5 Factor structure of the Coping Inventory for Stressful Situations (CISS-21) in adolescents and young adults with chronic digestive disorders

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Abstract

The Coping Inventory for Stressful Situations-21 (CISS-21) is a valid and reliable measure of generic coping strategies in adult samples with various chronic diseases. Little is known about application to a younger target group. In the present study, confirmatory factor analysis on the CISS-21 was performed in adolescents and young adults with various chronic digestive disorders (total n=521) and healthy peers (n=274), aged 12-25 years. Results provide evidence for a satisfactory fit and the invariance of the three-factor model (task-oriented, emotion-oriented and avoidance coping scales), in several age groups as well as in patients and controls. In conclusion, the factor structure of the CISS-21 is being maintained when applied to younger adolescents with and without chronic digestive disorders. This makes it possible to compare the use of coping strategies by chronically ill adolescents and young adults of different ages, as well as between healthy and chronically ill adolescents and young adults.

Keywords: coping assessment, adolescents, young adults, chronic digestive disorders

Introduction

Coping can be considered a key-concept in health psychology and related disciplines, as coping helps to explain the impact of stressors on health and well-being [1]. Having a chronic disease can be experienced as stressful for the daily life of patients [2]. Also, being diagnosed with a chronic digestive disorder, in particular suffering from a chronic liver disease or IBD, can have a serious impact on the social position of adolescents and young adults in daily life [3]. It was found that negative consequences occur in education, leisure activities, labor participation, financial situation, partnership and sexuality. As coping possibly helps to explain this impact on the social position, we wished to investigate, and thus assess, the role of coping in adolescents and young adults with chronic digestive disorders.

Various coping instruments have been presented in the literature [1,2,4,5]. However, little attention has been paid to assessment issues, resulting in

many coping instruments of poor validity and reliability [1]. According to De Ridder [1], it is imperative to elaborate on a theoretical rationale of coping dimensions to make progress in coping assessment.

The current measurement of coping in adolescents and young adults include both theoretically and empirically derived measuring instruments, whereby the majority has been empirically derived. In creating scales, researchers generally rely on exploratory factor analysis, often, however, generating different results across samples. However, in theoretically based measures, factors are tested through confirmatory factor analyses, supporting the hypothesized structure of coping [5].

Compas et al. [5] identified only two measuring instruments in which confirmatory factor analyses strongly supported the theoretical structure, i.e. the Children's Coping Strategies Checklist (CCSC), measuring general coping styles and tested in age samples of 7-13 years [4] and the Responses to Stress Questionnaire (RSQ), measuring coping in response to specific stressors, tested in age samples 11 to 19 years [6]. However, we searched for a generic measuring instrument that could be applied to adolescents and young adults in the age of 12 to 25 years, with and without various chronic digestive disorders, as we wished to compare the use of coping strategies by adolescents and young adults of different ages and health status. Therefore, the Coping Inventory for Stressful Situations-21 (CISS-21) [7,8] was chosen. The CISS-21 is a theoretically derived, generic measuring instrument that has proven to have good psychometric characteristics in adult samples (as from 16 years). In the present study, we examined whether the theoretically assumed factor structure of the CISS-21 is being maintained in younger adolescents, as from the age of 12 years.

The CISS-21 has been developed to assess three coping strategies: task-oriented, emotion-oriented and avoidance coping. Task-oriented coping refers to purposeful task-oriented efforts aimed at solving the problem, cognitively restructuring the problem or attempts to alter the situation. The emphasis is on the task or planning, and to attempts to solve the problem. Emotion-focused coping refers to emotional reactions that are self-oriented. The aim is to reduce stress. Reactions include emotional responses, self-preoccupation and fantasizing. Avoidance coping refers to activities and cognitive changes aimed at avoiding the stressful situation via distracting oneself with other situations or tasks or via social diversion as a means of alleviating stress [7]. The development of these three dimensions was

