

SERBIAN TRANSLATION OF THE THREE DOMAINS OF DISGUST SCALE (TDDS): A PILOT STUDY

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Abstract

Disgust is a universal emotion representing a need to withdraw from revolting stimuli. The adaptationist paradigm dictates that there are three domains of disgust, the moral, the sexual and the traditional pathogen disgust. This has been operationalized as the Three Domains of Disgust Scale (TDDS). In two studies we have tested the student population in order

to first examine the structure of the questionnaire with exploratory and then confirmatory factor analysis. We have achieved appropriate model fit but with eliminating five items in order to preserve the original three factor structure. We have also detected the expected relationship with other measure of disgust already adapted to the Serbian language. In conclusion the TDDS is viable for use in the Serbian language albeit in a shortened version.

Key words: disgust, sexual disgust, moral disgust, pathogen disgust, TDDS.

CONFLICT OF INTEREST STATEMENT

The Authors declare that there are no conflicts of interest regarding the publication of this paper.

Introduction

Across individuals of all cultures we can capture the universal emotion of disgust ^[1]. The facial expression that follows the feeling of disgust is universal, as are the physiological changes in the body that follow it such as vomiting, increased salivation and parasympathetic activation. Disgust evolved to serve a specific function in our lives, and that is disease-avoidance, and as other human beings are the foremost source of disease transmission, it holds great sway during the formation of social attitudes and beliefs ^[2]. In so doing what initially was disease avoidance fanned out to encompass responses to acts and substances spanning from feces, incest to stealing ^[3]. In furthering research about disgust the aforementioned authors proposed an adaptationist view of disgust. In practice this meant that they propose that disgust serves three specific purposes: avoiding disease, boosting long term

reproductive success by avoiding risky partners and avoiding those that inflict social to oneself of one's group. Infectious diseases have since the dawn of humanity represented a constant threat to human wellbeing, survival and reproductive success ^[3]. In order to counter this natural selection has favored mechanism that help protect the human individual from evolutionary costly manifestations of infection. The

mechanism that developed are the complex and sophisticated workings of the human immune system and the set of behavior that prevents the infecting agent from ever reaching the immune system, the so called "behavioral immune system"^[4]. Pathogen disgust is likely to be elicited by objects that with a great deal of certainty, possess infectious microorganisms, such as dead bodies, rotting substances (food), bodily products and fluids and similar matter. These objects illicit disgust by visual, taste and olfactory stimuli. The specific facet of disgust that is elicited in these situations is pathogen disgust. Although in some respect similar to pathogen disgust, in that way that infectious disease elements (sexually transmitted diseases) are involved, sexual disgust is a far more nuanced emotion. This is shown by the fact that disgust is elicited if asked to imagine having sex with a sibling ^[5]. Throughout history the choice of sexual and reproductive mate has been an important decision that influenced the survival of one's offspring and their own reproductive success ^[3]. Selection pressure led to the evolution of two mechanisms that governed this behavior and those are lust, motivating sexual pursuit, and disgust, motivating sexual avoidance. The third, let us use the word domain, of disgust is the social transgression domain. When asked what behavior they find disgusting respondents added socially

transgressing behavior alongside that what can be construed as pathogen and sexual disgust^[5]. Activities that can be grouped into “moral disgust” include lying, cheating and stealing^[3]. These behaviors impose evolutionary costs on a group and is to be avoided in order for the group to be successful. Feelings of disgust towards individuals displaying such behavior has proven to be beneficial to the group in so far that they will slowly be excluded from the group. There in an ongoing discussion with regards to variability of disgust proneness between individuals based on multiple traits. One of this is time invariability of disgust proneness, that has been increasingly recognized as a personality characteristic^[6]. Research of the aforementioned authors yielded interesting results insofar that they have corroborated

the time invariable nature of disgust proneness, and that this time invariable element to disgust proneness is the one most responsible to its association to obsessive-compulsive symptoms. When assessing individual variability in disgust proneness one of the ruling paradigms was the parental paradigm that proposed the pivotal role of parents in “training” their offspring to react to disgusting stimuli^[7]. But in a large twins study this was proven not to be so, 54% of the covariance is attributed to genetic factors and the rest is explained by non-shared envi-

ronmental factors, completely sidelining the parental paradigm. This research also proposed that a history of infectious diseases might be one of the individual environmental factors controlling the variability of disgust proneness. Another factor that contributes to disgust level variability is gender^[8]. The study has shown that there is small but significant differences in moral and pathogen disgust sensitivity between genders, but there is a large difference in sexual disgust sensitivity, with female participants registering higher values in every domain. There are many instruments constructed to measure disgust drawing their inspiration from different disgust related paradigms. The first such instrument is the Disgust Sensitivity Scale measuring, initially, seven domains of disgust^[5]. It today remains the most used and translated scale, but the psychometric properties of the translations and its factor structure has been put into question^[9]. This scale is comprised out of items that focus on elicitors of disgust. The second scale created that has the complete opposite approach is the Disgust Propensity and Sensitivity Scale that focuses on non-elicitor based items attempting to capture disgust in nascent trait state. This scale has also been successfully adapted to the Serbian language^[10]. The next major paradigm in disgust research is the adaptationist view that resulted in the Three Domains of Dis-

gust Scale (TDDS) proposed by Tybur et al (2009). The scales psychometric properties have been thoroughly and favorably assessed ^[1], therefore we believed that translating this scale would be a valuable addition to the already available number of instruments for disgust research in the Serbian language. Aim The aim of this study is to translate and validate the structure of the translation of the Three Domains of Disgust Scale into the Serbian language, providing the scientific community with another instrument for researching disgust.

Aim

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Study 1 Method

The sample consists out of 210 participants, all of them students of the Faculty for Legal and Business Affairs, dr Lazar Vrkatić, Union University, that filled out an online questionnaire that circulated freely on social media networks. Out of them 179 (85.2%) declared themselves to be female. The average age of the participants

was 22,57 years (min=18; max=28; SD=2,74). The students participated in the survey freely without any compensation. Descriptive statistics, correlation and exploratory factor analysis were used in our research.

Disgust Propensity and Sensitivity Scale-DPSS^[11] is a 12 item scale that measures disgust as a state trait. What differentiates this scale from other in the field of disgust is that its items do not contain elicitors of disgust, as concrete situations, but only hypothetical ones concerning the feeling of disgust ("I avoid disgusting things"). The answers are registered on a five point Likert scale. The scale is divided into two subscales, Disgust propensity (DP) and Disgust Sensitivity (DS) and has been successfully translated and validated in the Serbian language ^[10]. The Cronbach alpha values for these subscales in our sample were 0,79 and 0,8 respectively.

Dark Triad Dirty Dozen-DTDD^[12] is a short 12 item scale measuring the dark triad, Machiavellianism, psychopathy and narcissism. Each subscale consists out of four items ("I tend to manipulate others to get my way," "I tend to lack remorse", "I tend to want others to admire me"). The scale was successfully translated and validated into the Serbian language ^[13]. The answers are registered on a five point Likert scale. The internal consistency measured by Cronbach's alpha was 0,84, 0,7 and 0,8 for each of the subscales respectively.

Positive and Negative Affect Scale X-PANAS X^[14] is a 20 item scale measuring positive and negative affect. In our research we have only used the negative affect subscale that consists out of 10 items, single nouns that describe how the participant is feeling (“guilt”). The questionnaire has been successfully translated into the Serbian language^[15]. The answers are registered on a five point Likert scale. The internal consistency of the subscale was favorable with an alpha value of 0,9.

Depression Anxiety and Stress Scale 21-DASS21^[16] is a 21 item scale, consisting out of three subscales representing Depression, Anxiety and Stress. Each of the subscales has seven items (“I couldn’t seem to experience any positive feelings at all,” “I was aware of dryness of my mouth,” “I found it hard to wind down” representative items of Depression, Anxiety and Stress subscales). The scale was successfully translated in the Serbian language and further validated^[17]. The answers are registered on a 4 point Likert scale. The scale can be used in subscales and as a summary score of psychological distress. The internal consistency of both solutions is good 0,94 as a complete score and 0,82, 0,84 and 0,8 as separate scores.

Three Domains of Disgust Scale-TDDS^[3] is a 21 item scale divided into three subscales, Moral Disgust (MD), Sexual Disgust (SD) and Pathogen Disgust (PD). Each of these subscales

consists out of seven items, situations that respondents describe as disgusting or not (“Watching a pornographic video”, “Stealing from a neighbor”, “Stepping in dog poop”, for SD, MD and PD respectfully). The responses are registered on a seven point Likert scale. The Serbian translation of items has yielded acceptable internal consistency for each subscale, with alpha values of 0,76, 0,80 and 0,75.

Result

First we successfully conducted exploratory factor analysis ($KMO=0.806$; $\chi^2(df)=1375.58(210)$; $p<0.001$). We have isolated five factor and the loadings can be found in table 1. We have identified the first three components as corresponding to the three subscales defined in the original structure. Component 1 to Sexual Disgust, component 2 to Pathogen Disgust and component 3 to Moral Disgust. Factor loadings are presented in table 1.

Table 1.
Results of exploratory factor analysis of study 1.

Items	Component				
	1	2	3	4	5
TDDS8	0,876				
TDDS20	0,758				
TDDS5	0,757				
TDDS2	0,652				
TDDS14	0,637				
TDDS11	0,569			0,323	
TDDS4		0,831			
TDDS1		0,794			
TDDS10		0,653			
TDDS13		0,577			0,464
TDDS16		0,573			
TDDS19		0,500			0,481
TDDS6			0,871		
TDDS21			0,800		
TDDS15			0,479		-0,356
TDDS3			0,469		
TDDS9	0,332		0,465		
TDDS18				0,798	
TDDS17				0,720	
TDDS12			0,359	0,497	
TDDS7					0,824

Mean value for Sexual Disgust is 1,74(min=0; max=5; SD=1,34), for Moral Disgust it's 3,34 (min=0; max=5; SD=1,18) and for Pathogen Disgust it is 2.14 (min=0; max=4,8;SD=1,14). There is a statistically significant gender difference between all disgust subscales

scores ($p<0,001$, $p=0,015$; $p<0,001$ respectively). There is no correlation between age and disgust levels. The correlations between measured constructs and disgust subscales can be found in table 2.

Table 2.

Correlations between measured constructs.

	Sexual Disgust	Moral Disgust	Pathogen Disgust
Disgust sensitivity	0,34**	-	0,39**
Disgust propensity	0,28**	-	0,42**
Negative affect	0,20**	-	0,19**
Depression	0,18**	-	0,19**
Stress	0,23**	-	0,17*
Anxiety	0,23**		0,18**
Machiavellism	-	-0,24**	-
Psychopathy	-	-	-
Narcissism	-	-	0,22**

* $p < 0.05$; ** $p < 0.01$

Study 2 Method

The sample of Study 2 consisted out of 353 participants, all students of various universities and faculties in Novi Sad. The sample was collected by students of the Faculty for Legal and Business affair, dr Lazar Vrkatić, Union University, in exchange for activity credits. The survey was distributed as internet form. Out of the complete sample 246 (69.7%) declared themselves as female, and the average age of participants was 20,22 (min=18; max=25; SD=1,74). We have used methods of descriptive statistics, correlation and confirmatory factor analysis. Two instruments were used in the battery of tests that was distributed to the students.

Considering indicators of good model fit in confirmatory factor analysis, we used several including Root Mean Square Error of Approximation (RMSEA). We placed the maximum acceptable value at 0,08, while we took $< 0,05$ to reflect a good model fit^[18]. Further we used the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) in order to determine the goodness of fit. For both indexes we considered values of at least 0,90 to indicate an acceptable model fit, while values of 0,95 and above represent a good solution^[19,20]. The last two parameters we used were the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) where models with lower AIC and BIC are considered to be indicators of better model fit^[21,22].

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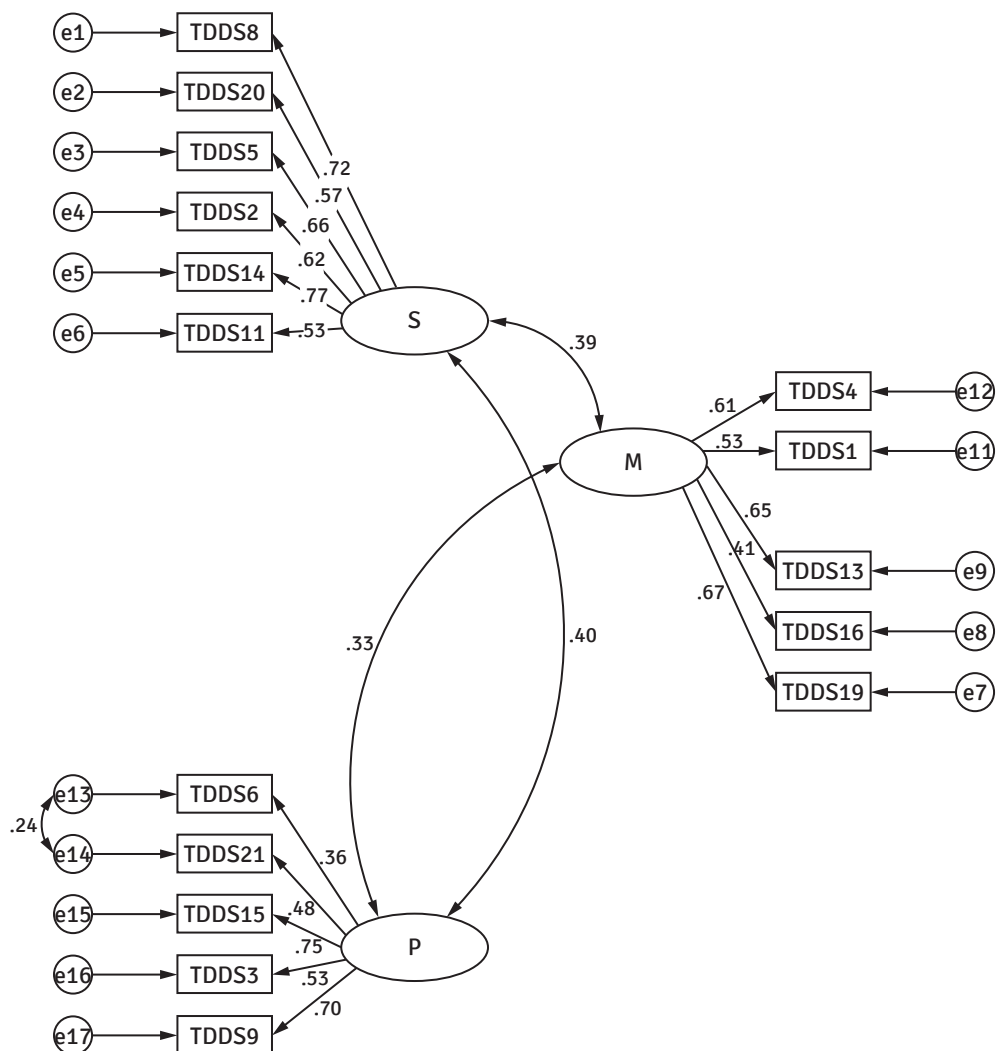
ed acceptable internal consistency for each subscale, with alpha values of 0,81 for SD, 0,72 for PD and 0,74 for MD.

Result

We performed confirmatory factor analysis in order to test the original structure model and the one derived from study two. The model from study two had to be improved by removing item 10 from the Moral Disgust subscale, and with that operation we have achieved adequate model fit. All the measured indices show that this is a superior model in the Serbian adaptation and is the one used in this research, both study 1 and 2. The fit index values can be found in table 3. The graphic model can be observed in Graph 1. The mean value of the Sexual Disgust score in this sample was 2,57 (min=0; max=6; 1,59), for Pathogen Disgust it was 3,18 (min=0; max=6; SD=1,33) and for Moral Disgust 4,03 (min=0; max=6; SD=1,4). Gender differences have been found in Sexual Disgust (p<0,001) but not in the values of other two subscales. The values of correlations between measured constructs can be found in table 4.

