47.55	47.04	47.13	0.74
TG (mg/dl)	143.37	201.24	194.09	6.95*
Glucose (mg/dl)	86.37	100.27	96.62	14.11*

Note. TC = total cholesterol; LDL-C = LDL cholesterol; HDL-C = HDL cholesterol; TG = triglycerides.
*$p < .01$.

LDL-C, TG, glucose and BMI, and higher HDL-C. The last goal was to verify whether BM characteristics are different depending on respondents' smoking habits. As never-smokers are at lower risk of CVD and smoking cessation brings beneficial impact on health, it was assumed that active-smokers have the highest levels of TC, LDL-C, TG, glucose, and the lowest HDL-C as well as that ex-smokers have lower levels of the aforementioned BM than active-smokers.

Material and Methods

Study Procedure

The study consisted of (a) biochemical blood tests and anthropometric measurements made by a nurse and (b) self-assessment of SoC.

For the selection of homogenous group of workers, the criterion of occupational energy expenditure resulting from type of work was applied. Blue-collar workers employed in departments of coke and carbonaceous substances production were included, whereas other workers of the enterprise were excluded.

Methods

Fasting blood for the analysis of BM was collected according to venous blood collection standards with a closed system. To assess BMI, the measurements of body weight and height were done with the use of scale and stadiometer.

Sense of Coherence Questionnaire (SOC-29) developed by Antonovsky was used to measure the global level of SoC. Respondents may referred to 29 items concerning different life experiences using 7-point scale. The higher the global score, the stronger the SoC. The Polish version of SOC-29 has satisfactory psychometric properties (Koniarek, Dudek, & Makowska, 1993).

The study group was then divided into two SoC subgroups based on SoC median: higher and lower SoC.

Research Group

The study group consisted of 304 Polish males working 8-hour shifts in a 4-brigade rotating system. Table 1 reports the sample characteristics.

Only 2.3% men ($n = 7$) had higher education, 35.6% ($n = 109$) graduated secondary school, 45.8% ($n = 190$) basic vocational school and 16.3% ($n = 50$) primary school.

Results

Kruskal–Wallis analysis of variance (ANOVA) revealed that SoC level did not differ depending on smoking behavior (the differences were not statistically significant). Mann–Whitney U also identified no differences in BMI and particular BM: TC, LDL-C, HDL-C, TG, and glucose levels between high and low SoC individuals (the differences were not statistically significant). Regardless of SoC level, individuals had comparable BMI and BM values.

The analysis revealed that the groups distinguished based on the smoking status differed as regards two of BM: TG and glucose (Table 2). Comparing to the active-smokers, the ex-smokers had lower blood concentration of TG and glucose whereas the never-smokers had the lowest indicators.

Conclusions

Some researches argue that active-smokers have generally lower SoC (Igna, Julkunen, & Ahlström, 2008; Nilsen et al., 2015) and individuals of the strongest SoC are less likely to be active-smokers (Wainwright et al., 2007). However, contrary to expectations, this study showed no differences in SoC between never-, active-, and ex-smokers. Importantly, previous longitudinal studies report that due to its dynamic nature, related to life events, SoC is changing during life course. However, such SoC fluctuations do not imply changes in alcohol or smoking behaviors, which suggests that habits developed relatively early in life are stronger than changes of beliefs (Kuuppelomäki & Utriainen, 2003). Presumably, smoking interventions would be more efficacious when aimed at specific rather than global health beliefs like SoC (El-Shahawy et al., 2015).

No differences in BMI and BM based on SoC may be explained by the fact that blue-collar workers, in contrast to managerial and administrative workers, show generally lower SoC (Poppius et al., 1999). These results may be also related to not very varied BM values—in both SoC subgroups, HDL-C means were rather correct but the mean levels of TC, LDL-C, TG, and BMI were generally increased. The little variety in reference to BM can be additionally influenced by the fact that BM are associated with education level but in this group individuals were in majority low educated. To verify whether there are associations between SoC, BM, and BMI, the group of higher educated workers should also be studied in the future.

The other thing is publication bias. Statistically significant findings results are 40% more likely to be published than nonsignificant results (Lederman & Lederman, 2016). Not only the value of the study but also the direction of the results influence the decision about publication (Chambers, 2014). Because of that, it is sometimes problematic to find results being contrary to popular beliefs and as a consequence to conduct valuable discussion.

The results provide limited support for the relationships between smoking status, triglycerides and glucose. As expected, glucose and TG levels were the highest among active-smokers, followed by ex-smokers and the lowest in never-smokers. Obviously, smoking has adverse effects on glucose metabolism, which is crucial for maintaining good health (O'Kelly & Rydén, 2009). Thus smoking cessation is generally considered beneficial for cardiovascular health because it helps decrease the blood glucose level as well as TG (Mancia et al., 2013; Perk et al., 2012).

At the same time, there was no significant relationship between smoking and TC, HDL-C, and LDL-C. Such result could be partly explained by the high occupational energy expenditure of the studied workers. Men working in coal industry are generally exposed to everyday intensive physical effort that may bring beneficial results for CRF because regular physical activity helps in reducing atherogenic blood lipids. This arises question whether psychical activity does not influence positively also on TG level. Increased TG blood concentration may be also associated with alcohol consumption and age as well as with hypothyroidism or kidney disease. Since the causes of increased lipids were not the aim of the study, the participants were not asked about the other than cardiovascular diseases they suffered from and therefore it is only a hypothesis on the relationship between TG and the occurrence of other diseases in this group.

Yet, the cross sectional character of this research does not allow for any conclusions on the causal relationships between the variables. Another limitation is unrepresentativeness of the sample. The studied men worked in the same enterprise and lived in the same region. It is assumed that the obtained results might be characteristic for this group of blue-collar workers. The study need to be replicated in different working conditions and samples.

The present findings considering SoC indicate that any psychological construct should not be studied separately because probably only some sets of different features may influence one's behavior and BM. It is also suggested to control dietary habits and recreational physical activity in future research to improve the relationships between psychological features and CRF.

ORCID iD

Anna Najder http://orcid.org/0000-0002-1072-6679

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