grounded on consensus in the coping literature that there should be a basic distinction between emotion-focused and problem-focused coping, whereby emotion-focused coping strategies refer to a person orientation and problem-focused coping strategies to a task orientation [7]. On the basis of empirical research Endler and Parker [9] also suggested a third basic coping strategy, namely avoidance, which included either person-oriented (social diversion) and task-oriented (distraction) strategies.
As aforementioned, the CISS originally was developed for use in adults. The aim of this study was to investigate whether a valid and reliable measure of coping strategies could be adopted for use in a younger target group with and without chronic digestive disorders. For this purpose, the theoretically assumed three-factor structure was examined by means of confirmatory factor analysis.

Method

Study population

This study was carried out in 521 adolescents and young adults with chronic digestive disorders and 274 healthy controls. Digestive disorders were categorized in five diagnostic groups, including inflammatory bowel diseases (IBD) (n=190), chronic liver diseases (n=51), congenital digestive disorders (n=122), coeliac disease (n=61) and food allergy (n=97). Patients were recruited via their medical specialists in academic and specialized hospitals using the following criteria: being diagnosed within one of the five diagnostic categories stated by a certified medical specialist, illness duration of at least six months, age from 12 to 25, being non-institutionalized, being aware of diagnosis, not being terminally ill, being mentally capable to participate and mastering the Dutch language sufficiently. Extra patients with coeliac disease were recruited through a patient organization, using the same criteria (diagnosis had to be confirmed by at least one small-bowel biopsy). There was no selection on illness activity or severity of complaints and disability.
Healthy controls were randomly recruited from the patient files of general practitioners of participating patients. Except being diagnosed within one of the five previously named diagnostic categories, the same criteria were used as for the recruitment of patients. For the recruitment procedure, general

practitioners were provided with a random set of three different letters of the alphabet on the basis of which they were requested to select three controls with surnames starting with the indicated letters and fitting the specified criteria.

The study was approved by all participating hospitals' ethical committees. All subjects gave written informed consent. Only after informed consent was received, a written questionnaire was sent to the respondents.

In Table 1 the characteristics of the research group are summarized. The mean age in the different groups, diagnostic groups and control group, varied from 18.4 years in adolescents and young adults with congenital digestive disorders to 22.1 years in the IBD group. The percentage female patients varied from 45.9% (congenital digestive disorders group) to 70.1% (food allergy group). The mean score on socio-economic status varied from 3.8 (chronic liver disease group) to 4.7 (coeliac disease group).

Table 1 Characteristics of the total sample, five separate diagnostic groups and control group (total n=795)

	I Inflammatory bowel disease n=190	II Chronic liver disease n=51	III Congenital digestive disorders n=122	IV Coeliac disease n=61	V Food allergy n=97	Control group n=274
Age (Mean,SD)	22.1 (2.3)	22.0 (2.7)	18.4 (3.7)	18.4 (3.7)	18.4 (3.8)	18.5 (3.8)
% 12-14	0.5	2.0	21.3	18.0	21.6	17.9
% 15-17	4.2	3.9	18.0	21.3	17.5	26.6
% 18-20	17.4	23.5	24.6	23.0	27.8	19.0
% 21-24	77.9	70.6	36.1	37.7	33.0	36.5
Gender (% women)	58.9	51.0	45.9	67.2	70.1	55.5
Socio-economic status (Mean, SD)[1]	4.2 (1.7)	3.8 (2.0)	4.3 (1.7)	4.7 (1.6)	4.6 (1.6)	4.5 (1.6)

[1] Operationalized by the highest education of one of the parents or caregivers on a 7-point-scale: (1) no education or only primary school to (7) a completed university training.

CISS-21

The CISS-21 [7] is assumed to assess coping by three basic coping strategies: emotion-oriented, task-oriented and avoidance coping. We used the Dutch translation as proposed and validated by De Ridder and Maes [8]. Each scale of the CISS-21 consists of 7 items, randomly distributed within the form to control for order effects (see Appendix). Respondents were asked to rate each item on a five point scale ranging from (1) "not at all" to (5) "very much".