Table 3.
Results of the confirmatory factor analysis.

	$\chi^2(df)$	CFI	TLI	RMSEA	AIC	BIC
Original model	539,630(186)	0,817	0,793	0,073	629,630	848,621
Proposed model	205,486(100)	0,922	0,906	0,055	277,486	452,679



Graph 1.

The structural representation of the proposed model for TDDS Serbian adaptation with standardized factor loadings.

Table 4.

Correlations between measured constructs in Study 2.

	Sexual Disgust	Pathogen Disgust	Moral Disgust
Disgust Propensity	0,245**	0,285**	-
Disgust Sensitivity	0,221**	0,233**	-

Discussion

Let us first examine the proposed structure of the questionnaire we have tried to validate. It consists out of three subscales, pathogen disgust, moral disgust and sexual disgust. Each of the subscales consists out of seven items that are measured on the scale from 0 to 6. These three domains were defined as part of an adaptationist take on disgust^[3]. First we completed exploratory factor analysis and identified the three components that correspond to the three proposed subscales to the greatest degree, this was done in study 1. This left us eliminating four items from the subscales. In study 2 we have completed confirmatory factor analysis. We have tried the original proposed model and the model derived from study 1. In order to achieve adequate model fit in accordance with our standards we had to eliminate one additional item from the Moral Disgust subscale. We then had a working model of the scale with 16 items and three subscales that correspond to the original subscales. The most structurally sound with most original items saved is the sexual disgust scale, and this speaks to the greatest universality of this concept, from the subscales measured. With regard to Moral disgust the correlations with other constructs are both interesting and revealing. We know that there is a correlation between the complete TDDS and DPSS scores^[23] and

scores on individual subscales^[1]. Our research has shown that there is no significant relationship between Moral disgust and disgust as a trait and that the brunt of the described relationship is carried by sexual and pathogen disgust. This implies that while the fact of the existence of moral disgust is beyond reproach there is no significant connection with disgust measured by a scale that is devoid of disgust elicitors. Moral disgust must be governed by other factors, and that in fulfilling its evolutionary purpose it has evolved so far from original trait disgust that while operating on the basis of the same mechanism some of the connections with other disgust based constructs have been severed. This, however, is only our attempt at explaining the results in our sample, further research on this subject is needed. Other two measured constructs by the TDDS scale, Sexual and Pathogen disgust have significant correlation with trait disgust as measured by the DPSS, with Sexual disgust correlating slightly stronger than expected in our sample^[1]. The initial results were replicated in the second study albeit with a lower level of correlation than in the first. All things considered we have replicated the results of previous studies and this bodes well for the validity of our adaptation of the TDDS scale. The connection between disgust and negative affect is known in the available literature^[24], when measured specifically with the

TDDS there is some confusion. Only Pathogen Disgust measures a positive significant correlation with negative affect while the other two subscales do not have any significant correlation ^[2]. This has only been partially replicated in our study where Sexual Disgust also has a correlation with negative affect, albeit a low one. At present we can only speculate as to why this is, perhaps a cultural artefact of the Serbian milieu, but we do not have a clear answer. All in all the direction and the strength of the correlation between negative affect and Pathogen Disgust goes in favor of the scales validity. On the other hand measuring the relationship between TDDS constructs and psychological distress and defined by the DASA-21 scale is perplexing. The available study ^[1] states that there is no correlation between moral disgust and distress, and this finding has been replicated. On the other hand this study only registers low negative correlation between Sexual Disgust and depression, and a very low positive correlation between stress and Pathogen disgust, while we register low positive correlations between Pathogen and Sexual Disgust and all measures of psychological distress. This is perhaps something that the cultural specificities of our more traditional society, or of the student sample but at present we cannot explain this discrepancy without further study of the possible mediating factors. We have found a

study measuring the relationship between disgust and the dark tetrad but they have used the Disgust Sensitivity Scale, that does not adhere to the adaptationist paradigm behind the TDDS ^[25]. They show a very weak negative correlation between all constructs of the dark tetrad and disgust. Our study does show negative correlation between moral disgust and Machiavellianism, but a positive correlation between pathogen disgust and narcissism. Again we find ourselves in the situation where we can only partially replicate results from international studies but we must reiterate that these are from the western context and that the cultural differences and context play a strong role in these relationships and can be the root cause of the discrepancies.

