Adaptation and Psychometric Proprieties Study for the Portuguese Version of the Adolescent Coping Scale – *Escala de Coping para Adolescentes*

Estudo de Adaptação e Características Psicométricas da Versão Portuguesa da *Adolescent Coping Scale* – Escala de *Coping* para Adolescentes

Diogo Frasquilho GUERREIRO[1], Diana CRUZ[2], Maria Luísa FIGUEIRA[1], Daniel SAMPAIO[1]

Acta Med Port 2014 Mar-Apr;27(2):166-180

ABSTRACT

Introduction: Coping is a psychological process that prompts the individual to adapt to stressful situations. The Adolescent Coping Scale is a widely used research and clinical tool. This study aimed to develop a Portuguese version of the Adolescent Coping Scale and to analyze the strategies and coping styles of young people in our sample.

Material and Methods: An anonymous questionnaire comprising the Adolescent Coping Scale was submitted and replied by 1 713 students (56% female, from 12 to 20 years, average age 16) The validity study of the scale included: principal component and reliability analysis; confirmatory analysis using structural equation modelling Subsequently, a gender comparison of both the strategies and the coping styles was conducted through independent samples t tests.

Results: The final structure of the Adolescent Coping Scale adaptation retained 70 items assessing 16 coping strategies grouped into three major styles. The scales showed good internal consistency (Cronbach alpha values between 0.63. and 0.86, with the exception of one dimension that as shown a value of 0.55) and the confirmatory model showed a good fit (goodness of fit index values between 0.94 e 0.96). Two coping strategies were eliminated on statistical grounds (insufficient saturations of items in the corresponding dimensions). We found that the style of coping focused on problem solving is the most used by youths from our sample, in both sexes. Females had higher mean values in non-productive coping style and reference to others.

Discussion: This adapted version has high similarity with the original scale, with expectable minor changes, given that coping is influenced by cultural, geographical and socio-economic variables.

Conclusion: The present study represents an important part of the validation protocol Portuguese Adolescent Coping Scale, including its linguistic adaptation and its internal consistency and factor structure studies.

Keywords: Adaptation, Psychological; Adolescent; Questionnaires; Portugal; Psychometrics.

RESUMO

Introdução: O *coping* é um processo psicológico que leva ao ajustamento individual perante situações de *stress*. A *Adolescent Coping Scale* é um instrumento de investigação e uma ferramenta clínica, amplamente utilizada. O presente estudo tem como objectivos desenvolver uma versão Portuguesa da *Adolescent Coping Scale* e analisar as estratégias e estilos de *coping* dos jovens da nossa amostra.

Material e Métodos: Um questionário anónimo compreendendo a *Adolescent Coping Scale* obteve respostas de 1 713 alunos (56% do sexo feminino, com idades compreendidas entre os 12 e os 20 anos e uma média etária de 16). O estudo de validade da escala contemplou: análise em componentes principais e avaliação da consistência interna; análise confirmatória através de modelo de equações estruturais. Posteriormente, foram comparadas por género as estratégias e estilos de *coping* da amostra (testes *t* para amostras independentes).

Resultados: A estrutura final da adaptação da *Adolescent Coping Scale* reteve 70 itens, que avaliam 16 estratégias de *coping* agrupadas em três estilos distintos. As escalas apresentaram bons valores de consistência interna (alfas de Cronbach compreendidos entre 0,63 e 0,86, com a exceção de uma dimensão que apresentou um valor de 0,55) e o modelo confirmatório demonstrou bom *fit* (*goodness of fit index* compreendidos entre 0,94 e 0,96). Foram eliminadas duas estratégias de *coping* por motivos estatísticos (ausência de saturação de itens suficientes nas dimensões correspondentes). Verificámos que o estilo de *coping* focado na resolução do problema é aquele maioritariamente utilizado pelos adolescentes da nossa amostra, em ambos os sexos. No sexo feminino observaram-se valores médios mais elevados nos estilos de *coping* não produtivo e de referência a outros.

Discussão: A versão adaptada apresenta elevada semelhança com a escala original, com alterações minor espectáveis tendo em conta que o *coping* é influenciado por variáveis culturais, geográficas e sócioeconómicas.

Conclusão: O presente estudo representa uma parte importante do protocolo de validação Portuguesa da *Adolescent Coping Scale*, nomeadamente a sua adaptação linguística, estudo da consistência interna e da estrutura fatorial.

Palavras-chave: Adaptação Psicológica; Adolescente; Questionários; Psicometria; Portugal.

INTRODUCTION

Coping is defined by Lazarus and Folkman[1] as 'behavioural and cognitive ever-changing efforts aimed to manage specific internal or external demands, considered as exceeding personal resources'. It is therefore a stabilizing factor i.e. making individual adjustment or adaptation easier when facing stressing events.[2] Evidence of adaptation may be found in well-being, social functioning and somatic health. Coping efficacy is transactional i.e. it depends on the interaction between the different variables that characterize a particular situation and the resources of the individual,

1. Departamento de Psiquiatria. Faculdade de Medicina. Universidade de Lisboa. Lisboa. Portugal.
2. Faculdade de Psicologia. Universidade de Lisboa. Lisboa. Portugal.

Recebido: 29 de Julho de 2013 - Aceite: 20 de Novembro de 2013 |

the aim of the process of coping itself and individual determinants.[1] Strategies of coping are anticipated by personal and behavioural assessment mechanisms. The individual activates cognitive processes in order to identify the critical situation with which he is faced, checks current conditions, efficient and non-efficient previous experiences and level of risk involved and further analyses available resources and possible alternatives, in order to deal with that specific problem.[3] The process of coping may be different when the problem is present at home or at school, for example, as these contexts greatly influence of the type of interpersonal relationships (in which hierarchy and power issues coexist). Teenagers use different strategies in order to face problems with their peer-group or problems involving adults (such as parents or teachers). Until now, most research on coping in adolescence has been based on a theoretical model,[4] generally known as the 'transactional model of coping'.[3]

Preferred coping strategies towards stressors define two major coping styles[3,4]: emotion-focused coping (including strategies such as distancing and avoidance) aimed at emotional regulation towards a stressor situation and problem-focused coping aimed at dealing with the problem causing the dysregulation. Other researchers are in favour of defining coping strategies in three styles[4]: problem-focused, involving attempts to deal directly with the stressor; coping by reference to others includes seeking help from significant people from within the social support network and non-productive coping style, based on avoidance strategies i.e. not directly facing the problem.

Adolescence is a stage of the life cycle naturally associated to different stressors,[5] demanding for several adjustments (such as physiological changes, evolution of cognitive capacities and social experience, among others.).[6,7] It is also a time with a unique opportunity to understand and stimulate coping abilities, where the assessment of coping strategies and styles used by young people becomes very important

Individual coping strategies vary according to gender: girls have a tendency to use more passive strategies focused on emotional regulation or to seek social support. In turn, boys tend to use more active, playful or avoidance-oriented strategies.[8,9] Furthermore, the use of certain strategies is subjected to variations according to culture, geography or socioeconomic strata (for instance, in one comparative study between German, Australian, Colombian and Palestinian adolescents, 'physical activity' was mostly used by young Germans while, in contrast, Palestinian youths classified it in 16th place in the ranking of used strategies).[10-12]

From a medical point of view, coping processes are also extremely relevant, not only in mental pathology[13] but also in different physical diseases in which this issue is ever more important.[14,15] For instance, diseases such as type-1 diabetes, chronic pain and cancer in adolescence have been the subject of research in this area, demonstrating the role of coping in disease adjustment and outcome.[15]

Coping assessment has been traditionally adult-focused.[16,17] An increasing interest in adolescence has only arisen in the last 30 years, leading to the development of several tools required for measuring coping in this age group.[4] In an important revision of the literature on the subject, Compas *et al.*[18] summarized all available scales developed since 1988 for coping assessment. A total of 20 assessment tools were collected, sharing the question on how a stressful situation, hypothetical or specific, would be dealt with by the participant. Most measurement scales have neglected statistical procedures, mainly due to the critical view that '...psychometric procedures like internal consistency and factor analysis techniques may have limited utility for assessing the adequacy of coping measurement'.[19]

The *Adolescent Coping Scale* (ACS) is both a useful research and clinical instrument[20] and may be applied by health and education technicians. Developed by Frydenberg and Lewis and originally applied to Australian adolescents, it is a most relevant instrument for the measurement of coping variables, with a strong psychometric validity[6,20] and widely used in several international studies.[4] A Portuguese adaptation of this scale is therefore considered to be important both for national clinical practice and research.

Our study aimed to obtain the ACS Portuguese adaptation – Adolescent Coping Scale (long version), already validated for several cultures and languages.[21-25] Our specific objectives include (1) the analysis of ACS factor structure in a sample of Portuguese adolescents, considering the probable presence of cultural and linguistic specificities; (2) the study of scale internal consistency and confirmatory factor analysis; (3) the description and analysis of gender differences regarding ACS coping strategies and styles, in the Portuguese version.

MATERIAL AND METHODS

Our group of subjects included students from public schools in the Lisbon area, aged between 12 and 20 (currently attending the 8th, 10th or 12th grade). Every school in the Lisbon area that included students on these educational levels (according to data provided by the Ministry of Education) was invited to participate in this study. Fourteen out of 57 schools agreed to participate representing a recruitment rate of 24%, in line with similar studies.[26,27] The size of the sample was calculated based on the main objective of the study and a sample above 1,500 students was considered appropriate, with enough statistical power for ACS adaptation. In this study, a total of 2,100 questionnaires were delivered.

Measures

Socio-demographic variables – Socio-demographic data was obtained using a questionnaire designed for a wider study[28] and included issues regarding gender, age, family structure and school performance.

Coping – The long version of the *Adolescent Coping Scale* (ACS)[20] was used in order to assess the way young

people 'usually react in a stressful situation'. This self-report questionnaire takes 10/15 minutes to complete and includes 79 close-ended questions (and one open-ended to non-addressed strategies) assessing 18 conceptually and empirically distinct coping strategies, included in three coping styles: problem-focused; reference to others and non-productive coping.[16,20] The 79 items are assessed by a five-point Likert scale (ranging from 1 = Not applicable or "I do not do it"; to 5 = "I do it very often"). Two forms of this instrument were developed: a specific form, in which the participant or the researcher selects a certain situation and the whole questionnaire is completed referring to it and a general form, in which the participant's answers are based on their usual reaction when facing problems or stressful situations. The specific form may be used to minimize situational determinants, while the general form allows for the observation of the way a certain individual uses coping processes to deal with a broad range of situations.[4]

Procedure

ACS translation and retroversion – Once the authorizations were obtained from the authors and the ACS publishers for the Portuguese adaptation, this process occurred in several phases. The first one included ACS translation and retroversion by a psychiatrist and a German, English and bilingual language teacher, in a double-blind fashion. The retroversion was submitted to evaluation by the original authors and to evaluation by experts in the field.

Finally, we also carried out a pre-test of the final questionnaire to 22 students from the 9th and 11th grades (upon approval by the Ministry of Education and with informed consent). A focus group followed, with the participation of the same young people, in order to determine clarity in the instruction, mean time of completion, semantic clarity and univocal comprehension of the items, as well as the response format itself. Cultural specificities emerged from this analysis prompting the need to carry out language adaptations.

Administration – Upon approval by the Ethics Committee at the Faculty of Medicine of Lisbon University and at the Ministry of Education, the objectives of the study were exposed, in writing, to the school directors and to the parents, requesting informed consent for student's participation.

The participating schools received 2,100 questionnaires. On the day of completion of the questionnaires, the students were guided by a teacher (with whom the researchers previously met) who coordinated the process and ensured responder's anonymity. All questionnaires were subsequently sealed by the teacher and collected by researchers.

Statistical procedure – An exploratory factor analysis was initially carried out – Principal Component Analysis (PCA) – using SPSS 19 software. The choice of this type of exploratory analysis is based on the following: 1) to our knowledge, there is an absence of Portuguese studies on this instrument; 2) there are potential cultural (for instance, Australian *vs.* Portuguese) and socio-economic differences observed over the last 20 years.

The strategy of data analysis followed the one described by the original authors in their factor structure study and involves carrying out a three-stage PCA related to three randomly selected parts of the scale.

The second methodological stage involved – with this new PCA - whether the coping dimensions were organized in similar general coping styles to the original structure.[20]

Cronbach's alpha (reliability coefficient) values were calculated on both stages and values above 0.60 were considered as indicators of satisfactory internal consistency, as described by Field.[29] The comparison of coping strategies and styles by gender used t-tests for independent samples, with a significance level of 0.05.

Finally, adequacy of the reached factor solution to sample data was tested through confirmatory factor analysis using Structural Equation Modelling (AMOS 19 software).

RESULTS

Response rate and description of the sample

From the 2,100 questionnaires delivered, 1,726 were returned. From these, 13 were excluded due to age criteria or a response pattern considered as doubtful regarding adequacy/veracity, with a final response rate of 82%.

Table 1 characterizes the sample, comparing it with socio-demographic results of the major study ever performed on health behaviours in Portuguese adolescents, the HBSC 2010.[30] In contrast to the present study, the latter included students attending the sixth grade and excluding those attending the 12th grade.

Principal Component Analysis (PCA-1, PCA-2 and PCA-3).

As described, PCA involved three stages, related to three groups of randomly selected items, according to the procedure adopted by the original authors. In all the stages, an exploratory factor analysis was carried out with direct oblimin rotation, excluding items that reached saturation below 0.30. This type of rotation was chosen as, according to Field,[29] this is the most adequate type of rotation for high dimension samples allowing for more distribution freedom of the items in factors.

PCA 1 – The exploratory factor analysis suggested that retention of 5 factors explained 49.32% of the total variance (Table 2). The *'iludir-se'* dimension (adapted from the English '*wishful thinking'*) was deleted as only two items reached saturation in that factor.

We found that factors *'suporte social'* ('social support'), *'culpabilizar-se'* ('self-blame'), *'investir em amizades íntimas'* ('invest in close friends') were kept in the same dimensions as in the original scale.

Regarding the factor *'ignorar o problema'* ('ignore the problem'), three of the four items (i.e., item 16, 58 and 76) are identical to those described in the original structure. In the factor solution found in our study, this dimension also

Table 1 - Socio-demographic characterization of our group of participants, compared with the national data of the HBSC 2010 study (n.c. = non-comparable data)

		Sample of the present study (*n* = 1,713)	Sample of the HBSC 2010 study (*n* = 5,050)
Gender % (*n*)	**Female**	55.6 (953)	52.3 (2,643)
	Male	44.4 (760)	47.7 (2,407)
Age (years)	**Mean**	15.6	14.0
	Standard deviation	1.7	1.8
	Age interval	12 - 20	10 - 21
Place of birth %	**Portugal**	90.9	94.4
	South America	3.3	1.3
	Africa (PALOP – African Portuguese-speaking Countries)	3.2	1.4
	European countries	2.1	0.8
	Other	0.5	2.1
Family typology %	**Nuclear**	56.4	n.c.
	Mono-parental	17.7	n.c.
	Extended	8.0	n.c.
	Institutionalized	0.3	n.c.
	Other	17.6	n.c.
School grade % (*n*)		**8th grade**: 23.6 (404) **10th grade**: 44.5 (763) **12th grade**: 31.9 (546)	**6th grade**: 30.8 (1,556) **8th grade**: 31.6 (1,594) **10th grade**: 37.6 (1,900)
School failure %	**Never failed**	72.8	n.c.
	Failed once	17.1	n.c.
	Failed twice or more	10.1	n.c.

included item 41 (*'espero que o problema se resolva por si'* - 'I hope that the problem will sort itself out'), which was not related to this dimension in the original scale.

We found more differences regarding the factor *'focar-se no positivo'* ('focus on positive') when compared to the original version. From the six items composing this dimension, three originally belonged to other dimensions (item 13 and 69 derived from the dimension *'iludir-se'* and the item 65 derived from *'ignorar o problema'* 'ignore the problem').

We obtained reasonable to good values regarding internal consistency of the five dimensions that were identified.

PCA 2 – The exploratory factor analysis suggested that retention of six factors accounted for 52.4% of total variance (Table 2).

Table 2 A - Results of the three stages of the Principal Component Analysis.
PCA-1: KMO = 0.85, Bartlett's test of sphericity $\chi 2_{(351)}$ = 12,088.88, $p < 0.001$

Dimensions	Items	PCA -1 Factors				
		1	2	3	4	5
Suporte Social	17	0.78				
	1	0.72				
	59	0.73				
	31	0.65				
	71	0.64				
Culpabilizar-se	56		0.86			
	70		0.85			
	42		0.74			
	51		0.58			
Focar-se no positivo	35			0.75		
	47			0.73		
	62			0.52		
	69			0.69		
	65			0.50		
	13			0.49		
Investir em amizades íntimas	40				0.82	
	77				0.73	
	53				0.46	
	11				0.48	
	14				0.33	
Ignorar o problema	16					0.77
	76					0.62
	41					0.71
	58					0.42
Eigenvalues		4.781	3.503	2.153	1.547	1.300
% variance		17.71	12.98	7.98	5.83	4.82
Cronbach's alpha		**0.77**	**0.81**	**0.72**	**0.66**	**0.64**

Table 2 B - Results of the three stages of Principal Component Analysis.
PCA-2: KMO = 0.79, Bartlett's test of sphericity $\chi 2_{(351)}$ = 13,352.129, $p < 0.001$

Dimensions	Items	PCA-2 Factors					
		1	2	3	4	5	6
Preocupar-se	73	0.73					
	7	0.70					
	64	0.64					
	24	0.60					
	37	0.44					
Procurar apoio espiritual	48		0.90				
	22		0.89				
	5		0.85				
	36		0.70				
Guardar para si	57			0.85			
	43			0.80			
	15			0.63			
Procurar ajuda profissional	61				0.86		
	72				0.83		
	23				0.80		
	6				0.73		
Concentrar-se na resolução do problema	2					0.83	
	18					0.80	
	78					0.67	
	32					0.54	
	44					0.52	
Reduzir a tensão	79						0.51
	27						0.80
	75						0.54
	68						0.36
Eigenvalues		4.263	3.018	2.448	2.190	1.222	1.004
% variance		15.79	11.18	9.07	8.11	4.53	3.72
Cronbach's alpha		**0.72**	**0.86**	**0.69**	**0.82**	**0.73**	**0.55**

Table 2 C - Results of the three stages of Principal Component Analysis.
PCA-3: KMO = 0.82. Bartlett's test of sphericity $\chi 2_{(300)}$ = 8,349.435, $p < 0.001$. Saturations reached in unpredicted factors are underlined.

Dimensions	Items	PCA-3 Factors				
		1	2	3	4	5
Procura de pertença	33	0.73				
	50	0.70				
	38	0.62				
	8	0.55				
	46	<u>0.54</u>				
Ação Social	52		0.72			
	67		0.68			
	49		0.67			
	39		0.57			
	66		<u>0.48</u>			
Esforçar-se e ter êxito	25			0.74		
	60			0.70		
	3			0.61		
	45			0.56		
	19			0.48		
Fazer atividade física	4				0.83	
	34				0.72	
	20				0.65	
Não se confrontar	9					0.77
	10					0.76
	55					0.66
Eigenvalues		4.253	2.799	1.679	1.591	1.346
% variance		17.01	11.20	6.72	6.37	5.38
Cronbach's alpha		**0.68**	**0.64**	**0.69**	**0.67**	**0.63**

All the items in the dimensions *'preocupar-se'* ('worry'), *'procurar apoio espiritual'* ('seek spiritual support'), *'guardar para si'* ('keep to self'), *'procurar ajuda profissional'* ('seek professional help'), *'concentrar-se na resolução do problema'* ('focus on solving the problem') and *'reduzir a tensão'* ('tension reduction') reached saturation in the expected factors, keeping these dimensions as those described in the original structure of the instrument. The only exception regards the factors *'guardar para si'* in which item 30 (*'evito estar com pessoas'* – 'I avoid being with people') was deleted by statistical indication in order to increase the internal consistency of this dimension. Similarly, item 12

(*'choro ou grito'* – 'I cry or scream') was also removed from the dimension *'reduzir a tensão'*.

Regarding the internal consistency of the six dimensions found, we obtained acceptable Cronbach's alpha values, except for the low value in the dimension *'reduzir a tensão'*.

PCA 3 – The exploratory factor analysis suggested retaining five factors accounted for 46.7% of total variance (Table 2).

The results show that only the dimensions *'esforço e êxito'* ('work hard and achieve') and *'atividade física'* ('physical recreation') present structures identical to the one found in the original factor solution.

The dimension *'atividades relaxantes'* (adapted from the English '*seek relaxing diversions'*) was deleted as only two items reached saturation in this factor. We should remark that item 46 (included in this dimension in the original factor structure) was organized in factor 1 – *'procura de pertença'* ('seek to belong'). Regarding the latter – *'procura de pertença'* – all the remaining items were identical to those identified in the original structure.

Regarding the factor *'acção social'*, four of the five items are identical to the structure in the original dimension, except item 66 (*'faço o que os meus amigos querem'* – 'I do as my friends want') which originally relates to the dimension *'procura de pertença'*.

The dimension *'não confronto'* ('not coping') was designed with only three items (in the original, this dimension had five items). However, these were identical to those included in the original dimension. Item 63 (*'sofro de dores de cabeça ou dores de estômago'* – 'I have a headache or stomach ache) and 28 (*'fico doente ou agoniado'* 'I get sick') presented a high saturation in a single factor suggesting for a dimension more associated to somatisation. Nonetheless, as this is a very specific factor and with only two items, a decision for exclusion from the factor structure was based on a reductionist approach to avoid exaggerating this already extensive dimension from the scale.

We obtained acceptable Cronbach's alpha values regarding the internal consistency of the five dimensions.

Second-order factor analysis

A second PCA was then carried out, with varimax

Table 3 - Results of the Principal Component Analysis of all dimensions found in the Portuguese adaptation, with varimax rotation. The 3 factors relate to three coping styles: factor 1 – problem-focused; factor 2 – reference to others; factor 3 – non-productive coping. KMO = 0.79. Bartlett's test of sphericity $\chi 2_{(120)}$ = 7 999.952, $p < 0.001$. Saturations reached in unpredicted factors are underlined.

Dimensions	Factors		
	1	2	3
Concentrar-se na resolução do problema	0.79		
Esforçar-se e ter êxito	0.75		
Preocupar-se	<u>0.75</u>		
Procura de pertença	0.60		
Focar-se no positivo	0.56		
Fazer atividade física	0.35		
Ação Social		0.76	
Investir em amizades íntimas		<u>0.63</u>	
Procurar ajuda profissional		0.62	
Suporte Social		0.61	
Procurar apoio espiritual		0.31	
Ignorar o problema			0.77
Guardar para si			0.74
Culpabilizar-se			0.72
Não se confrontar			0.69
Reduzir a tensão			0.51
Eigenvalues	4.011	2.667	1.443
% variance	18.81	16.38	15.63
Cronbach's alpha	0.76	0.61	0.74

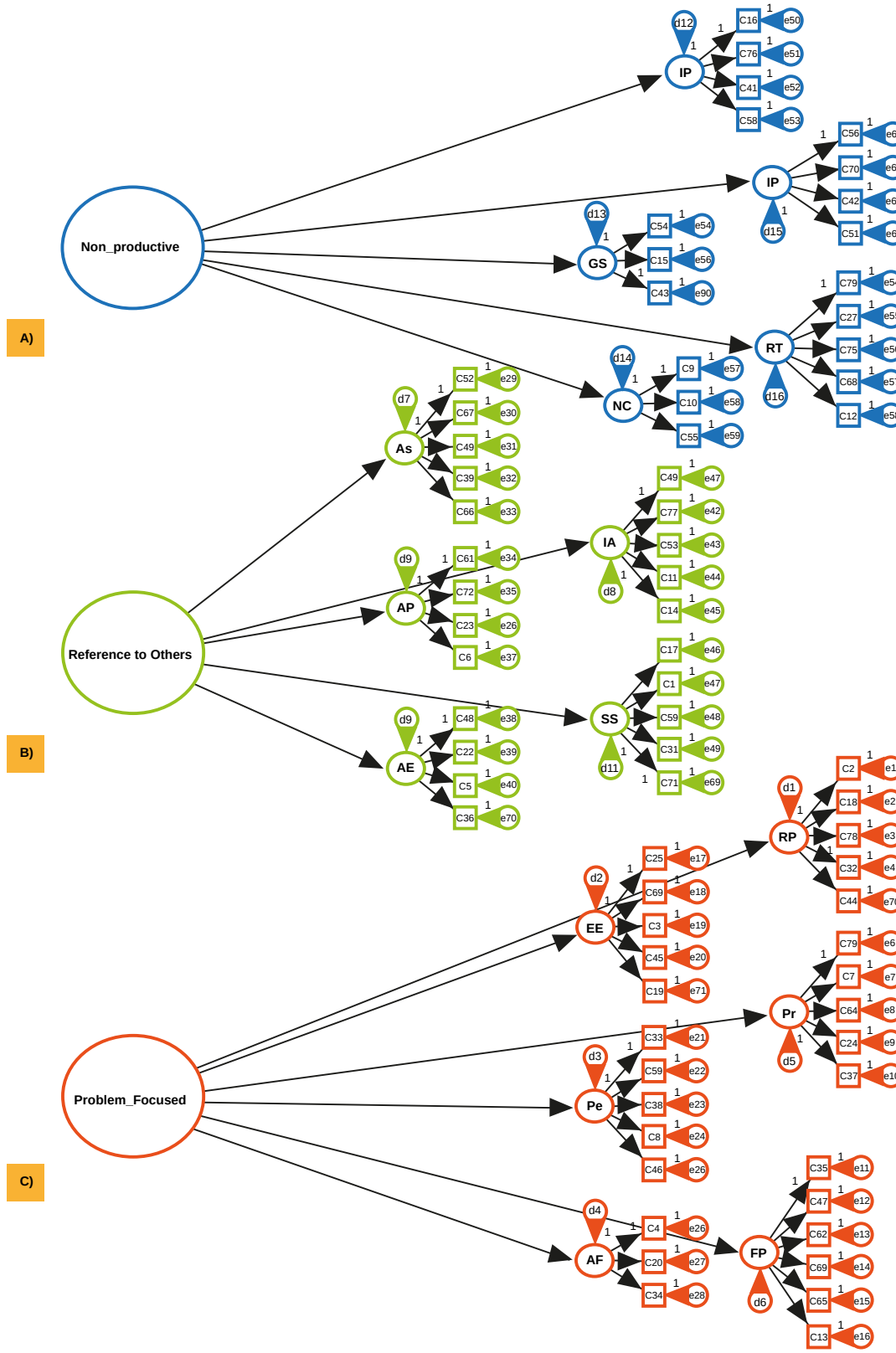

Figure 1 - Proposed structural model for the Portuguese ACS version. The results obtained for each of the dimensions of coping styles are displayed. All fit indices present $p < 0.001$ values.
A) proposed factor structure for 'non-productive' coping dimension - $\chi2_{(129)} = 809.53$. $p < 0.001$. CFI = 0.92. GFI = 0.95. NFI = 0.90 and RMSEA = 0.06.
B) proposed factor structure for 'reference to others' coping dimension - $\chi2_{(210)} = 846.23$. $p < 0.001$. CFI = 0.95. GFI = 0.96. NFI = 0.94 and RMSEA = 0.04.
C) proposed factor structure for 'problem-focused' coping dimension - $\chi2_{(335)} = 1,421.65$. $p < 0.001$. CFI = 0.92. GFI = 0.94. NFI = 0.90 and RMSEA = 0.04.

rotation, suggesting first-order factors should be organized in three broader factors (Kaiser's criterion over 1) accounting for 50.8% of total variance (Table 3). In this second-order analysis, the similarity between the components of this factor solution is the reason why we chose an orthogonal varimax rotation in order to maximize dispersion of items' saturations[29] and, as such, enhance the differences between the factors. This type of rotation was also used by the original authors of the scale.

The 16 coping strategies in the adapted version were grouped in three coping styles, according to the original ACS version:[20] problem-focused, reference to others and non-productive coping.

All were grouped in the predicted factors according to the original structure, except two: *'preocupar-se'*, which in the original version of the scale was included in the non-productive coping style and *'investir em amizades íntimas'* which was originally in the problem-focused coping style. Regarding internal consistency of the three dimensions found, we obtained acceptable Cronbach's alpha values, showing a high internal consistency in these factor groups.

Confirmatory factor analysis

After identifying the factor structure of the Portuguese ACS version (16 dimensions, related to coping strategies and organized in three more abstract factors, related to coping styles), a confirmatory factor analysis was carried out in order to determine model suitability. This analysis was carried out using the Structure Equation Modelling method, with maximum likelihood method for the analysis of covariance matrix and correlations between dimensions. