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Factorial validity, measurement invariance and concurrent validity of Hospital Anxiety and Depression Scale in a sample of Polish undergraduate students

Trafność czynnikowa, równoważność pomiaru i trafność kryterialna Szpitalnej Skali Lęku i Depresji w próbie polskich studentów

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Abstract

Aim: With increasing levels of psychopathology observed in students in recent years, there is a clear need for short and valid tools for evaluating their psychological health. Hospital Anxiety and Depression Scale (HADS) is one of the most commonly used instruments measuring these constructs. The aim of this study was to examine the psychometric properties of the Polish version of HADS in a sample of undergraduate students. **Material and methods:** A total of 1,032 students took part in the study. The students' were from various universities, years of study, and study courses. Confirmatory factor analysis was used to test the model fit of the original 2-factor structure. A series of hierarchically nested models were tested to assess measurement invariance between genders. Pearson correlation coefficients of HADS scores with criterion variables were calculated. The prevalence of depression was estimated on the basis of an empirical cut-off score. **Results:** Confirmatory factor analysis showed a good model fit of the Polish version of HADS, and strict measurement invariance between genders. Both anxiety and depression were related to higher levels of stress and lower sleep quality, social support and general quality of life. The prevalence of depression was estimated to be 7.6% or 21.2%, depending on the cut-off score used. **Conclusions:** The study corroborates good psychometric properties of the original 2-factor structure of the Polish version of HADS in a student sample, including measurement invariance between genders. It is thus concluded that HADS is a valid tool for the short measurement of anxiety and depression among students.

Keywords: anxiety, depression, measurement invariance, scale, validity

Streszczenie

Cel: Wraz z rosnącym w ostatnich latach problemem psychopatologii wśród studentów pojawia się wyraźna potrzeba krótkich i trafnych narzędzi do badania ich zdrowia psychicznego. Szpitalna Skala Lęku i Depresji (Hospital Anxiety and Depression Scale, HADS) jest jednym z najczęściej używanych narzędzi mierzących te konstrukty. Celem badania było sprawdzenie właściwości psychometrycznych polskiej wersji HADS w próbie studentów. **Materiał i metoda:** W badaniu wzięło udział 1032 studentów. Grupa badana była zróżnicowana pod względem typu uczelni, roku studiów oraz studiowanego kierunku. Konfirmacyjna analiza czynnikowa została zastosowana do zbadania dopasowania oryginalnego 2-czynnikowego modelu. Serię hierarchicznie osadzonych modeli przetestowano, aby zbadać równoważność pomiaru między płciami. Obliczono współczynniki korelacji Pearsona wyników HADS ze zmiennymi kryterialnymi. Oszacowano występowanie depresji na podstawie empirycznego progu odcięcia. **Wyniki:** Konfirmacyjna analiza czynnikowa pokazała dobre dopasowanie modelu polskiej wersji HADS oraz ścisłą równoważność pomiaru między płciami. Zarówno lęk, jak i depresja były związane z wyższym stresem oraz niższą jakością snu, wsparciem społecznym i ogólną jakością życia. Występowanie depresji zostało oszacowane na 7,6% oraz 21,2%, w zależności od przyjętego progu odcięcia. **Wnioski:** Badanie dostarczyło danych wskazujących na dobre właściwości psychometryczne oryginalnej 2-czynnikowej struktury polskiej wersji HADS w próbie studentów oraz równoważność pomiaru między płciami. Narzędzie to jest trafnym instrumentem do krótkiego pomiaru lęku i depresji wśród studentów.

