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Development of the Ghent Multidimensional Somatic Complaints Scale

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Abstract

The present study aimed at developing a new scale that operationalizes a hierarchical model of somatic complaints. First, 63 items representing a wide range of symptoms and sensations were compiled from somatic complaints scales and emotion literature. These complaints were rated by Belgian students (*N*=307) and Belgian adults (*N*=603). Exploratory factor analyses identified a gastro-intestinal, cardio-respiratory, pain, temperature regulation, and fatigue factor. Next, the number of complaints was reduced to 18. Second, the short scale, called the Ghent Multidimensional Somatic Complaints Scale (GMSC), was administered to Belgian students (*N*=735), Belgian adults (*N*=664), and Turkish adults (*N* = 222). Confirmatory factor analysis confirmed that a higher-order model with five first-order and one second-order factor fitted best. Regression analyses demonstrated that the first-order factors were differentially related to anxiety, depression, anger, age, and sex. In sum, the GMSC-scale offers the possibility to assess individual differences in somatic complaints from a hierarchical perspective.

Keywords: Somatic Complaints, Scale Development, Psychometrics, Confirmatory Factor Analysis, Cross-cultural Stability

Development of the Ghent Multidimensional Somatic Complaints Scale

Scales that assess the self-perception of the number and frequency of somatic complaints are probably among the most widely used forms of well-being assessment. This stems from the key role the measurement of somatic complaints plays in many areas of psychology, psychiatry, and health care. Somatic complaints affect non-clinical populations by an increased use of health care services, increased incompetence, and an increased number of days off work (De Gucht & Fischler, 2002; Smith, 1994). Moreover, somatic complaints are an essential ingredient of a number of constructs that describe psychosomatic malfunctioning of individuals, such as somatization, hysteria, functional somatic symptoms, medically unexplainable symptoms, and somatoform disorder (Deary, Scott, & Wilson, 1997). The two defining characteristics of these constructs are (1) the number, frequency, and intensity of somatic complaints, and (2) the fact that these complaints are (partially) medically unexplainable (De Gucht, & Fischler, 2002). The present study focuses on the first defining characteristic, which can be adequately studied by means of checklists and inventories.

Most existing scales for the assessment of somatic complaints are based on a one-factor model, because exploratory factor analysis of the internal structure identifies (almost) always one factor (Mumford et al. 1991; Olatunji, Deacon, Abramowitz, & Tolin, 2006; Wessely & White, 2004). However, this one-factor model has shown to be problematic. The few studies that have investigated the structure in the somatic complaints domain with confirmatory factor analysis (CFA) found that a multifactorial model had a superior fit to a one-factor model. For instance, when performing a CFA on the items of the Diagnostic Interview Schedule, Liu, Clark, and Eaton (1997) found two factors applicable for everybody, namely a general factor, on which every item loaded, and a conversion factor, consisting of a loss of hearing, trouble walking, and pain when urinating. In addition a pain factor was found for men including items such as headache and backpain and a female factor was found for

women, consisting of an irregular menstrual cycle or a lot of blood loss when menstruating. Robbins, Kirmayer, and Hemami (1997) found five factors in the same instrument which they called (1) Fibromyalgia, (2) Chronic Fatigue Syndrome, (3) Somatic Depression, (4) Somatic Anxiety, and (5) Irritable Bowel Syndrome. Although the factors were highly intercorrelated, a one-factor model fitted badly in both studies.

Due to the high correlations between factors in a multifactorial model, Deary (1999) developed a hierarchical model. This model identifies three sources of variation in the domain of somatic complaints, namely (1) a general source of variation, (2) a number of coherent symptom families, and (3) specific causes for why people report particular symptoms. If this model is valid, a hierarchical factor structure should emerge in the somatic complaint domain, with the particular symptoms being the indicators, the symptom families being the first-order factors, and the general source of variation leading to a single second-order factor. The major problem with CFA studies of somatic complaints and the resulting model of Deary (1999) is that there exists no agreement on the number and the kind of factors that underlie the general symptom factor. Moreover, to obtain acceptable model fit, error covariances and cross-loadings need to be included, hampering the practical use of the multifactoriality.

