Post-print version:

Romero-Acosta, K., Canals, J., Hernández-Martínez, C., Penelo, E., Zolog, T.C. & Domènech-Llaberia, E. (2013). Age and gender differences of somatic symptoms in children and adolescents. *Journal of Mental Health, 22*(1), 33-41.

https://doi.org/10.3109/09638237.2012.734655

Age and gender differences of somatic symptoms in children and adolescents

Kelly Romero[1]; Josefa Canals[2]; Carmen Hernández-Martínez[2]; Eva Penelo[3]; Teodora Cosmina Zolog[1] & Edelmira Domènech-Llaberia[1]

[1] Department of Clinical and Health Psychology, University Autonomous of Barcelona, Spain

[2] CRAMC, Department of Psychology, University Rovira i Virgili, Tarragona, Spain

[3] Laboratori d'Estadística Aplicada, Departament de Psicobiologia i de Metodologia de les Ciències de la Salut, Universitat Autònoma de Barcelona, Spain

This research was carried out in Catalonia (Spain).

Corresponding Author: Kelly Romero. Department of Clinical and Health Psychology, Universitat Autònoma de Barcelona, Campus Bellaterra, Edifici B, 08193 Bellaterra, Spain. Tlph: +34 935812883, Fax: +34 935812125, e-mail: Romero.Acosta@campus.uab.cat

Abstract

Aims: This study provides information about the prevalence of somatic symptoms (Ss) in a population of Spanish children and adolescents and their distribution by age and gender. It also sheds light on which Ss are more associated with depression and anxiety and which are associated with more disability. *Method*: A sample of 2558 school children and adolescents aged 8-16 years old, 1297 girls, completed one questionnaire about somatic symptoms, and two about anxiety and depressive symptoms. *Results*: 37.6% reported at least one somatic symptom, headache being the most prevalent. In terms of age distribution, 26.8% of children and 52.1% of adolescents reported somatic symptoms. Girls reported more somatic symptoms than did boys. These gender differences started at 13 years of age and decreased at 15. Headache, stomach-ache and muscle pain were the somatic symptoms that caused the most impairment. *Conclusions*: In general, both anxiety and depressive symptoms were related to all Ss.

Keywords: somatic symptoms; impairment; adolescents; children

Somatic symptoms (Ss) are characterized by pains that occur in the absence of a organic cause. They have also been described as altered expressions of emotional distress by patients who are unable to express emotional states (Isaac, 1996). The prevalence of Ss in children and adolescents has been estimated from 25% to 83% (Perquin, et al., 2000; Roth-Isigkeit, et al., 2005; Vila, et al., 2009). Some epidemiological studies indicate that between 40% and 75% of children and adolescents experience headaches at least monthly (Milde-Busch et al., 2010; Vila, et al., 2009), whereas 10% to 43% complain of frequent abdominal pain (Huguet, & Miró, 2008; Vila, et al., 2009).

Perquin et al., (2000) found that chronic pain in Dutch girls increased between 12 and 14 years of age. These gender differences in adolescence may be due to pubertal maturity, which in turn provokes physiological, psychological, and cognitive changes (Beck, 2008). Most studies do not find any gender difference in the prevalence of Ss before puberty; in contrast, adolescent girls tend to report more symptomatology than do boys (Domènech-Llaberia et al., 2004; Vila, et al., 2009).

The presentation of Ss may become persistent and lead to functional impairment, which can be lead to absence from school, and increased psychological symptomatology and use of health services (Beck, 2008). Vila et al. (2009) found that in comparison with a control group, those students with Ss reported considerably more impairment in terms of enjoying activities (30%), concentrating (47%), seeing friends (24%), or going to school (30%). In addition, Huguet and Miró (2008) found that children and adolescents (aged 8-16) who had chronic pain reported a worse quality of life, missed more days of school, and were more likely to use pain medication.