Słowa kluczowe: lęk, depresja, równoważność pomiaru, skala, trafność

INTRODUCTION

In recent years, there has been an increase in the prevalence of anxiety and depression in the student population. According to reports, the rise of anxiety between the 1950s and the 1990s was so high that normal samples of children from the 1980s would have been considered psychiatric in the 1950s (Twenge, 2000). Two meta-analyses have uncovered a large increase in psychopathology (including depression) among American college students ($N = 63,706$) in the period 1938–2007 on the MMPI (Minnesota Multiphasic Personality Inventory) and MMPI-2 (Twenge et al., 2010). Furthermore, a longitudinal study has found that levels of anxiety and depression are significantly higher in students' midcourse than before attending university (Andrews and Wilding, 2004). In some countries, up to half of undergraduate students may experience moderate to extremely severe levels of depression, anxiety, and stress (see Mamun et al., 2019). Also, specific student populations, such as students of medical universities (Dyrbye et al., 2008) or music academies (Lawendowski et al., 2019), may be exposed to highly stressful demands related to their studies, and suffer their health consequences. While limited longitudinal data are available concerning Poland, there is some indication that these trends are present in the Polish society (Höfer et al., 2012). For example, depression and anxiety, as well as indicators of burnout among undergraduate students, have recently been found to be significantly related to the newly suggested construct of study addiction conceptualised as an early form of work addiction (Atroszko, 2018, 2015). This is consistent with the findings showing that studying itself is a major source of distress and psychopathology for young adults (Richardson et al., 2005). For these reasons, it is necessary to study factors related to anxiety and depression among students, and apply efficient instruments measuring these variables. Anxiety and depression are associated with a substantial general decrease in an individual's well-being. The psychological hardships they cause are accompanied by increased levels of stress (Bunevicius et al., 2008; Lovibond and Lovibond, 1995), poor sleep quality (Taylor et al., 2005), lower perceived support from family and friends (Kendler et al., 2005; Zimet et al., 1988), and lower quality of life (Mendlowicz and Stein, 2000; Pyne et al., 1997).

Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983) is a widely used short 14-item scale for the measurement of anxiety and depression. The authors originally proposed a 2-factor solution with 7 items measuring anxiety, and seven items measuring depression. It was initially designed as a tool for hospital staff to use for the assessment of the level of psychological distress of patients. The authors excluded somatic symptoms, focusing solely on the psychological aspects of these mood disorders in order to avoid the scores being affected by patients' physical illness. The items from the anxiety subscale measure primarily generalised anxiety disorder (Snaith, 2003).

The items from the depression subscale focus on anhedonia, which is one of the two necessary components for the diagnosis of major depressive disorder. To evaluate the scale psychometrically, the authors investigated the relationship between HADS scores and interview ratings, as well as the relationships between specific items and full subscale scores, in order to eliminate faulty items. The scale showed satisfactory validity and reliability in a multitude of previous studies, and an empirical cut-off score for depression was suggested at 8+, based on the review of these studies (Bjelland et al., 2002). However, a higher cut-off (at 11+) is frequently used. A lower cut-off tends to be interpreted as depressive-ness or risk of depression, while a higher cut-off suggests clinical levels of depression. Although widely accepted as a screening tool used both in clinical and non-clinical samples, HADS is generally not recommended for precise diagnosis (Mitchell et al., 2010).

The purpose of the current study was to examine the psychometric properties of the original factorial structure of the Polish version of HADS in a student sample, including measurement invariance between genders. It was hypothesised that anxiety and depression would be correlated positively with stress and negatively with social support, sleep quality, and the general quality of life. The prevalence of depression was investigated based on an empirical cut-off score (Bjelland et al., 2002) in the present sample.

MATERIAL AND METHODS

Participants

The sample consisted of 1,074 undergraduate students. Due to missing data on relevant variables, 42 participants were eliminated from the analyses. When data were missing at random, and only a very small portion of data was missing (less than 2% overall), the missing data were imputed using Missing Values Analysis within SPSS 25. The final sample, therefore, comprised 1,032 students: 559 females (54.2%), 465 males (45.1%), and 8 persons (0.7%) who did not report their gender, with the mean age of $M = 21.78$ years (standard deviation, $SD = 3.27$). The participants were students from different universities in the Pomerania region of Poland. Convenience sampling was used, however, in principle, it was aimed at assuring diversity of students to some extent representing the population of undergraduate students in Poland. Consequently, the sample included most types of universities, both public and private, a variety of faculties and courses of study from each university, both full-time and part-time students, and students of all years of study.

Measures

Anxiety and depressiveness were measured by HADS, consisting of 14 items (7 for anxiety and 7 for depression), each with a 4-point Likert response format (Zigmond and

Snaith, 1983). In the present sample, Cronbach's alpha reliability coefficient was 0.74 for depression, and 0.85 for anxiety.