Research Goals

The overall aim of the current study was to construct the Ghent Multidimensional Somatic Complaints Scale (GMSC-scale), a valid somatic complaints scale that has a stable higher order factorial structure among Western as well as Non-Western samples. This overall aim fell apart into six specific goals. The first goal was to identify the optimal number of factors that underlies the general symptom factor. Since there is no theory about the number and the kind of factors that are eligible for it, this research question has been investigated exploratory. For such an endeavour to be successful, a lot of care had to be taken in identifying a set of items that is relevant and representative for the domain of somatic

complaints. While relevance and representativeness are in general necessary aspects of the validity of a psychological instrument (Messick, 1989), they are of particular importance in the present study. Symptom clusters that have not been well represented cannot be identified by an exploratory approach. For instance, items related to temperature regulation are known to be related to fear, shame, and anger (Scherer & Wallbott, 1994). Yet, they are rarely included in somatic complaints scales. In order to represent the domain of somatic complaints for the exploratory analysis, a range of items were compiled from different sources.

The second goal was to validate the hierarchical structure in the somatic complaints domain as proposed by Deary (1999). In other words, it was investigated whether the hierarchical structure of the instrument outperformed all other possible confirmatory factor analyses structures in terms of model fit, and demonstrated stability when applied to different samples.

The third goal was to construct and validate a short and easy to use instrument. As somatic complaints scales are used in many different contexts, one of the most important criteria for developing them has been their practical use. For instance, the Patient Health Questionnaire-15 (Kroenke, Spitzer, & Williams, 2002) was developed as a short scale for screening or monitoring somatic symptom severity. Thus the goal was to construct the GMSC-scale as a short and practical instrument with good measurement properties.

Most symptom scales, like the Symptom Checklist 90-R (Derogatis, 1994), are used across cultural groups without research on their cross-cultural validity. Therefore, the fourth goal was to collect first evidence that the GMSC-scale can be used in different cultural samples. To that end we investigated the stability of the multidimensional structure in a Turkish sample.

The fifth goal was to investigate whether the differentiation between symptom factors has psychological meaning. Since it is common to include specific somatic complaint items

into clinical assessment instruments, it can be expected that the somatic complaints factors also have psychological relevance. In most of the scales that measure maladaptive mood states, items such as fatigue and heart problems are included. For instance, the Mood and Anxiety Symptom Questionnaire (Keogh & Reidy, 2000) has the following items into the subscale "Anxiety arousal": "Hot or cold spells", "Hands were cold or sweaty", "Trembling or shaking", "Short of breath, "Heart was racing", and "Trouble swallowing". For depression, the Zung Self-Rating Depression scale (Zung, 1965) has an item on heartpounding and the Beck Depression Inventory has an item that refers to a lack of energy (Beck, Steer, & Garbin, 1988). Furthermore, anger scales such as the Buss-Durkee Hostility Scale (Lange, Hoogendoorn, Wiederspahn, & De Beurs, 1995) often refer to heat ("boiling of one's blood"), but do not refer to fatigue (Lange, Pahlich et al., 1995b). In the present study it has been investigated whether self-rated frequency of depressive, anxious, and angry emotions, which are the major emotions in internalizing and externalizing psychopathology (Krueger, 1999; Krueger, McGue, & Iacono, 2001), relate differently to specific somatic complaints factors.

The final goal was to explore differential effects for age and sex. Research has found evidence that women have more somatic complaints (Gijsbers Van Wijk & Kolk, 1997), although effect sizes vary between studies. For age there are a lot of inconsistencies not only on the magnitude, but also on the direction of the effects (Kolk, Hanewald, Schagen, & Gijsbers van Wijk, 2002). Therefore, it may well be possible that the magnitude and the direction of the effects depend on the type of somatic complaints factor under study.

Method

Samples

Exploratory Factor Analyses Samples. Two samples were used for the exploratory factor analyses (see Table 1). The adult sample ("exploratory adult sample") consisted of 603 Belgian working adults. Their mean age was 35, with a range between 21 and 51; 60.7% of

them was male. The mode of the highest educational level was a high school degree (61.2%). The student sample ("exploratory student sample") consisted of 307 Belgian psychology students. Their mean age was 20, with a range between 18 and 24; 80% of them was female.

[Insert Table 1 about here]

Confirmatory Factor Analyses Samples. Three different samples were used for the confirmatory factor analyses (see Table 1): 664 Belgian adults ("confirmatory adults sample", mean age = 40 (20-65), 50.8% male, the mode of the highest educational level was a high school degree (59.4%)); 735 Belgian students ("confirmatory students sample", mean age = 20 (18-27), 51.2% male); and 222 Turkish adults (mean age = 30 (18-57), 26.8% male, the mode of the highest educational level was higher education (57.7%)). In all samples participants were eligible for study inclusion if they were at least 18 years old and reported no medical disease, injury, or pregnancy. All data from the Belgian samples were collected with the Dutch-language scale in Flanders (the Dutch-speaking part of Belgium) between January and October 2006; data from the Turkish sample were collected with the Turkish-language scale in Turkey between February and June 2007.