Data analysis

In order to assess the fit of the theoretical supposed three-factor structure and the factor invariance of the CISS-21 in a younger target group and in adolescents and young adults with and without chronic digestive disorders, confirmatory factor analysis was applied, following the procedure of Rahim and Magner [10]. Confirmatory factor analysis is a powerful method of investigating the construct validity of a scale [5,10,11]. In the present study confirmatory analysis was performed with the LISREL 8 computer package [12].

In order to test the *three-factor structure*, a series of confirmatory factor analyses was performed: in 4 age groups (age 12-14, 15-17, 18-21 and 21-24 years); in patients (as 1 group); controls (1 group) and in 5 separate diagnostic groups (IBD, chronic liver diseases, congenital digestive disorders, coeliac disease and food allergy). In the measurement model, each of the 21 items was allowed to load on only its associated factor (which was identified a priori), and the factors (three coping strategies) were allowed to correlate. The covariance matrix for the 21 items was used for performing the analysis, and parameter estimates were made under the maximum-likelihood method.

Following Rahim and Magner [10], the extent to which the theoretical three-factor model fits the data in the different samples was assessed first. For this purpose, LISREL provides several measures, one of which is the *chi-square statistic*. Non-significant chi-squares suggest a satisfactory fit for the tested model; significant chi-squares an unsatisfactory fit. However, the chi-square is dependent on sample size, such that a large sample is likely to produce a

significant result, even when there is a reasonable good fit to the data [13]. Except the chi-square, LISREL provides other statistics, such as the *goodness-of-fit index* (GFI), which is based on the chi-square. In general, this measure ranges between 0 and 1, with higher values indicating a better fit. Next to the GFI, the *normed-fit index* (NFI) was computed. This measure assesses the fit of the proposed model relative to that of the null model, and is independent of sample size. It is suggested that .90 is a minimum value for satisfactory fit when using both indices [13]. In addition, the *Root Mean Square Error of Approximation* (RMSEA) was used (12,14,15]. The RMSEA takes account of the error of approximation in the population and the precision of the fit measure itself. A close fit of the model is indicated by a value lower than of .05 [14] or .06 [16], whereas values up to .08 represent reasonable errors in the population [14]. According to Jöreskog and Sörbom [12], we used a test of RSMEA < .05 (90 percent confidence interval).

To provide additional reference points [10,13], indices were also computed for a null model, i.e no relationship between the observed variables, and a one-factor model, i.e. all observed variables refer to only one factor: an undifferentiated coping strategy.

However, models with many variables and degrees of freedom will almost always have significant chi-squares due to high levels of random error found in typical items and the many parameters that must be estimated [10]. To address this problem, several authors [17,18] proposed a method in which subsets of items within factors are summed to create aggregate variables. Using these parcels, it is appropriate to have two aggregate variables per factor when the number of measured items per factor is five to seven. Like Rahim and Magner [10], we followed this method, and thus formed two parcels for each factor, creating six parcels in total. In the formation of these parcels, the first four items and the second three items within a factor (see Appendix) were summed (divided by respectively 4 and 3 to obtain the same scale scores) to create two parcels per factor. So, instead of 21 variables (seven items per factor, three factors), we created 6 aggregate variables (two variables per factor, three factors). Next to analyses based on the 21 observed items, measures of fit were also computed on the basis of these parcels.