Stress was measured by the Perceived Stress Scale (PSS-4) a 4-item scale with a 5-point Likert response format scale (Cohen et al., 1983). The scale showed good validity and reliability in the previous studies (Atroszko, 2015; Atroszko et al., 2015a, 2018, 2015b; Sendal et al., 2016). In the present sample, Cronbach's alpha reliability coefficient was 0.72.

Sleep quality was measured using a single-item self-report measure with the question "How satisfied are you with your sleep?", using a 9-point response scale from 1 – "Very dissatisfied" to 9 – "Very satisfied." The scale showed good validity in the previous study, and the interclass correlation coefficient (ICC) for test–retest reliability was 0.81 (Atroszko et al., 2015a).

Satisfaction with personal relationships was measured using a single-item self-report measure which asked the question "How satisfied are you with your personal relationships?" The response scale ranged from 1 – "Very dissatisfied" to 9 – "Very satisfied." The scale showed good validity in the previous study, and the interclass correlation coefficient (ICC) for test-retest reliability was 0.80 (Atroszko et al., 2015b).

Satisfaction with the support received from friends was measured using a single-item self-report measure with the question "How satisfied are you with the support you get from your friends?", with the same response format. The scale showed good validity in the previous study, and the ICC for test–retest reliability was 0.64 (Atroszko et al., 2015b).

The general quality of life was measured using a single-item self-report measure which asked the question "How would you rate your quality of life?", with a 9-point response scale from 1 – "Very poor" to 9 – "Very good." The scale showed good validity in the previous study, and the interclass correlation coefficient (ICC) for test-retest reliability was 0.86 (Atroszko et al., 2015a).

Procedure

Data collection was based on convenience sampling. The study was a "paper and pencil" cross-sectional study. Students were invited to participate anonymously in the study during lectures or classes. The estimated response rate was above 95%. All willing students were included in the study. Participation was totally anonymous, and no monetary or other material rewards were offered. Data were gathered as a part of a research project concerning study addiction (Atroszko, 2015).

Statistical analyses

Confirmatory factor analyses (CFA) were performed using Mplus 6.11. Due to the strictly ordinal character

of the response scale, the CFA models were tested using the weighted least square mean and variance adjusted (WLSMV) estimator. The following measures were used to evaluate the fit of the model: χ^2 divided by degrees of freedom (χ^2/df), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Root Mean Squared Error of Approximation (RMSEA). Measurement invariance between females and males in both samples, as well as between the samples themselves, was assessed using multiple-group procedures in which sets of parameters were freed sequentially in a series of four hierarchically nested models. Configural invariance determines whether the overall constructs are equivalent across groups. Metric invariance tests whether the matrix of factor loadings applies to all groups. Scalar invariance tests the equality of measurement intercepts (thresholds for categorical items). Strict invariance determines the equality of residual variances across groups. Because the models for each level of invariance are nested within the earlier models, they are compared using the change in fit indices (Putnick and Bornstein, 2016). A change in CFI (Δ CFI) less than 0.01, and a change in RMSEA (Δ RMSEA) less than 0.015, suggest no meaningful decrease in model fit, and support measurement invariance (Chen, 2007). Means, standard deviations, percentages, Cronbach's alpha for reliability, Pearson correlation coefficients, and prevalence of depression were calculated using IBM SPSS 25. Please note that some of the correlation coefficients were previously reported in other studies (Atroszko et al., 2015a, 2015b). The depression cut-off point was set at 8+ and 11+ (Bjelland et al., 2002).

RESULTS

In the female group, a two-factor model showed the following fit indices: $\chi^2/df = 4.10$, CFI = 0.960, TLI = 0.952, RMSEA = 0.074 (90% confidence interval, CI = 0.065–0.085). In the male group, model fit indices were: $\chi^2/df = 3.04$, CFI = 0.966, TLI = 0.959, RMSEA = 0.066 (90% CI = 0.057–0.076). Tab. 1 shows factor loading for each item separately for both groups. Tab. 2 shows model fit for each successively stringent test of invariance.

The prevalence of depression in the current sample was estimated at 21.2% ($n = 219$) for the 8+ cut-off score, and 7.6% ($n = 78$) for the 11+ cut-off score. Tab. 3 presents mean scores, standard deviations, percentages, and correlation coefficients of the study variables.