Measures

Ghent Multidimensional Somatic Complaints Scale. A preliminary questionnaire with 63 somatic symptoms and sensations was constructed. To obtain a maximum domain representativeness of the somatic items, these items were compiled from four scales often used in somatization research and practice. These scales were: (1) The Bradford Somatic Inventory (BSI, Mumford et al., 1991), (2) the somatization subscale of the Symptom Checklist-90-R (Derogatis, 1994), (3) the Patient Health Questionnaire-15 (Kroenke et al., 2002), and (4) the Somatoform Disorders Schedule (Janca et al., 1995). In addition, items from the Mood and Anxiety Symptom Questionnaire (Keogh & Reidy, 2000) were added to have a good representation of those complaints that are associated with mood states. From

conceptually similar items, the BSI item was chosen, because those items were constructed to be valid in a non-western setting. Finally, nine symptoms, all related to emotional experiences, were included in the questionnaire. Emotion literature has repeatedly shown that psychological distress can be expressed in the form of somatic complaints (Breugelmans et al., 2005; Roseman, 2001). This item selection procedure resulted in a 63 item scale which covered the somatic complaints domain. The 63-item questionnaire was translated into English and back-translated into Dutch. A small sample (n=18) checked the intelligibility and reported problems to the first author of the study in a face-to-face interview. Participants were asked to rate the frequency during the last month of each somatic sensation and symptom on an eight-point Likert scale: (0) never, (1) extremely rarely, (2) rarely, (3) from time to time, (4) regularly, (5) often, (6) very often, and (7) constantly.

In a later stage, the 63-item version was reduced to an 18-item version with the same response scale. This short instrument was administered to the "adult CFA" and "student CFA" sample. For the Turkish version of the scale, the 18 items were translated and back-translated into Turkish and administered to the Turkish respondents.

Frequency of Negative Feelings. The depression, anxiety, and anger scales were adopted from the Leuven Emotion Scale (LES), a Dutch scale that assesses the frequency of emotions and is comparable to the PANAS-X scales (Fontaine, Luyten, De Boeck, & Corveleyn, 2001). The emotion terms of the LES were selected based on a study of the cognitive structure of emotions (Fontaine, Poortinga, Setiadi, & Suprapti, 2002) and contain no somatic items. In total the LES has 76 items, forming 18 scales which have a six factorial internal structure, but in the present scale only the three most relevant scales were selected. Depression was assessed on the basis of five items (depression, dejection, sadness, unhappiness, and pessimism) and had a Cronbach's α reliability of .69; the anger scale (three items: angry, furious, and infuriated) had a reliability of .81; and the anxiety scale (four items: fearful, anxious, afraid,

and frightened) had a reliability of .85. Participants were asked to rate the frequency of these feelings during the last month on the 8-point Likert scale. Only the participants of the Belgian adult sample ("adult CFA") completed the anxiety, depression, and anger scales.

Procedure

For the full version of the scale, 348 psychology students collected data. In addition to completing the scale themselves, the students administered the scale to two working adults. After two weeks, the adults who wanted to participate returned the questionnaire in a closed envelope, which they received together with the questionnaire, to the student. In the accompanying letter, which was the same for every sample, it was explicitly stated that people had the right at all times to stop filling in the questionnaire and/or return the questionnaire empty and/or only partially fill it in. Furthermore, complete anonymity was guaranteed. This means that all participants were free to stop participation, either by not handing in the questionnaire or by handing in a closed envelope with the empty questionnaire. The student handed the closed, anonymous envelopes with the questionnaires to the first author of the study. For the second analysis, a similar procedure was followed with a different sample of 372 psychology students. This time the students were not asked to fill in the scale themselves, but instead distributed the scales to two fellow students from another discipline. Again, the closed, anonymous envelopes were returned to the first author of the study. For the Turkish sample, a Turkish native, who performed a research internship at the university of Istanbul, approached a number of organizations in Istanbul.

Data Analysis

Exploratory factor analysis (principal component analysis) was performed on the "exploratory student" and "exploratory adult" sample to explore the factorial structure. To determine the number of factors, parallel analysis - one of the most promising methods to determine the number of principal components or factors (Velicer, Eaton, & Fava, 2000) -

was used in addition to the Cattell (1966)'s scree plot. Essentially, parallel analysis creates a random dataset with the same amount of observations and variables as the original data. A correlation matrix is computed from the randomly generated dataset and then eigenvalues of the correlation matrix are computed. If the eigenvalues from the random data are higher than the ones from the PCA or factor analysis, the components or factors can be considered as random noise (Thompson & Daniel, 1996). For the present study, the 95% and 99% confidence intervals were used. In order to reduce the number of items, the selection was limited to the items with: (1) a single loading of at least .40 on one of the five factors in both samples; (2) a loading on the same factor in both samples; (3) no secondary loading that was less than .15 lower than the primary loading in one of the two samples; and (4) conceptual distinctness from other items (highest loading item of each group of similar items).