Conclusion

The Three Domains of Disgust Scale has been adapted to the Serbian translation by the process of translating items and eliminating the ones that do not fit, while retaining the original intended structure. We have achieved an adequate model fit by removing five items and showing the expected relationship between it and another scale measuring disgust. We have not fully replicated the results found in literature regarding other measured constructs, but this can possibly be placed at the feet of cultural differences.

SRPSKI PREVOD SKALE TRI DOMENA GADJENJA (TDDS): PILOT STUDIJA

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Sažetak

Gađenje je univerzalna emocija koja predstavlja potrebu da se povučemo od averzivnih stimulusa. Adaptacionistička paradigma diktira da postoje tri podvrste gađenja, domena, a to su moralno, seksualno i, tradicionalno, patogeno gađenje. Ovaj pristup je operacionalizovan u takozvanoj Skali tri domena gađenja (TDDS). U dve studije sprovedene na studentskoj populaciji smo utvrdili strukturu upitnika putem prvo eksplorativne potom konfirmatorne faktorske analize. Uspeli smo da stvorimo model koji ima adekvatne vrednosti indeksa podudarnosti, ali smo morali da uklonimo pet stavki kako bismo sačuvali originalnu trofaktorsku strukturu. Takođe smo detektovali očekivane odnose sa drugom merom gađenja već adaptiranoj na srpski jezik. Zaključujemo da je TDDS uspešno adaptirana na srpski jezik iako u skraćenoj formi.

Ključne reči: gađenje, seksualno gađenje, moralno gađenje, patogeno gađenje, TDDS.

Supplement

Molim Vas navedite koliko se gadite sledećih situacija.

Stavke	Nimalo				Veoma			
Ukrasti čokoladicu iz prodavnice.	0	1	2	3	4	5	6	
Čuti dvoje nepoznatih ljudi kako vode ljubav.	0	1	2	3	4	5	6	
Stati u kereći izmet.	0	1	2	3	4	5	6	
Krasti od komšije.	0	1	2	3	4	5	6	
Imati oralni seks.	0	1	2	3	4	5	6	
Sedeti pored nekoga ko ima crvene kraste na rukama.	0	1	2	3	4	5	6	
Student koji vara kako bi dobio višu ocenu.	0	1	2	3	4	5	6	
Gledanje pornografskog videa.	0	1	2	3	4	5	6	
Rukovati se sa strancem koji ima znojav dlan.	0	1	2	3	4	5	6	
Prevariti prijatelja.	0	1	2	3	4	5	6	
Otkriti da neko ko vam se ne sviđa ima seksualne fantazije o vama.	0	1	2	3	4	5	6	
Kada ugledate bu na nekim ostacima u vašem frižideru.	0	1	2	3	4	5	6	
Krivotvoriti nečiji potpis na dokumentu.	0	1	2	3	4	5	6	
Imati seksualne odnose sa nekim koga ste tek upoznali.	0	1	2	3	4	5	6	
Stojati blizu osobe koja neprijatno miriše.	0	1	2	3	4	5	6	
Proguravati se kroz red kako bi ste kupili poslednje dve karte za predstavu.	0	1	2	3	4	5	6	
Kada se stranac suprodnog pola namerno očee o vašu butinu u liftu.	0	1	2	3	4	5	6	
Videti bubašvabu kako pretrčava preko poda.	0	1	2	3	4	5	6	
Namerno lagati tokom poslovne transakcije.	0	1	2	3	4	5	6	
Imati analni seks sa osobom suprotnog pola.	0	1	2	3	4	5	6	
Slučajno dodirnuti nečiju raskrvavljenu ranu.	0	1	2	3	4	5	6	

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