It has been stated that gender issues must be considered in health promotion interventions because males and females do not share the same perception of these interventions (Svedberg, 2011), and do not share the same prevalence of symptoms in the

general population. Adolescent girls tend to report not only more Ss but also more anxiety and depressive symptoms than do boys (Beck, 2008; Perquin et al., 2000). Both groups of symptoms have been found to co-occur (Gledhill & Garralda, 2006). Janssens et al. (2010) pointed out that anxiety and depression are a risk factor of Ss and not a consequence. Anxiety and depression may change the perception of bodily signals and that may make adolescents more likely to develop Ss (Janssens et al., 2010). Indeed, Ss tend to become more frequent as the severity of the depression symptoms increases (Beck, 2008), and this in turn increases disability. Children and adolescents with unexplained somatic symptoms usually are attended in primary care, however, many of them do not receive the appropriate treatment because paediatricians are unable to detect an organic aetiology to explain symptom presentation (Beck, 2008).

It is important to describe the effects of Ss on school attendance and daily life (home, school, and friends) and to determine which Ss are more associated with depression, anxiety and disability, because this will enable healthcare professionals to help children and adolescents manage their Ss before they become recurrent and persistent (Roth-Isigkeit et al., 2005). An early intervention in Ss may prevent them from continuing. Furthermore, the simultaneous presence of anxiety and depressive symptoms with Ss may lead paediatricians to make the correct diagnosis and, therefore, to choose inadequate treatment.

To our knowledge, only one study has examined impairment and the prevalence of Ss in Spain (Huguet & Miró, 2008), and no study has studied a large sample of children and adolescents, of which over two thirds are early adolescents (10 to 14 years-old). The objectives of the present study are three-fold: a) to estimate the prevalence of Ss, and their distribution in terms of gender and age in a population of Spanish children and adolescents; b) to analyze which Ss cause the most impairment, and c) to identify which Ss are most associated with depressive and anxiety symptoms.

Method

Participants

This study has used data from two Spanish samples: one made up of children and another of adolescents. The first set of data was collected between January and June of 2007 academic year in Reus, a town near Tarragona (Spain), whose population in 2007 was 107,118 inhabitants according to the Spanish National Statistics Institute. This sample was selected using cluster sampling. From the total of 26 schools, a set of 13 schools (7 state and 6 state-subsidized schools) were randomly selected. Therefore, of the 3225 students registered in the fourth, fifth, and sixth years of primary school in the 2006 - 2007 academic year, we invited 2023 pupils (1001 from state schools and 1022 from state-subsidized schools) to take part. In the end, 1514 students agreed to participate, of whom 795 were girls and 719 were boys aged 8-12 (M = 10.52 years, SD = 1.23). Regarding Socio-Economic-Status (SES), 18% came from the upper class and middle upper class, 42.5% from the middle class, and 39.5% from the middle-lower and lower class.

The second database was obtained in Rubí, a town near Barcelona, between January and June of 2010 academic year. The population of Rubí in 2010 was 72,987 inhabitants, according to the latest report of the Spanish National Statistics Institute. Of the 1324 students registered in the second and third years of secondary school, 1067 agreed to answer the questionnaires. However, six students were excluded because they had just arrived in Spain from Morocco or China and could not answer the questionnaires owing to difficulties in understanding the Spanish language. Therefore, the adolescent sample consisted of 1061 adolescents aged 12 – 16 (M = 15.65 years, SD = 0.89), of whom 502 were girls and 559 were boys. 23.5% came from the middle-upper class, 30.8% from the middle class, and 45.7% from the middle-lower class. Table 1 shows more detailed information about the socio-demographic characteristics of the total sample.

--- INSERT TABLE 1 ---

Procedure

The Research and Ethical Committees of the Autonomous University of Barcelona and the Rovira i Virgili University approved the study protocols. First of all, we were required to ask the Territorial Delegation of the Department of Education for permission to contact the primary and secondary schools in both municipalities. In Reus, a group of 13 schools was randomly selected from the total of 26 schools. In Rubí we explained the aims of the research project to the directors of the town's five state schools and four state-subsidized schools and invited them to participate. All schools agreed to participate and collaborated in sending the parental written informed consent forms to the students' homes. Questionnaires were administered to students by trained graduate research assistants in the students' classrooms during normal school hours. It was emphasized to participants that there was no right or wrong answer. The questionnaires were immediately reviewed after completion and, if necessary, we asked participants to complete missing data.