On the items that met the reduction criteria, another PCA was performed and the component matrices were compared using orthogonal Procrustes rotation, which rotates a matrix to maximum similarity with a target matrix minimizing sum of squared differences of the loadings (Schönemann, 1966). As a measure of congruence, the Tucker's phi was computed, which ranges between 0 and 1, with values above .90 indicating structural equivalence (Van de Vijver & Leung, 1997a,b).

In the other three samples, the structure found in the first two samples was tested using confirmatory factor analysis. For the estimation of the model, the robust maximum likelihood procedure was used to correct for non-normality (Satorra & Bentler, 1994). This method adjusts the ML chi-square by a correction factor to account for the observed multivariate kurtosis (Curran, Weat, & Finch, 1996), which is especially problematic for responses on somatic complaints scales. Several criteria of model fit were used: the likelihood ratio statistic (χ^2 and χ^2/degrees of freedom); the Comparative Fit Index (*CFI*); the Standardized Root Mean Square Residual (*SRMR*); and, finally, the Root Mean Square Error of Approximation

(*RMSEA*) (Jöreskog & Sörbom, 1996). A well-fitting model has a non-significant χ^2 statistic or at least evidence of a χ^2/df value between two and four with lower values indicative of greater fit (Marsh & Hovecar, 1995). Hu and Bentler (1998) suggest a cut-off value of .95 for CFI and of .06 for *RMSEA*. They suggest that the *SRMR* should be close to .08, with lower values indicating better fit.

Internal consistency was investigated in the "student CFA" and "adult CFA" sample using Cronbach's α; values of .70 or higher were considered acceptable (Nunnally, 1978). Finally, multivariate multiple regressions were performed in the adult CFA sample with anger, depression, anxiety, age and sex as independents and the complaints factors as dependents.

Results

Exploratory Factor Analysis

Factor analysis (principal component analysis) clearly revealed a one-factorial structure on the basis of the scree plot in both the "exploratory student" and "exploratory adult" samples. This single factor accounted for more than 25 % of the variance. Moreover, the factor is highly comparable for both samples with a congruence (Tucker's φ) of .989.

The aim to construct a multidimensional scale was supported by the fact that more than two thirds of the variance was not captured by the one-factorial structure. We used parallel analysis to determine the required number of factors. The two most common significance levels were tested (95% and 99%). In the exploratory adult sample five factors were withheld with the percentile 95 criterion and four with the percentile 99 criterion. In the exploratory student sample six factors were withheld with the 95 criterion and five with the 99 criterion (see Table 2). These results point to a five-factorial structure in both samples.

[Insert Table 2 about here]

Construction and Testing of a Short Symptom Scale

First, the number of items was reduced on the basis of the results from the exploratory samples. In total, 18 items were withheld forming five factors, divided into five symptom groups: pain symptoms related to head and neck (three items), cardio-respiratory symptoms related to the chest (four items), gastro-intestinal symptoms related to the abdomen (four items), temperature regulation (warmth and cold; three items), and fatigue (four items).

When a principal component analysis was performed on the 18 selected items in the exploratory samples, a five-factorial structure emerged in both samples. Procrustes rotation showed that this structure was highly comparable between both samples (see Table 3); Tucker's phi values ranged from .934 to .979.

[Insert Table 3 about here]

In the confirmatory samples three models were tested with the 18 item-version: (1) a one-factorial model, (2) a five-factorial model with the five complaint factors, and (3) the higher-order model of (2). Fit indices of the models tested are represented in Table 4.

[Insert Table 4 about here]

As apparent in Table 4, the one-factorial model did not fit well in any of the samples. The five factorial first-order model displayed an acceptable fit both in the student sample and the adult sample. The correlations between the factors ranged from .54 (between factor 1 and 3) to .70 (between factor 4 and 5) with a mean correlation of .62 in the student sample, and from .52 (between factor 1 and 3) to .72 (between factor 4 and 5) with a mean correlation of .63 in the adult sample.

For the higher-order factorial model (Figure 1), most fit indices did not change. However, model *CAIC* values indicated that the higher-order model is the most parsimonious.

[Insert figure 1 about here]

Reliability of the total scale was higher than .90 in all three samples; reliability per factor met the .70 criterion in every sample, except for the pain in head and shoulders (α= .65) and temperature regulation scales (α= .69) in the student sample.

