



LINK BETWEEN PSYCHOLOGY AND BIOLOGY: DISSATISFACTION, INFLAMMATION AND HEALTH

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Abstract — Evidence suggests that body dissatisfaction may relate to biological processes and that negative cognitions can influence physical health through the complex pathways linking psychological and biological factors. The present study investigates the relationships between body image satisfaction, cytokine levels, physical activity and obesity in 96 asymptomatic middle-aged men and women (48 normal and 48 overweight). Multivariate analysis showed that body dissatisfaction and physical inactivity were independently associated with higher levels of C-reactive protein and tumor necrosis factor- α , also after adjustment for obesity. The others interactions were also examined to control interactive or synergistic effects and critical controls known in psychoneuroimmunology related studies. The novel finding is that body image dissatisfaction is strongly linked to inflammation and may promote the increase in cytokines, representing a relative metabolic risk, independently of most traditional risk factors such a gender, BMI and intra-abdominal (waist-to-hip ratio) adiposity. Overall, these results highlight the fact that person's negative cognitions and physical inactivity needs to be considered in intervention strategies in treatment of obesity and for health promotion.

Index Terms — TRANS2CARE, body image, obesity, biopsychology, inflammation, metabolic syndrome

1 BACKGROUND

Evidence suggests that body dissatisfaction may relate to biological processes and that negative cognitions can influence physical health through the complex pathways linking psychological and biological factors. Regardless to the documented association between dissatisfaction, distress and negative affect it is possible that dissatisfaction may relate to biological processes, such as increased systemic inflammation, for different reasons. First of all, it is known that the prevalence of body dissatisfaction in inflammatory conditions due to obesity is very high. Link between body satisfaction and body mass index is well established and body mass index is related to elevated levels of C-reactive

protein (CRP). Then, the association between inflammation and obesity is well documented. Second, body dissatisfaction is linked to negative affect and to emotional stress which is related to induction of physiological responses. Additionally, stressful experiences and negative emotions are linked with the immune system's adaptive reactions which trigger many metabolic and behavioural adjustments, such as changes in plasma volume, production of pro-inflammatory cytokines and production of cytokine synthesizing cells. Finally, there is also evidence that TNF- α and CRP are related to psychosocial factors and that stress derived from psychosocial causes can directly activate pro-inflammatory cytokine production in the absence of infection or injury.

2 OBJECTIVES

The objective of our study was to examine psychobiological mechanism in which psychological factors can influence physical health and elicit physiological responses. Thus, examine pathways in the association between negative cognitions and person's dissatisfaction, level of inflammatory cytokines in asymptomatic healthy overweight individuals.

3 APPROACH & METHODS

General approach

1. Blood collection. 2. Serum preparation. 3. Measuring of level of body dissatisfaction and inflammation biomarkers 4. Perform correlation and hierarchical multiple regression analyses.

To test the hypothesis that dissatisfaction may results in a psychobiological activation which is evident in elevated inflammation markers, and is a risk factor for many of the most common diseases.

Methods

The final analytical sample was confined to 96 asymptomatic subjects (32 males and 64 females). All participants underwent standard anthropometrical measurements of body composition, aerobic and anaerobic capabilities assessment, body image measurements, and serological measurements of C-reactive protein and tumor necrosis factor – alpha (TNF- α). To investigate the effect of obesity on concentration of CRP and TNF- α and body dissatisfaction, participants were divided in overweight and normal weight groups. Linear correlation and hierarchical multiple regression analyses were used to examine the effects of study variables and body dissatisfaction on the level of inflammation biomarkers, measured with CRP and TNF- α .

4 RESULTS

Body image dissatisfaction uniquely predicted inflammation biomarkers, C-reactive protein and tumor necrosis factor- α , even when controlled for obesity indicators and others critical controls (Figure 1). Thus, body image dissatisfaction is strongly linked to inflammation processes and may promote the increase in cytokines, representing a relative metabolic risk, independently of most traditional risk factors such a gender, BMI and intra-abdominal (waist-to-hip ratio) adiposity. The others interactions were also examined to control interactive or synergistic effects and critical controls known in psychoneuroimmunology related studies.

Two hierarchical multiple regression analyses were performed to examine the effects of dissatisfaction on the level of the two inflammation biomarkers, measured with CRP and TNF- α (Table 1). First the indicators of obesity, and aerobic fitness level were entered as control variables (step 1), followed by some others possible confounders as gender, age, systolic and diastolic blood pressure, sleeping time, smoking status and alcohol use (step 2), and followed by body dissatisfaction (step 3).