CONCLUSIONS

The aim of this study was to examine the psychometric properties of one of the most commonly used instruments for measuring anxiety and depression in a student sample. Confirmatory factor analysis for HADS showed a good model fit and strict measurement invariance between genders, consistently with prior research (Fong and Ho, 2014; Stott et al., 2017). The scale had comparable

Item	Factor 1		Factor 2	
	Females	Males	Females	Males
HADS1 (R)	0.76	0.66		
HADS3 (R)	0.73	0.69		
HADS5 (R)	0.81	0.78		
HADS7	0.71	0.65		
HADS9	0.63	0.66		
HADS11 (R)	0.80	0.78		
HADS13 (R)	0.77	0.76		
HADS2			0.62	0.58
HADS4			0.65	0.62
HADS6 (R)			0.82	0.79
HADS8 (R)			0.60	0.63
HADS10 (R)			0.55	0.50
HADS12			0.63	0.62
HADS14			0.49	0.32

Tab. 1. Standardised item factor loadings for a 2-factor solution in the female and male groups, (R) = item scored reversely

psychometric properties to the original scale and its previous adaptations (Annunziata et al., 2011; Herrero et al., 2003). Correlations of anxiety and depression with other variables were as expected, providing evidence for concurrent validity. The high correlations between anxiety and depression are expected due to the significant comorbidity of the two disorders. The reliability of both subscales was satisfactory. The prevalence of depression in the present sample was estimated to be 21.2% for the 8+ cut-off score, and 7.6% ($n = 78$) for the 11+ cut-off score. These findings are, to a significant extent, congruent with previous studies that estimated the prevalence of depression in student populations at 15.6–30.6% (Eisenberg et al., 2007; Ibrahim et al., 2013). However, there seems to be a trend of decline in mental health among young populations (Twenge et al., 2010), and currently in some countries more than half of students may be suffering moderate to high levels of anxiety, depression, and stress (Mamun et al., 2019). This indicates a need to monitor the mental health of students, and to investigate factors contributing to its decline. The estimates of depression from the Polish samples show high variability, ranging from 3.0% up to 45.5% (Bobak et al., 2006; Kiejna et al., 2015; Mikołajczyk et al., 2008; Mojs et al., 2012), which indicates a strong need for systematic rigorous research on depression in Poland using consistent criteria to evaluate the estimates of its prevalence. Having a reasonably well-established cut-off score, HADS seems to be a potentially useful tool for large-scale screening

Model	χ^2	df	CFI	Δ CFI	RMSEA	90% CI	Δ RMSEA
Configural invariance	534.213	152	0.964	–	0.070	[0.064, 0.077]	–
Metric invariance	519.467	164	0.966	0.002	0.065	[0.059, 0.072]	–0.005
Scalar invariance	485.067	192	0.972	0.006	0.055	[0.049, 0.061]	–0.010
Residual invariance	598.082	204	0.963	–0.009	0.062	[0.056, 0.067]	0.007

Tab. 2. Model fit indices for measurement invariance between females and males

Variable	Mean (SD)	1.	2.	3.	4.	5.	6.	7.
1. Anxiety	7.19 (4.55)	-						
2. Depression	4.64 (3.50)	0.65**	-					
3. Stress	10.58 (3.03)	0.60**	0.46**	-				
4. Sleep quality	5.58 (2.11)	–0.37**	–0.33**	–0.33**	-			
5. Satisfaction with personal relationships	6.05 (2.36)	–0.26**	–0.28**	–0.32**	0.27**	-		
6. Satisfaction with support received from friends	6.79 (1.85)	–0.28**	–0.33**	–0.25**	0.22**	0.40**	-	
7. General quality of life	6.75 (1.41)	–0.42**	–0.44**	–0.39**	0.37**	0.40**	0.43**	-

** $p < 0.01$.

Tab. 3. Mean scores and standard deviations (SD), correlation coefficients between study variables

surveys, and its consistent application might allow a comparison and integration of results of studies from different populations.

The study's weakness is the use of convenience sampling and, therefore, caution is recommended when generalising the results to other populations. Furthermore, all data were self-reported. As for the strengths of the study, the sample size was fairly large, providing high statistical power, and valid and reliable psychometric tools were used.