After testing the three-factor model, two multi group analyses were conducted in order to examine the *invariance of the three-factor model* across different groups: across age groups (1) and across patients, controls

and different diagnostic groups (2). For each multi group analysis a covariance matrix was computed for each group. Then the following four models were estimated and compared sequentially on the basis of fit [10,11]: model 1, in which the pattern of factor loadings was held invariant across groups; model 2, the pattern of factor loadings and the factor loadings were held invariant across groups; model 3, the pattern of factor loadings, the factor loadings and the errors were held invariant across groups; and model 4, the most restrictive model, in which the pattern of factor loadings, the factor loadings, the errors as well as the variances and covariances were held invariant across groups. For each model, the covariance matrices for all groups were analyzed simultaneously. In performing these tests, the following statistics were computed: chi-square, GFI, NFI and RMSEA. As a test for equal factor loadings across groups, the chi-square of model 2 was compared with the chi-square of model 1. A non-significant difference means that the hypothesis of equal factor loadings cannot be rejected on a statistical basis. In the same way, model 3 was compared with model 2 and model 4 with model 3.

Finally, the *internal consistency* (Cronbach's alpha) of the constructed scales was computed in the several samples.

Results

Factor structure, separate items

Table 2 (columns left) shows indices that were used to assess the extent to which the proposed three-factor model fits the data in the four age samples. For comparative purposes, fit indices are also presented for a null model and a one-factor model.

Chi-square tests for the three-factor model were significant, suggesting an unsatisfactory fit. However, the chi-square is dependent on sample size: a large sample is likely to produce a significant result even when there is a reasonably good fit to the data (see Methods section). Applying the .90 criterion for GFI and NFI, the three-factor model only has a moderate fit: the GFI, ranges from .74 to .87, showing the best fit in the oldest sample and the worst fit in the youngest sample. The NFI also indicates a moderate fit, ranging from .59 in the youngest sample to .77 in the oldest sample. Applying the .05-.08 criterium for the RMSEA, results show a moderate fit

of the three-factor model in two age-groups. However, significant p-tests indicate high errors of approximation.
After this, the three-factor model was tested in patients (as 1 group) and the control group and in the different diagnostic groups. The results are summarized in Table 3 (columns left). Again, significant chi-squares were found in combination with measures of fit ranging from .53 to .87, and significant RMSEA's. These results only indicate a moderate fit.
As expected, these results suggest that the theoretical three-factor model has only a moderate fit to the data. As pointed out before, parcels were introduced in the analyses instead of separate items.

Factor structure, parcels

Table 2 (columns right) presents goodness-of-fit indices for the three-factor model in the four age samples based on analyses with parcels. Only in the two oldest age groups significant chi-squares were found. The GFI was high, ranging from .97 to .99. Furthermore, the NFI also exceeds the .90 criterion in all age samples. The RMSEA ranged from zero to .10, only significant in the oldest age group. These results indicate that the three-factor model has a satisfactory fit in the four age samples.
The same analyses were conducted in patients (as one group) and in controls, and in the five different diagnostic groups (Table 3, columns right). GFI and NFI both exceeded the .90 criterion in all samples. In two samples the RMSEA was found significant. These results indicate a reasonable to satisfactory fit in the different samples.

Table 2 Measures of fit for separate age samples, based on analysis of 21 separate variables (columns left) and 6 parcels (columns right) of the CISS-21

Sample and model	n	Chi^2	df	GFI	NFI	RMSEA	Chi^2	df	GFI	NFI	RMSEA
Age 21-24 years	381										
null model		2,675*	210				809*	15			
1-factor model		1,813*	189	.60	.32	.15*	539*	9	.73	.33	.39*
3-factor model		606*	186	.87	.77	.08*	30*	6	.97	.96	.10*
Age 18-20 years	167										
null model		1,434*	210				380*	15			
1-factor model		913*	189	.58	.36	.15*	194*	9	.77	.49	.35*
3-factor model		445*	186	.80	.69	.09*	15*	6	.97	.96	.10 (ns)
Age 15-17 years	131										
null model		1,007*	210				302*	15			
1-factor model		653*	189	.60	.35	.14*	156*	9	.76	.48	.35*
3-factor model		303*	186	.84	.70	.07*	3	6	.99	.99	.00 (ns)
Age 12-14 years	103										
null model		923*	210				245*	15			
1-factor model		554*	189	.62	.40	.14*	95*	9	.78	.61	.31*
3-factor model		376*	186	.74	.59	.10*	10	6	.97	.96	.08 (ns)