Instruments

Somatic Symptoms Questionnaire (SSQ). This questionnaire inquired about the presence and frequency (once, twice, three times, and over three times) of five somatic complaints (headache, dizziness, stomach-ache, fatigue and muscle pain) in the three months prior to assessment. We considered it was Ss only present when students indicated that they had experienced Ss more than three times during the three months prior to assessment. In order to assess the functional impairment caused by somatic complaints, children and adolescents were asked how many days they had missed school because of Ss (none, one, two, three, or more than three days). In addition, participants were asked to specify how Ss affected their ability to engage in common daily activities at home, at school and in their relationships with friends (a little, a lot, not at all). Finally, to rule out any medical

explanation for the Ss, participants were asked if they had been to see a paediatrician about them and if the paediatrician had found a medical explanation for this discomfort. If illness or accident was found to be the cause, the presence of Ss was ruled out, whereas if the paediatrician or doctor had found no explanation, the Ss were regarded as a somatic complaint. Thus, two aspects were taken into account to determine whether the participants suffered from Ss: 1) having experienced Ss more than three times during the three months prior to the self-report assessment; and 2) having received no medical explanation for the Ss from a paediatrician.

Our Ss questionnaire was based on the instrument developed by Domènech-Llaberia et al. (2004), which was designed to be answered by parents of preschool children. Thus, we adapted it so it could be answered by primary school children and adolescents. For instance, the question "*Has your child complained of stomach pain in the last three months?"* was adapted to "*Have you had stomach pain in the last three months?*". In the current study, internal consistency was satisfactory (α = .80)

Children's Depression Inventory (CDI; Kovacs, 1992). This takes 10 to 20 minutes to complete and consists of 27 items scored on a 3-point scale (0: *absent*; 1: *moderate*; 2: *severe*). Both children and adolescents are asked to choose which of the three options best describes how he/she has typically felt over the past two weeks. A good reliability (α=0.81 to 0.85) was reported for this version in a Spanish community and clinical population (Figueras et al., 2010). In the sample, internal consistency was also satisfactory (α = .83).

Screen for Child Anxiety-Related Emotional Disorders, child version (SCARED-C; Birmaher et al., 1999; Vigil-Colet et al., 2009). This asks children and adolescents about the frequency of their symptoms using a 3-point Likert-type scale (i.e., 0: *not true or hardly ever true*, 1: *somewhat true or sometimes true*, and 2: *very true or often true*). A cut-off of 25 on the SCARED-C provided optimal sensitivity (71%) and specificity (67%) in an American

clinical sample (Birmaher, 1999). SCARED has demonstrated good internal consistency (α = .74 to .93), test-retest reliability (ICCs: .70 to .90), and good discriminant validity (Birmaher, et al., 1999).

Socio-demographic information. This form was prepared by the authors. Children and adolescents answered questions about age, gender, SES (Hollingshead, 2011) and place of birth. For the SES, education and occupation levels of both parents were taken into account. The researchers and the class tutor helped the primary school children to fill in the socio-demographic questionnaire, and then this information was corroborated by school.

Data Analysis

SPSS 18 for Windows was used. Four age groups were established (Perquin et al., 2000; Roth-Isigkeit et al., 2005; Vila et al., 2009), these being: 8 to 10 years old (*n* = 591, 23.2%), 11 to 12 years old (*n* = 871, 34.2%), 13 to 14 years old (*n* = 864, 33.9%), and 15 to 16 years old (*n* = 222, 8.7%). A gender comparison of somatic symptoms (headache, dizziness, stomach-ache, muscle pain, and fatigue) was performed using chi-square tests. Binary logistic-regression models were used: 1) to evaluate the relationship between each S and the dichotomized measure of total impairment (e.g., no impairment *vs*. at least one day missing school, or visiting the paediatrician, or impairment regarding home, school or friends), and 2) to explain the association between Ss and anxiety and depressive symptoms. The models were adjusted with likely confounding variables such as gender, age, SES, and place of birth. All predictors and potential confounding variables were entered during the same step ("enter" method). Nagelkerke's R^2 valued the predictive accuracy of each model, and Hosmer-Lemeshow's test evaluated the goodness-of-fit.