Cross-Cultural Generalizability

As in the Belgian samples, the one-factorial model did not fit well in the Turkish adult sample. The five factorial first-order model displayed a much better fit (see Table 4). The correlations between the factors ranged from .46 (between factor 3 and 5) to .80 (between factor 2 and 5) with a mean correlation of .64. Model *CAIC* values indicated that the higher-order model is the most parsimonious (see Table 4 and Figure 1).

Regression

Whereas in the Belgian adult CFA sample the general complaint factor is related to anxiety, depression, anger, age and sex, multivariate multiple regression analyses (see Table 5) in the adult CFA sample showed that the five first-order factors are differentially related to these predictors. Anxiety is related to every complaint scale, while depression is only significantly related to fatigue, and anger only to pain in head and shoulders. Moreover, women reported more pain, fatigue, and warmth-coldness. A higher age was associated with more warm-cold complaints.

[Insert Table 5 about here]

Discussion

As is typically found with somatic symptom scales, the scree plot in exploratory factor analysis pointed to a one-factorial solution. Parallel analysis, however, clearly indicated the need for a multi-factorial representation of the somatic complaints domain. Across two large exploratory samples parallel analysis pointed to the presence of five factors. The fact that the exploratory analysis started from a relevant and representative set of somatic complaints gives

us a strong argument to assume that the underlying structure of somatic complaints is five factorial.

It was possible to construct a short, reliable, and easy to use instrument that captures the multidimensionality adequately. In line with the existing literature (Wessely, Nimnuan, & Sharpe, 1999), it was found that similarities between factors outweigh differences and that a higher-order model provides the best fit. This supports the hypothesis that the domain of somatic complaints is hierarchically organized with a general source of variance (a higher-order factor) and multiple, more specific sources of variance which are substantially correlated (Deary, 1999). Moreover, the GMSC-scale combines a stable theory driven structure with good practicality. No cross-loadings neither error-covariances were required to obtain a well-fitting model, both in a large adult and a large student sample.

Of the five factors that have been identified, three refer to clearly identifiable bodily areas, namely head and neck complaints, chest and heart complaints, and stomach and bowel complaints. They contain symptoms that are included in other widely-used somatic complaints scales (cfr. Derogatis, 1994; Janca et al., 1995; Keogh & Reidy, 2000; Kroenke at el., 2002; Mumford et al., 1991). Another common factor found in the present scale is fatigue. The relevance of fatigue for somatic complaints has already been observed previously in the literature (e.g. Deary, 1999; Martin, Chalder, Rief, & Braehler, 2007). A possible explanation is that the experience of somatic complaints and the burden they place on someone's body increase the levels of fatigue. This may also explain the relatively high cross-loadings of some items on this last factor.

The temperature regulation factor is not common in the somatic complaints domain. Since most somatic complaints scales do not contain temperature regulation items, this factor could not have been detected in previous research. Given the close link that is found between temperature on the one hand and fear, shame or anger on the other hand in situational emotion

studies (Scherer & Wallbott, 1994), it is surprising that items on temperature regulation failure have not (or only marginally) been included in somatic complaint instruments. Moreover, the fact that this factor has high loadings on the overall somatic complaints factor indicates that these sensations cannot be ignored. This factor can also be important when conducting research in non-Western cultures where cold and warmth sensations are much more central to symptomatology and health care (e.g. Ots, 1990).

The five-factor structure turned out to be stable in a rather different cultural group than the one where the scale was developed, namely in a sample from the Turkish population. This is only a first step in demonstrating the generalizability of the five-factor model across cultural groups. However, to the extent that these five factors refer to basic somatic and psychosomatic processes, further generalizability should be expected.

The importance of differentiating between somatic complaint factors for psychologists is shown by their differential association with a number of emotion clusters, age, and sex. The specific effect of depression on fatigue is well-documented in psychiatric literature (e.g. Fuhrer & Wessely, 1995; Weissman, Markowitz, Ouelette, Greenwald, & Kahn, 1990). The association between anger and pain complaints has also been recognized (Bruehl, Chung, & Burns, 2006). However, no association between anger and heart complaints or temperature regulation complaints was found which could have been expected (Scherer & Wallbott, 1994). This could point to a difference between an angry mood and intense anger experienced during an emotional episode, but more research is needed to substantiate this hypothesis. Surprisingly, we found associations for anxiety with every complaint factor. Future research should try to discover whether different types of anxiety can account for this result. In the DSM IV (APA, 2000), different types of anxiety disorders are related to different somatic complaints. Generalized anxiety disorder, for instance is related to fatigue and sleep problems, whereas panic disorder is characterized by palpitations and hot or cold spells.