Anxiety and depression have severe implications for well-being and mental health, and are an increasing problem in young adults. The current study suggests that one in five undergraduate students may be experiencing depressive symptoms. Therefore, the causes of anxiety and depression among students should be systematically investigated. Furthermore, taking into account growing evidence for study-related factors such as academic performance contributing to the psychopathology of young adults and adolescents, more studies should be undertaken to determine the role of the educational system in students' health. For this reason, having a short and valid tool for their measurement is imperative, and HADS proves to be a valuable choice.

Conflict of interest

All authors declare that they have no conflict of interest regarding this manuscript.

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Ethics

Ethical principles were carried out in accordance with the Declaration of Helsinki. The project was approved by Research Ethics Committee at the University of Gdańsk (no. 13/2013). Participation in the study was voluntary.

References

Andrews B, Wilding JM: The relation of depression and anxiety to life-stress and achievement in students. *Br J Psychol* 2004; 95: 509–521.

Annunziata MA, Muzzatti B, Altoè G: Defining Hospital Anxiety and Depression Scale (HADS) structure by confirmatory factor analysis: a contribution to validation for oncological settings. *Ann Oncol* 2011; 22: 2330–2333.

Atroszko PA: Commentary on: *The Bergen Study Addiction Scale: psychometric properties of the Italian version. A pilot study*. Theoretical and methodological issues in the research on study addiction with relevance to the debate on conceptualising behavioural addictions. *Psychiatr Psychol Klin* 2018; 18: 276–282.

Atroszko PA: The Structure of Study Addiction: Selected Risk Factors and the Relationship with Stress, Stress Coping and Psychosocial Functioning. Unpublished doctoral thesis, University of Gdańsk, Gdańsk 2015.

Atroszko PA, Bagińska P, Mokosińska M et al.: Validity and reliability of single item self-report measures of general quality of life, general health and sleep quality. In: McGreevy M, Rita R (eds.): *Proceedings of the 4th Biannual CER Comparative European Research Conference*. Sciecee Publishing, London, UK 2015a: 207–211.

Atroszko PA, Balcerowska JM, Bereznowski P et al.: Facebook addiction among Polish undergraduate students: validity of measurement and relationship with personality and well-being. *Comput Human Behav* 2018; 85: 329–338.

Atroszko PA, Pianka L, Raczynska A et al.: Validity and reliability of single-item self-report measures of social support. In: McGreevy M, Rita R (eds.): *Proceedings of the 4th Biannual CER Comparative European Research Conference*. Sciecee Publishing, London, UK 2015b: 216–219.

Bjelland I, Dahl AA, Haug TT et al.: The validity of the Hospital Anxiety and Depression Scale. An updated literature review. *J Psychosom Res* 2002; 52: 69–77.

Bobak M, Pikhart H, Pajak A et al.: Depressive symptoms in urban population samples in Russia, Poland and the Czech Republic. *Br J Psychiatry* 2006; 188: 359–365.

Bunevicius A, Katkute A, Bunevicius R: Symptoms of anxiety and depression in medical students and in humanities students: relationship with big-five personality dimensions and vulnerability to stress. *Int J Soc Psychiatry* 2008; 54: 494–501.

Chen FF: Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Modeling* 2007; 14: 464–504.

Cohen S, Kamarck T, Mermelstein R: A global measure of perceived stress. *J Health Soc Behav* 1983; 24: 385–396.

Dyrbye LN, Thomas MR, Massie FS et al.: Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med* 2008; 149: 334–341.

Eisenberg D, Gollust SE, Golberstein E et al.: Prevalence and correlates of depression, anxiety, and suicidality among university students. *Am J Orthopsychiatry* 2007; 77: 534–542.

Fong TCT, Ho RTH: Testing gender invariance of the Hospital Anxiety and Depression Scale using the classical approach and Bayesian approach. *Qual Life Res* 2014; 23: 1421–1426.

Herrero MJ, Blanch J, Peri JM et al.: A validation study of the hospital anxiety and depression scale (HADS) in a Spanish population. *Gen Hosp Psychiatry* 2003; 25: 277–283.