Results

Somatic Symptoms prevalence

Of the total sample, 968 (37.6%) participants reported at least one somatic symptom; of these,

26.8% were children and 52.1% were adolescents. Among the five Ss studied, headache was the most prevalent (48.3%), followed by muscle pain (42.7%), stomach-ache (38.8%), fatigue (28.4%), and dizziness (19.4%).

Gender comparison in the four age groups

Of the total sample, more girls (41.5%) than boys (33.6%) reported the presence of some Ss ($p < .001$). Table 2 shows the frequencies of the five somatic symptoms in the four age groups, taking into account gender differences.

--- INSERT TABLE 2 ---

Somatic Symptoms and impairment

Of the 968 children and adolescents who reported Ss, 86.2% also reported impairment, 49.2% sought professional help, and 78.5% had been absent from school. Adolescents presented more impairment than did children ($p < .001$). The older participants reported more impairment up to the age of 13 - 14 (88.2%); but this decreased slightly at the age of 15 – 16 (86.8%).

Children and adolescents with headache ($n = 468$) reported the highest prevalence in visits to the paediatrician (54.9%), school absenteeism (78.9%), impairment at home (58.7%), at school (59.4%) and with friends (33.8%). Table 3 shows the binary logistic-regression model that evaluated the association between the five Ss and the impairment caused (67.5% of cases correctly classified).

--- INSERT TABLE 3 ---

Depressive and anxiety symptoms co-occurring with Ss

A total of 387 participants (15.1%) reported depressive symptoms and 1111 (43.1%) individuals reported anxiety symptoms. More than half of the participants with depressive symptoms and 41.4% of the participants with anxiety showed co-occurrence with Ss. Table 4 shows the results of the five logistic-regression models and explains the association between

each S and the anxiety and depressive symptoms.

--- INSERT TABLE 4 ---

Discussion

This study provides information concerning the prevalence of Ss in children and adolescents from Catalonia (Spain). Ss are more reported by girls than by boys and are more prevalent in adolescents than in children. The prevalence rate of Ss found in this study is higher than that found by Perquin et al. (2000, 25%) and lower than that found by Roth-Isigkeit et. al. (2005, 83%). This may be because the study by Roth-Isigkeit et al. (2005) and the present study did not analyze the same number of Ss. Our study only took into account five Ss, whereas Roth-Isigkeit et al. analyzed 10 Ss. Our results are comparable to those found by Huguet and Miró (2008) in a Spanish population. They found that 37.7% of 561 Spanish students had chronic pain in the preceding three months.

As in other studies (Perquin et al, 2000; Roth-Isigkeit et al., 2005; Vila et al., 2009), headache was the most prevalent somatic symptom in our study, followed by stomach-ache. As in Perquin et al. (2000) stomach-ache, was the most prevalent somatic complaint in our study for children aged 8 to 10 years old. In addition, in the present study, headache was the most prevalent somatic symptom in 13 to 16 year-olds.

We found significant differences between children and adolescents in the prevalence of Ss. Some previous research has suggested that primary school children show more Ss than do adolescents in secondary school (Milde-Busch et.al., 2010). Nonetheless, in the present study, Ss increased from 8 to 14 years old, at which point the reporting of somatic complaints decreased sharply. A similar pattern of results has been observed in a Spanish population by Huguet and Miró (2008), who found that boys and girls reported more Ss as their age increased. This could indicate that Spanish adolescents are more anxious and reported more somatic symptoms than adolescents from other cultures.

In line with other studies, girls reported more Ss than boys did, especially in the adolescent period (Perquin et al., 2000), although there was a different gender pattern regarding the prevalence of one specific type of somatic complaint; that is, boys showed more Ss than did girls during the period of 8 to 10 years old, and boys in particular reported more muscle pain than did girls. This could be because at this age, boys in Spain play more soccer and do more physical activities than girls, which may make them more sensitive to muscle pain. Nonetheless, girls report higher prevalences than boys for all Ss in the remaining age groups. As in previous research, headache and stomach-ache were more frequently reported by girls than by boys (Beck, 2008 ; Huguet & Miró, 2008; Perquin et al., 2000). These differences started at 13 years old and finally stopped at 15 years old.