Furthermore, older participants reported more temperature regulation complaints than younger ones, and women reported more pain in head and shoulders, temperature regulation, and fatigue complaints than men. These findings shed a new light on previous findings that women have more complaints, and that the relationship with age can be positive or negative (e.g. Gijsbers Van Wijk & Kolk, 1997; Hollifield, Paine, Tuttle, & Kellner, 1999). Only taking the overall somatic complaint factor can be misleading. The magnitude and the direction of differences between various groups depend on the representation of each factor in the global scale. For instance, when a scale contains a large number of items referring to neck and head pain, the difference between men and women will be larger than when a scale contains a lot of stomach complaints. The differential relationships with age and sex emphasize the importance of a multidimensional model for somatic complaints. Nevertheless, whereas the stability of the factorial structure was well established in the present study, the stability of the relationships of emotions and demographic characteristics with the somatic complaint factors should be demonstrated in future research.

One of the shortcomings of the present study is that the model was tested in a general population and validated on samples of students and working adults. However, research on somatic complaints in a general population is not uncommon (Brown, 2004; Kroenke & Price, 1993). Grabe et al. (2003) found that many subjects from the general population experience somatic symptoms, and some of them are seriously distressed or impaired. Moreover, in a population of “normal” working people, somatic complaints can have important consequences. It has been demonstrated that somatic complaints are one of the most important predictors of medical health care cost, sick leave, absenteeism, and employment incompetence (De Gucht & Fischler, 2002; Smith, 1994). Nevertheless, future research should analyse clinical samples and primary care samples to replicate the factorial structure. For instance, the applicability and validity of the scale to individuals who were diagnosed as

having somatic disorders or medically unexplained symptoms would be essential to prove the practical value of the GMSC-scale. Further research also needs to replicate the findings in other cultural and ethnic groups.

Another shortcoming is the lack of research on test-retest reliability and relationships with other relevant variables. Future research should try to validate the instrument by looking at possible correlates of the instrument, such as alexithymia, positive affectivity, and neuroticism (De Gucht, Fischler, & Heiser, 2004).

The Ghent Multidimensional Somatic Complaints Scale can be considered as a promising screening tool, because it does not only give indications on general somatic well-being, but also on more specific forms of somatic suffering that relate differently to emotional functioning. Due to its multidimensionality, this scale gives a more refined assessment of somatic well-being than the existing self-report measures of somatic complaints.

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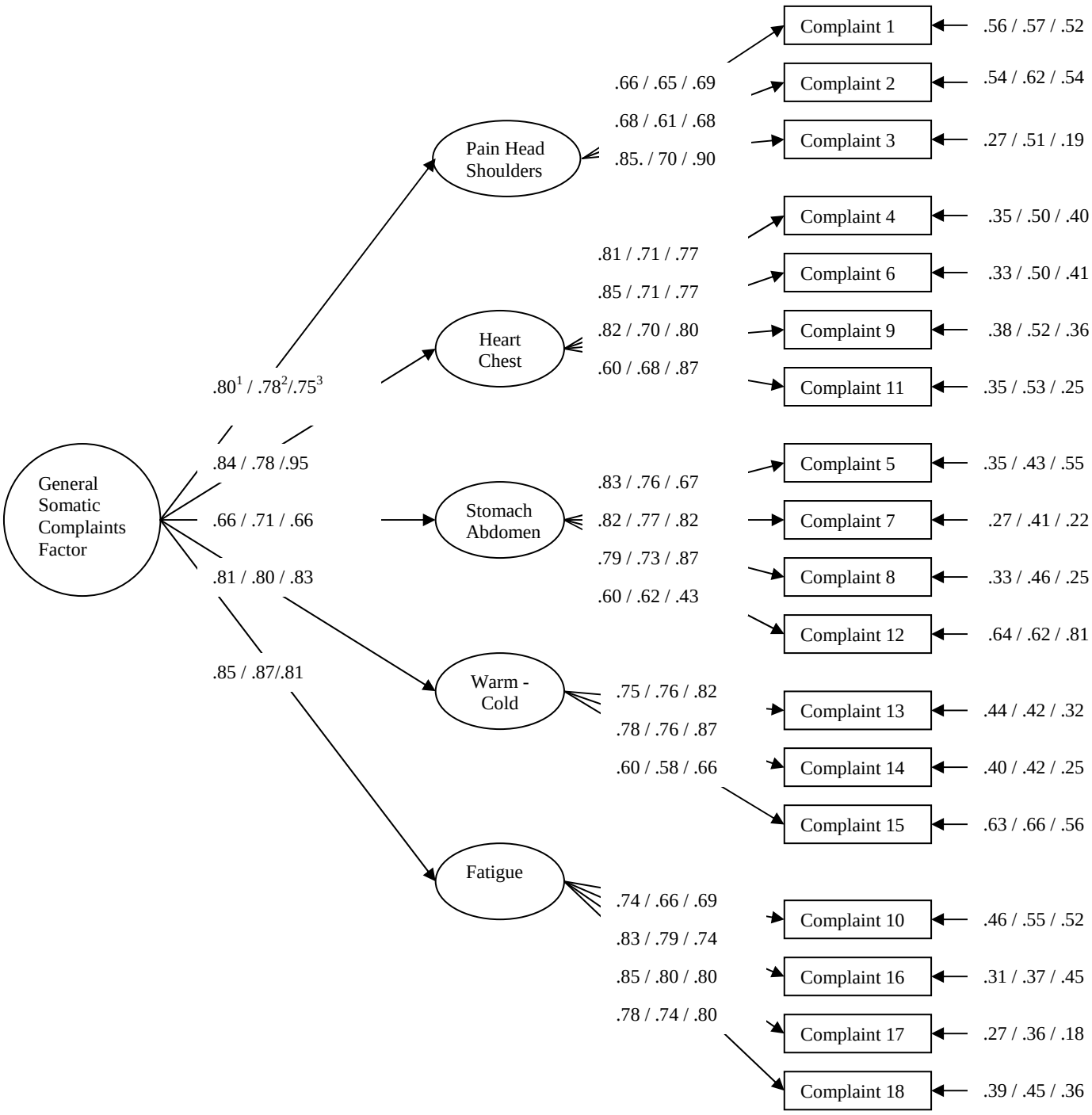
Figure caption