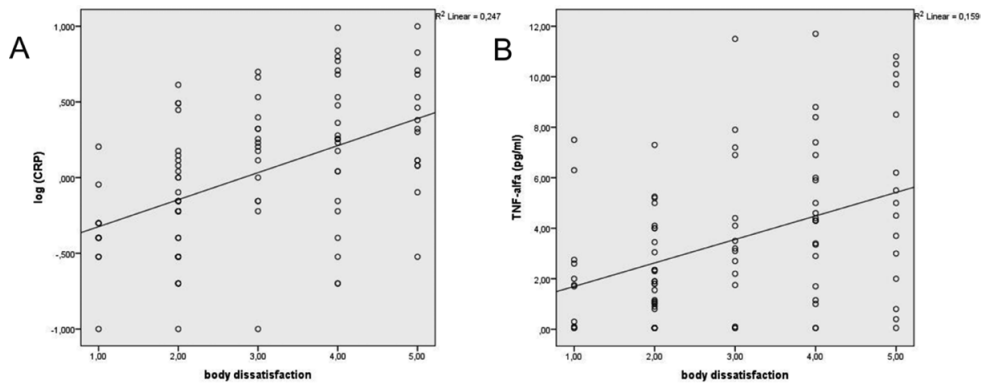


Figure 1: Correlation between dissatisfaction with weight and serum CRP and TNF- α concentration.

Table 1: Results of hierarchical multiple regression analysis for variables predicting inflammation, measured with CRP and TNF- α (N = 96).

	Dependent variables					
	CRP			TNF- α		
Predictors	β	F	ΔR^2	β	F	ΔR^2
Step 1		17.4	0.37***		8.1	0.22**
Waist to hip ratio	0.19*			0.28**		
Body fat	0.57***			0.34***		
Aerobic fitness level	-0.14*			-0.17*		
Step 2		3.2	0.07		2.4	0.03
Gender	0.18			0.15		
Age	0.18			0.07		
Systolic blood pressure	0.03			0.03		
Diastolic blood pressure	0.10			0.04		
Sleeping time	0.14			0.05		
Smoking status	0.01			0.03		
Alcohol use	0.07			0.07		
Step 3		6.2	0.17***		5.4	0.09**
Body dissatisfaction	0.46***			0.33**		
Total R²			0.61***			0.34**
N			96			96

Notes: CRP, C-reactive protein; TNF- α , tumor necrosis factor - α .

* $p < 0.05$, ** $p < 0.01$ and *** $p < 0.001$

5 POTENTIAL NEW PRODUCTS & SERVICES

Service: Results contribute to the knowledge base of biopsychology and the complex pathways in the association between psychological and biological factors and perceived stressfulness of body image dissatisfaction may promote the increase in cytokines in clinically healthy middle-aged men and women representing a relative metabolic risk, independently of most traditional risk factors such as gender, age, BMI or total body fat and intra-abdominal (waist-to-hip ratio) adiposity.

Results highlight the fact that person's negative cognitions needs to be considered in intervention strategies in different treatments and in strategies for health promotion. Therefore, dissatisfaction could be an important mediator connected with pathophysiological factors and processes.

6 CURRENT COLLABORATIONS

6.1 With other researchers

The University of Primorska, Faculty of Health Sciences (PP12, Trans2Care).

7 CONTACT OR COLLABORATIONS NEEDED

Future collaboration with clinical laboratories is needed.

8 COMMUNICATION TOOLS

This study has been presented at:

- University of Primorska, at the first scientific conference with international participation- Slovenian day of dietetics 2012 on 25. oktober 2012 (<http://www.hippocampus.si/ISBN/978-961-6832-31-1/index.html>)
- Universidad Pablo de Olavide, Sevilla, Spain, at the Departamento Biología Molecular e Ingeniería Bioquímica, on 6th to 10th May 2013 (Sevilla, Spain)

9 FUNDS NEEDED

9.1 For basic research (investigation of biological mechanisms): 5.000 €

9.2 For applied research (solutions for real-world problems): 15.000 €

9.2 For pilot & demonstrator activities (to develop a prototype): 45.000 €

10 CONCLUSION

Findings provide some insight into the complex associations between obesity, body image satisfaction, cytokine levels and aerobic fitness level, supporting the suggestion that further research should be made in this area. Overall these results highlight the fact that person's negative

cognitions needs to be considered in intervention strategies in treatment of obesity, but also in strategies for health promotion. Indeed, it is possible that despite the successful reduction of weight in order to improve the health risks, this improvement do not result in significant reduction and changes in cytokine levels due to the neglect of psychological factors that may be associated with them. To conclude, some important attempts were made to explain psychological pathways linking cognitions with inflammatory biomarkers which are a risk factor for many of the most common diseases.

ACKNOWLEDGEMENT

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REFERENCES

Černelič Bizjak M., Jenko Pražnikar Z. Impact of negative cognitions about body image on inflammatory status in relation to health. *Psychology & health*. 2014; 29,3:264-278.