Höfer P, Rockett IRH, Värnik P et al.: Forty years of increasing suicide mortality in Poland: Undercounting amidst a hanging epidemic? *BMC Public Health* 2012; 12: 644.

Ibrahim AK, Kelly SJ, Adams CE et al.: A systematic review of studies of depression prevalence in university students. *J Psychiatr Res* 2013; 47: 391–400.

Kendler KS, Myers J, Prescott CA: Sex differences in the relationship between social support and risk for major depression: a longitudinal study of opposite-sex twin pairs. *Am J Psychiatry* 2005; 162: 250–256.

Kiejna A, Piotrowski P, Adamowski T et al.: [The prevalence of common mental disorders in the population of adult Poles by sex and age structure – an EZOP Poland study]. *Psychiatr Pol* 2015; 49: 15–27.

Lawendowski R, Bereznowski P, Wróbel WK et al.: Study addiction among musicians: measurement, and relationship with personality, social anxiety, performance, and psychosocial functioning. *Music Sci* 2019. DOI: 10.1177/1029864918822138.

Lovibond PF, Lovibond SH: The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther* 1995; 33: 335–343.

Mamun MA, Hossain MS, Griffiths MD: Mental health problems and associated predictors among Bangladeshi students. *Int J Ment Health Addiction* 2019. DOI: 10.1007/s11469-019-00144-8.

Mendlowicz MV, Stein MB: Quality of life in individuals with anxiety disorders. *Am J Psychiatry* 2000; 157: 669–682.

- Mikolajczyk RT, Maxwell AE, El Ansari W et al.: Prevalence of depressive symptoms in university students from Germany, Denmark, Poland and Bulgaria. *Soc Psychiatry Psychiatr Epidemiol* 2008; 43: 105–112.
- Mitchell AJ, Meader N, Symonds P: Diagnostic validity of the Hospital Anxiety and Depression Scale (HADS) in cancer and palliative settings: a meta-analysis. *J Affect Disord* 2010; 126: 335–348.
- Mojs E, Warchol-Biederman K, Samborski W: Prevalence of depression and suicidal thoughts amongst university students in Poznan, Poland, preliminary report. *Psychology* 2012; 3: 132–135.
- Putnick DL, Bornstein MH: Measurement invariance conventions and reporting: the state of the art and future directions for psychological research. *Dev Rev* 2016; 41: 71–90.
- Pyne JM, Patterson TL, Kaplan RM et al.: Assessment of the quality of life of patients with major depression. *Psychiatr Serv* 1997; 48: 224–230.
- Richardson AS, Bergen HA, Martin G et al.: Perceived academic performance as an indicator of risk of attempted suicide in young adolescents. *Arch Suicide Res* 2005; 9: 163–176.
- Sendal L, Sawicki A, Bagińska P et al.: Relationship of cynical hostility with anxiety and depressiveness among university students in Poland. In: Leśny J, Nyckowiak J (eds.): *Badania i rozwój młodych naukowców w Polsce. Nauki humanistyczne i społeczne. Młodzi Naukowcy*, Poznań 2016: 91–98.
- Snaith RP: The Hospital Anxiety and Depression Scale. *Health Qual Life Outcomes* 2003; 1: 29.
- Stott J, Spector A, Orrell M et al.: Limited validity of the Hospital Anxiety and Depression Scale (HADS) in dementia: evidence from a confirmatory factor analysis. *Int J Geriatr Psychiatry* 2017; 32: 805–813.
- Taylor DJ, Lichstein KL, Durrence HH et al.: Epidemiology of insomnia, depression, and anxiety. *Sleep* 2005; 28: 1457–1464.
- Twenge JM: The age of anxiety? Birth cohort change in anxiety and neuroticism, 1952–1993. *J Pers Soc Psychol* 2000; 79: 1007–1021.
- Twenge JM, Gentile B, DeWall CN et al.: Birth cohort increases in psychopathology among young Americans, 1938–2007: a cross-temporal meta-analysis of the MMPI. *Clin Psychol Rev* 2010; 30: 145–154.
- Zigmond AS, Snaith RP: The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand* 1983; 67: 361–370.
- Zimet GD, Dahlem NW, Zimet SG et al.: The multidimensional scale of perceived social support. *J Pers Assess* 1988; 52: 30–41.