Figure 1. Higher-order five-factorial model of the 18 item Ghent Multidimensional Somatic Complaints Scale



Note. [1] Belgian adults; [2] Belgian students, [3] Turkish adults

Table 1

Sample Characteristics

	Exploratory samples		Confirmatory samples		
	Adult	Student	Adult	Student	Turkish Adult
N	306	307	664	735	222
Mean age	35	20	40	20	30
% Male	60.7	20	50.8	51.2	26.8
% LE[1]	5.9	-	4.8	-	6.6
% ME[2]	61.2	-	59.4	-	35.7
% HE[3]	32.9	-	35.8	-	57.7

Note. [1]Low educated (not finished high school), [2] Moderately educated (High school degree), [3] High educated (bachelor or master degree)

Table 2

Parallel Analysis on the Exploratory Adult and the Exploratory Student Sample

	Eigenvalues					
Components	Adults	PA 95[1]	PA 99[2]	Students	PA 95[1]	PA 99[2]
1	20.924	2.260	2.307	16.915	2.097	2.124
2	3.331	2.121	2.168	3.399	1.989	2.017
3	2.921	2.028	2.068	2.899	1.906	1.931
4	2.340	1.953	1.983	2.357	1.842	1.875
5	1.902	1.891	1.908	1.947	1.788	1.804
6	1.713	1.835	1.859	1.756	1.735	1.760
7	1.614	1.783	1.801	1.709	1.691	1.708
8	1.556	1.731	1.749	1.486	1.647	1.658
9	1.467	1.682	1.702	1.467	1.606	1.623
10	1.370	1.639	1.656	1.356	1.567	1.583

Note. [1] Parallel analysis eigenvalues at the 95 confidence interval

[2] Parallel analysis eigenvalues at the 99 confidence interval

Table 3

Exploratory Analysis: Factor loadings after Procrustes Rotation on the 18-item Version