The current study confirmed the results obtained by Huguet & Miró (2008) regarding the reduction in daily activities and the increased use of health services as consequence of Ss. As in Roth-Isigkeit et al. (2005) children and adolescents with headache more often reported school absenteeism than those who had other Ss. Headache, stomach-ache and muscle pain caused the most impairment.

All of the five Ss studied co-occurred with depressive symptoms. Our results are in keeping with other studies which relate Ss and other groups of symptoms such as anxiety and depression (Beck, 2008). Our data lend some support to that of Janssens et al. (2010), who found that depression and anxiety are risk factors and not the result of Ss. Our study is also in line with Stanford et al (2008) who found that anxiety/depression were an important predictors of recurrent headache, stomach-ache and backache. According to Beck (2008) Ss begin to develop in anxious or emotionally reactive children or adolescents who perceive greater threats and danger. Thus, the presence of anxiety and depression contribute to the manifestation of Ss. Further research is needed to identify the association between major depression and anxiety disorders and the presence of different Ss.

The co-occurrence of Ss with both anxiety and depressive symptoms increases the prevalence of Ss. These findings emphasize the importance of preventing the co-occurrence of depressive, anxiety and Ss because of the potential consequences for children and adolescents, namely, an increase in Ss.

The early detection of somatization in children and adolescents is important to prevent chronic conditions. There have been several epidemiological studies of paediatric somatic symptoms. We think that the strength of the present study is that is analyzes the development of Ss prevalence, impairment and co-occurrence of different ages. One limitation is the cross-sectional design used because it does not take into account causal relationships among variables. Nevertheless, our results could be useful in clinical interventions. They suggest, for example, that Ss tend to co-occur with depressive and anxiety symptoms, children and adolescents who seek medical healthcare for Ss should also be screened for possible depressive and anxiety symptoms. Finally, from this research it seems clear that Ss persist throughout childhood and adolescence and provoke high levels of impairment, not only in terms of seeking medical advice or missing classes, but also in terms of daily activities at home, at school and with friends. These facts should give paediatricians cause to reflect on the importance of preventing these symptoms so as to avoid chronicity and subsequent impairment.

References

Beck, J. E. (2008). A developmental perspective on functional somatic symptoms. *Journal of Pediatric Psychology*, *33*, 547-562. doi:10.1093/jpepsy/jsm113

Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): A replication study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*, 1230-1236. doi:10.1097/00004583-199910000-00011

Domènech-Llaberia, E., Jané, C., Canals, J., Ballespí, S., Esparó, G., & Garralda, E. (2004). Parental reports of somatic symptoms in preschool children: Prevalence and associations in a Spanish sample. *Journal of the American Academy of Child & Adolescent Psychiatry*, *43*, 598-604. doi:10.1097/00004583-200405000-00013

Figueras, A., Amador-Campos, J.A., Gómez-Benito, J., & del Barrio, V. (2010). Psychometric properties of the Children's Depression Inventory in community and clinical sample. *The Spanish Journal of Psychology*, 13, 990-999.

Gledhill, J., & Garralda, M. (2006). Functional Symptoms and Somatoform Disorders in Children and adolescents: The Role of Standardised Measures in Assessment. *Child and Adolescent Mental Health*, *11*, 208-214. doi:10.1111/j.1475-3588.2006.00392.x

Hollingshead, A. B. (2011). Four Factor Index of Social Status. *Yale Journal of Sociology*, *8*, 21-52. Retrieved from: http://www.yale.edu/sociology/yjs/yjs_fall_2011.pdf

Huguet, A., & Miró, J. (2008). The severity of chronic pediatric pain: An epidemiological study. *The Journal of Pain*, *9*, 226-236. doi:10.1016/j.jpain.2007.10.015

Instituto Nacional de Estadística (INE). (n.d.). Retrieved November 26, 2011, from: http://www.ine.es/

Isaac, M. (1996). Somatization –a culture- bound or universal syndrome? *Journal of Mental Health, 5*, 219-222. doi:10.1080/09638239650036884

Janssens, K. M., Rosmalen, J. M., Ormel, J., van Oort, F. A., & Oldehinkel, A. J. (2010). Anxiety and depression are risk factors rather than consequences of functional somatic symptoms in a general population of adolescents: The TRAILS study. *Journal of Child Psychology and Psychiatry*, *51*, 304-312. doi:10.1111/j.1469-7610.2009.02174.x

Kovacs, M. (1992). *Children Depression Inventory, CDI Manual*. Toronto, Ontario, Canada: Multihealth Systems, Inc.