Note: GFI=goodness-of-fit index; NFI=normed fit index; RMSEA=Root Mean Square Error of Approximation

- $p \leq .05$; ns = non significant

Table 3 Measures of fit for controls, patients (total group) and separate diagnostic groups, based on analysis of 21 separate variables (columns left) and 6 parcels (columns right)

Sample and model	n	Chi^2	df	GFI	NFI	RMSEA	Chi^2	df	GFI	NFI	RMSEA
Controls	269										
null model		1,941*	210				601*	15			
1-factor model		1,282*	189	.60	.34	.15*	371*	9	.73	.38	.39*
3-factor model		477*	186	.85	.75	.08*	22*	6	.97	.96	.10*
Patients (total group)											
null model	513	3,736*	210				1,197*	15			
1-factor model		2,279*	189	.59	.39	.15*	728*	9	.72	.39	.39*
3-factor model		760*	186	.87	.80	.08*	39*	6	.97	.97	.10 (ns)
IBD	190										
null model		1,512*	210				428*	15			
1-factor model		1,037*	189	.57	.31	.15*	285*	9	.72	.33	.40*
3-factor model		464*	186	.81	.69	.09*	27*	6	.96	.94	.14*
Chronic liver disease	51										
null model		618*	210				137*	15			
1-factor model		466*	189	.50	.25	.17*	79*	9	.71	.42	.40*
3-factor model		275*	186	.69	.55	.10*	7	6	.95	.95	.04 (ns)

Table 3 *continued*

Sample and model	n	Chi^2	df	GFI	NFI	RMSEA	Chi^2	df	GFI	NFI	RMSEA
Congenital disorders	115										
null model		1,071*	210				273*	15			
1-factor model		633*	189	.61	.41	.14*	106*	9	.79	.61	.31*
3-factor model		393*	186	.76	.63	.10*	11	6	.97	.96	.09 (ns)
Coeliac disease	60										
null model		711*	210				162*	15			
1-factor model		488*	189	.53	.31	.16*	99*	9	.71	.39	.41*
3-factor model		336*	186	.67	.53	.12*	7	6	.96	.95	.07 (ns)
Food allergy	97										
null model		1,258*	210				254*	15			
1-factor model		923*	189	.50	.27	.20*	162*	9	.69	.36	.42*
3-factor model		591*	186	.69	.53	.15*	10	6	.97	.96	.09 (ns)

Note: GFI=goodness-of-fit index; NFI=normed fit index; RMSEA=Root Mean Square Error of Approximation

Note: measures of fit in sample chronic liver diseases are based on preliminary solutions (model did not converge after X iterations)

* p.≤05; ns=not significant

Factor invariance

Two multi-group analyses were conducted to examine the invariance of the three-factor model of the CISS-21 across different samples: in age groups and in patient groups. In these analyses we continued using parcels. In each multi-group analysis 4 models were tested (see methods section). The first multi-group analysis was performed in age samples to test the invariance of the structure across age groups. Results of this analysis are presented in Table 4. Although the chi-square of each model was significant, the other indices (GFI, NFI and RMSEA) provided evidence that the first three models have a good fit: the goodness-of-fit index for each of these models was found .95 or higher, each normed fit index .94 or higher and each RMSEA lower than .05. Furthermore, as a test of the hypothesis of equal factor loadings across the groups, the chi-square of model 2 was compared with the chi-square of model 1, whereas the difference was found to be non-significant, meaning that the hypothesis of equal factor loadings cannot be rejected on a statistical basis. In the same manner, model 3 was compared with model 2 and model 4 with model 3, to test -respectively- the hypothesis of equal errors and equal variances. Table 4 shows that the hypotheses of equal pattern, loadings and errors cannot be rejected; the hypothesis of equal variances / covariances should be rejected. In other words, these findings not only indicate a satisfactory fit of the hypothesized three-factor structure, also the factor loadings and error terms appear to be practically identical in the different samples. Only the variance was found to be different in the various samples.