Student EFA					Somatic complaints	Adult EFA				
F1	F2	F3	F4	F5		F1	F2	F3	F4	F5
.820	.078	.012	.223	.080	1. Severe headache. (B)	.779	.124	.052	.145	.133
.489	-.011	.103	-.024	.470[a]	2. Pain or tension in neck or shoulders. (B)	.498	.020	.233	.182	.357
.772	.197	.032	.054	.176	3. Tension in the head. (B)	.607	.262	.162	-034	.424
.151	.722	.194	.025	.190	4. Tightness in the chest. (B)	.215	.806	.067	.173	.136
-.016	.612	.003	.349	.217	6. Choking feeling in the throat. (B)	.156	.548	.317	-075	.345
-.090	.648	-.028	.092	.403	9. Difficulties breathing, even in rest. (B)	.085	.715	.159	.227	.258
.219	.780	.210	.014	.003	11. Weakness in the heart. (B)	.023	.819	.048	.194	.128
.102	.055	.719	.120	.264	5. Pain in the abdomen. (B)	.108	.081	.779	.150	.283
-.005	.143	.819	.033	.247	7. Indigestion. (B)	.072	.084	.794	.099	.295
.020	.114	.712	.189	.276	8. Bloated feeling in stomach. (B)	.041	.178	.722	.183	.376
.030	.067	.750	.118	.030	12. Diarrhea. (SDS)	.106	.107	.622	.106	.008
.099	.273	.195	.542	.245	13. Warm or cold spells. (M)	.120	.112	.138	.676	.263
.008	.038	.068	.738	.254	14. Cold feeling inside the body. (E)	.068	.114	.046	.738	.314
.021	.025	.085	.770	.024	15. Gooseflesh. (E)	-066	.120	.265	.646	.076
.124	.144	.113	.372	.571	10. Heavy feeling in the whole body. (B)	.009	.254	.175	.267	.709
.171	.161	.239	.203	.714	16. Weak inside the body. (SCL)	.073	.040	.162	.270	.786
.179	.032	.096	.093	.818	17. Lack of energy. (B)	.281	.091	.163	.149	.778
.154	.150	.136	.164	.730	18. Tired, even when not working. (B)	.236	.150	.113	.189	.737

Note. (B) item derived from the Bradford Somatic Inventory; (SDS) item derived from the Somatoform Disorders Schedule; (M) item derived from the Mood and Anxiety Symptom Questionnaire; (E) item derived from emotion research; (SCL) item derived from the SCL-90

[a] This cross-loading was not found in the initial EFA on the 63 items (on which the selection criteria applied), nor was it required in the CFA model.

Table 4

Confirmatory Analysis: Fit Indices of the Short Scale (Robust Maximum Likelihood)

Model	*Chi²*	*Df*	*Chi²/df*	*SRMR*	*RMSEA*	*CFI*	*CAIC*
One factor “adult CFA”	1695.57	170	9.974	.082	.111	.94	3197.44
Five factors “adult CFA”	334.97	125	2.680	.048	.050	.99	971.45
Higher order “adult CFA”	347.46	130	2.673	.049	.050	.99	950.45
One factor “student CFA”	1186.85	170	6.981	.072	.091	.94	2135.65
Five factors “student CFA”	306.14	125	2.450	.044	.044	.99	852.16
Higher order “student CFA”	315.09	130	2.424	.044	.044	.99	824.32
One factor Turkish adults	795.93	170	4.682	.082	.104	.95	1028.01
Five factors Turkish adults	348.12	125	2.785	.073	.049	.99	644.67
Higher order Turkish adults	360.41	130	2.772	.076	.049	.99	624.73

Table 5

Multivariate Multiple Regression Analyses of Anxiety, Depression, Anger, Age, and Sex on the Five Somatic Complaint Factors in the Adult CFA Sample

	Factors					
Predictors	Pain	Heart	Stomach	Warm-Cold	Fatigue	General
Anxiety	.168**	.343**	.148**	.212**	.199**	.278**
Depression	.038	.086	.058	.088	.225**	.138**
Anger	.176**	.097	.083	.066	.097	.137**
Age	-.039	-.042	-.122	-.206**	-.116	-.121**
Sex	.222**	-.040	.073	.270**	.111*	.161**

Note. All parameters are standardized regression weights (β). Due to the large sample size, p-values higher than .01 are not taken into account. * p <.01; ** p < .001

Appendix

The Ghent Multidimensional Somatic Complaints Scale

Instructions: The following questionnaire asks about bodily complaints or the feelings you experience inside your body. Please, write down the number (in front of each question) which indicates how often you have experienced the particular complaint in the past four weeks.

0	1	2	3	4	5	6	7
Never	Extremely Rare	Rarely	From time to time	Regularly	Often	Very often	All the time

In the past four weeks, have you (had)….?

1. ___ severe headaches
2. ___ pain or tension in your neck or shoulders
3. ___ a feeling of tension (tightness) in your head, like it was tightly held by someone or something
4. ___ the feeling of pressure or tightness of the chest or heart
5. ___ pain or discomfort in the belly (abdomen)
6. ___ a choking feeling in your throat, like your throat was blocked
7. ___ suffered from indigestion (problems with digesting)
8. ___ a swollen or bloated feeling in your stomach
9. ___ difficulties breathing, even when resting
10. ___ a heavy feeling inside your entire body
11. ___ felt a weakness or faint in your heart
12. ___ diarrhea
13. ___ warm or cold spells, which suddenly made you feel very warm or very cold
14. ___ felt coldness in your body
15. ___ gooseflesh
16. ___ felt physical weakness somewhere in your body
17. ___ repeatedly a lack of energy
18. ___ felt tired, even when you were not working