Milde-Busch, A., Boneberger, A., Heinrich, S., Thomas, S., Kühnlein, A., Radon, K., & ... von Kries, R. (2010). Higher prevalence of psychopathological symptoms in adolescents with headache. A population-based cross-sectional study. *Headache: The Journal of Head and Face Pain*, *50*, 738-748. doi:10.1111/j.1526-4610.2009.01605.x

Perquin, C. W., Hazebroek-Kampschreur, A. M., Hunfeld, J. M., Bohnen, A. M., Suijlekom-Smit, L., PaSschier, J., & der Wouden, J. (2000). Pain in children and adolescents: A common experience. *Pain*, *87*, 51-58. doi:10.1016/S0304-3959(00)00269-4

Roth-Isigkeit, A., Thyen, U., Stöven, H., Schwarzenberge, J., Schmucker, P. (2005). Pain among children and adolescents: restrictions in daily living and triggering factors. *Pediatrics, 115*, e152-e162. doi:10.1542/peds.2004-0682

Stanford, E. A., Chambers, C. T., Biesanz, J. C., Chen, E. (2008). The frequency, trajectories and predictors of adolescent recurrent pain: A population-based approach. *Pain*, 138, 11-12.

Svedbeg, P. (2011). Attitudes to health promotion interventions among patients in mental health services – differences in relation to socio-demographic, clinical and health-related variables. *Journal of Mental Health, 20*, 126-135. doi:10.3109/09638237.2010.507684

Vigil-Colet, A., Canals, J., Cosí, S., Lorenzo-Seva, U., Ferrando, P., Hernández-Martínez, C.,

… Doménech-Llaberia, E. (2009). The factorial structure of the 41-item version of the Screen for Child Anxiety Related Emotional Disorders (SCARED) in a Spanish population of 8 to 12 years-old. *International Journal of Clinical and Health Psychology*, *9*, 313-327.

Vila, M., Kramer, T., Hickey, N., Dattani, M., Jefferis, H., Singh, M., & Garralda, M. (2009). Assessment of somatic symptoms in British secondary school children using the Children's Somatization Inventory (CSI). *Journal of Pediatric Psychology*, *34*, 989-998. doi:10.1093/jpepsy/jsp005

Table 1. Description of the sample

	Total sample (N = 2558)		Boys (n = 1278)		Girls (n = 1297)	
Socio-demographic characteristics	*N*	*%*	*N*	*%*	*n*	*%*
Group of ages						
8-10	596	23.3	280	22.1	316	24.7
11-12	873	34.1	413	32.6	450	35.7
13-14	862	33.7	449	35.1	413	32.0
15-16	227	8.9	126	9.9	101	7.8
Socio-economic status						
High and middle-high	522	20.5	287	22.5	235	18.3
Middle	960	37.6	474	37.1	489	37.8
Low and middle-low	1068	41.9	503	39.4	565	43.9
Ethnic composition						
Spaniards	2168	84.2	1094	85.6	1074	82.8
Immigrants	407	15.8	184	14.4	223	17.2

Table 2. Types and frequency (%) of somatic symptoms regarding gender in each age group (N = 2558)