Table 4 Invariance analysis across four age samples

Model and sample	Chi^2-contribution	Chi^2 df (total model)	Chi^2 (difference)	df	GFI NFI (total model)		RMSEA
Null model		1,735* 60					
Equal factor pattern(1)		58* 24			.97	.97	.04(ns)
***12-14**	10(18%)						
***15-17**	3(5%)						
***18-20**	15(26%)						
***21-24**	30(51%)						
Equal factor pattern and laodings(2)		88* 42	30(ns)	18	.96	.95	.04(ns
***12-14**	15(17%)						
***15-17**	14(16%)						
***18-20**	21(24%)						
***21-24**	38(44%)						
Equal factorpattern, laodings and errors(3)		98* 60	10(ns)	18	.95	.94	.03(ns)
***12-14**	18(18%)						
***15-17**	16(16%)						
***18-20**	24(24%)						
***21-24**	41(42%)						
Equal factor pattern, loadings, errors, and variances / covariances(4)		1,648* 69	1,550*	9	.60	.05	.17*
***12-14**	213(13%)						
***15-17**	290(18%)						
***18-20**	355(22%)						
***21-24**	790(48%)						

Note: GFI=goodness-of-fit index; NFI=normed fit index; RMSEA=Root Mean Square Error of Approximation
$p \leq .05$; ns=not significant

Table 5 presents results of the second multi group analysis of the three-factor model: across patients and controls (two samples). Again, the chi-square of each model was significant, but the other indices provide evidence that the first three models have a good fit: the goodness-of-fit index for each of these models was found .97 or higher, each normed fit index .96 or higher and the RMSEA between .05 and .07. In the first model the RMSEA was found significant, however, with a score of .07 representing reasonable errors. Comparisons between the models provide evidence for the hypotheses of an equal pattern of factor loadings, equal factor loadings and invariant errors. The significant chi-square difference between model 4 and model 3 indicates, again, that the hypothesis of equal variances and covariances should be rejected.
The LISREL-model did not converge in testing the factor invariance across the five different diagnostic groups. Therefore, these analyses were only carried out in patients as one group, compared with the control group.

In general, these results provide strong support for the invariance of the three-factor model across age groups, as well as controls and patients, with respect to factor pattern, factor loadings and error terms.

Table 5 Invariance analysis across control sample and patient sample

Model and sample	Chi^2-contribution	Chi^2 df (total model)	Chi^2 df (difference)	GFI NFI (total model)		RMSEA
Null model		1,797* 30				
Equal factor pattern(1)		61* 12		.97	.97	.07*
***patients**	39(64%)					
***controls**	22(36%)					
Equal factor pattern and laodings(2)		63* 18	2(ns) 6	.98	.96	.06(ns)
***patients**	40(63%)					
***controls**	23(37%)					
Equal factorpattern, laodings and errors(3)		73* 24	10(ns) 6	.97	.96	.05(ns)
***patients**	43(59%)					
***controls**	30(41%)					
Equal factor pattern, loadings, errors, and variances / covariances(4)		1,663* 27	1,590* 3	.66	.08	.28*
***patients**	1,096(66%)					
***controls**	567(34%)					

Note: GFI=goodness-of-fit index; NFI=normed fit index; RMSEA=Root Mean Square Error of Approximation

$p \leq .05$; ns=not significant

Scale construction

Although the previous results of confirmatory factor analysis provide evidence for a satisfactory fit of the total model, the factor loading of the first item 'Take some time off and get away from the situation' on the factor

avoidance (see Appendix) was not significant in most of the samples (except for the age sample 18-20 years and the food allergy sample, $p \leq .01$). Therefore, we suggest to exclude this item from the scale 'avoidance' in samples of adolescents and young adults with chronic digestive disorders and in these age groups without chronic digestive disorders. In the so constructed scales, Cronbach's alpha's varied in the different samples from .79 to .86 in task-oriented coping (7 items), .79 to .86 in emotion-oriented coping (7 items) and from .78 to .85 in the avoidance coping scale (6 items).

Discussion

The aim of the present study was to determine whether the theoretically assumed three-factor structure of the CISS-21, a valid and reliable coping measurement instrument in adults, could be reproduced in adolescents and young adults aged 12 to 25 years, with and without various chronic digestive disorders. For this purpose, the fit of the three-factor model was investigated by means of confirmatory factor analysis. Results indicate that the three-factor structure of the CISS-21 has a satisfactory fit, in the younger age samples as well as in the different diagnostic groups and in the control group with healthy peers. In adult samples, the CISS-21 has proven to have good psychometric characteristics; apparently, in younger age samples, generic coping strategies can also be categorized as task-focused, emotion-focused and avoidance coping.

Except a satisfactory fit of the hypothesized three-factor structure of the CISS-21, general support was obtained for factor invariance across age samples and across patient and control samples. For this purpose, 4 models were successively compared in multi group analyses, running up from an equal factor pattern in model 1 to the most restrictive model 4, in which, apart from the factor pattern, the factor loadings and the error terms, the variance also was held invariant. Through the first three models, satisfactory results were obtained. This means that in age groups as well as in patients and controls, the factor pattern, the factor loadings and the error terms appeared to be practically identical in the various samples. These results strongly support the theoretical three-factor structure of the CISS-21 in a younger target group and in adolescents and young adults with chronic digestive disorders. Only the variance - added in the latter model to be held

invariant across the samples - did not lead to satisfactory results. Discrepancies in variance between groups possibly indicate that differences exist in the use of coping strategies between age groups and between patient and controls.

Some comments have to be made upon these results. First, in testing the factor structure, the measures of fit in the sample chronic liver diseases were based on preliminary solutions (the model did not converge). This is probably due to small numbers. However, exploratory factor analyses (data not shown) also demonstrated the theoretical model structure in this sample, supporting the preliminary solutions of the confirmatory factor analyses. In addition, with regard to the factor invariance tests, patients as a whole group were compared with controls first, resulting in evidence for a high extent of invariance across these samples. After that, multi-group analyses were carried out in the five different diagnostic groups. However, the LISREL-model did not converge in these analyses, probably as a consequence of the application of a complex model in relatively small subgroups. Again, results of exploratory factor analyses (data not shown) supported our hypothesis that the theoretical three-factor structure does exist across the separate diagnostic groups as well. Taking these comments into account, it can be concluded that the factor structure of the CISS-21 is being maintained in younger adolescents with and without various chronic digestive disorders.

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Appendix

Shortened version (21-items) Coping Inventory for Stressful Situations (CISS-21)

1. Take some time off and get away from the situation (A) *
2. Focus on the problem and see how I can solve it (T)
3. Blame myself for having gotten into this situation (E)
4. Treat myself to a favorite food or snack (A)
5. Feel anxious about not being able to cope (E)
6. Think about how I solved similar problems (T)
7. Visit a friend (A)
8. Determine a course of action and follow it (T)
9. Buy myself something (A)
10. Blame myself for being too emotional about the situation (E)
11. Work to understand the situation (T)
12. Become very upset (E)
13. Take corrective action immediately (T)
14. Blame myself for not knowing what to do (E)
15. Spend time with a special person (A)
16. Think about the event and learn from my mistakes (T)
17. Wish that I could change what had happened or how I felt (E)
18. Go out for a snack or meal (A)
19. Analyze my problem before reacting (T)
20. Focus on my general inadequacies (E)
21. Phone a friend (A)

T = Task-oriented coping
E = Emotion-oriented coping
A = Avoidance coping

* On the basis of our results it is suggested to exclude this item from the scale 'Avoidance coping' in samples of adolescents and young adults.