	Symptoms	Boys (n = 1268) % (CI 95%)	Girls (n = 1290) % (CI 95%)	χ^2	p
8 – 10 (n = 596)	Stomach-ache	13.2 (9.7; 17.7)	14.8 (11.4; 19.2)	0.338	.561
	Headache	13.2 (9.7; 17.7)	13.3 (10.0; 17.5)	0.001	.978
	Muscle pain	14.6 (11.0; 19.3)	7.6 (5.2; 11.1)	7.589	.006
	Dizziness	7.4 (4.7; 10.8)	7.3 (4.9; 10.7)	0.004	.949
	Fatigue	6.78 (4.4; 10.6)	6.0 (3.9; 9.2)	0.149	.700
11– 12 (n = 873)	Muscle pain	10.4 (7.8; 13.7)	8.3 (6.1; 11.1)	1.196	.274
	Headache	6.3 (4.3; 9.1)	12.2 (9.5; 15.5)	8.836	.003
	Stomach-ache	6.1 (4.1; 8.8)	11.1 (8.5; 14.3)	6.938	.008
	Fatigue	5.8 (3.9; 8.5)	6.1 (4.2; 8.7)	0.030	.864
	Dizziness	2.7 (1.5; 4.7)	4.3 (2.8; 6.6)	1.803	.179
13– 14 (n = 862)	Headache	17.6 (14.4; 21.4)	38.5 (33.9; 43.3)	47.033	<.001
	Muscle pain	21.8 (18.3; 25.9)	25.7 (21.7; 30.1)	1.756	.185
	Stomach-ache	12.5 (9.7; 15.9)	27.8 (23.7; 32.4)	31.970	<.001
	Fatigue	14.3 (11.3; 17.8)	19.9 (16.3; 24.0)	4.797	.029
	Dizziness	4.9 (3.3; 7.3)	16.9 (13.6; 20.9)	32.761	<.001
15– 16 (n = 227)	Headache	19.8 (13.8; 27.7)	37.6 (28.8; 47.4)	8.841	.003
	Muscle pain	24.6 (17.9; 32.8)	26.7 (19.1; 36.1)	0.134	.715
	Stomach-ache	13.5 (8.6; 20.5)	25.7 (18.2; 35.0)	5.479	.019
	Fatigue	15.1 (9.9; 22.4)	17.8 (11.6; 26.4)	0.309	.578
	Dizziness	4.0 (1.7; 9.0)	16.8 (10.8; 25.3)	10.599	.001

Somatic symptoms are organized descending.

Table 3. Results of binary logistic-regression model that evaluates the association between the five somatic symptoms and impairment, adjusted for gender, age, SES, and place of birth

Criterion	Predictors/Covariates	OR (CI 95%)	*p*	R^2	H-L
Impairment	Headache	4.58 (3.13; 6.68)	<.001	.187	.317
	Fatigue	1.72 (1.17; 2.53)	.006		
	Dizziness	1.63 (0.96; 2.78)	.029		
	Stomach-ache	2.81 (1.96; 4.03)	<.001		
	Muscle	2.03 (1.50; 2.75)	<.001		
	Gender: female	1.25 (1.05; 1.50)	.012		
	Age	1.13 (1.08; 1.19)	<.001		
	SES high	0.91 (0.72; 1.16)	.442		
	SES low	1.08 (0.88; 1.31)	.475		
	Origin: immigrants	1.12 (0.87; 1.45)	.387		

R^2: Nagelkerke's R square; H-L: Hosmer-Lemeshow test

Table 4. Results of logistic regression models explaining the association between somatic symptoms and anxiety and depressive symptoms, adjusted by gender, age, SES and place of birth

Criterion	Predictors	OR (CI 95%)	*p*	R^2	H-L
Headache	Anxiety Symptoms	1.02 (1.00; 1.03)	.001	.16	.51
	Depressive Symptoms	1.07 (1.05; 1.10)	<.001		
Stomach-ache	Anxiety Symptoms	1.03 (1.01: 1.04)	<.001	.10	.82
	Depressive Symptoms	1.06 (1.04; 1.09)	<.001		
Fatigue	Anxiety Symptoms	1.02 (1.01; 1.04)	<.001	.14	.44
	Depressive Symptoms	1.08 (1.06; 1.11)	<.001		
Dizziness	Anxiety Symptoms	1.03 (1.01; 1.05)	<.001	.16	.21
	Depressive Symptoms	1.10 (1.07; 1.12)	<.001		
Muscle Pain	Anxiety Symptoms	1.03 (1.01; 1.05)	<.001	.11	.01
	Depressive Symptoms	1.10 (1.07; 1.12)	<.001		

R^2: Nagelkerke's R square; H-L: Hosmer-Lemeshow test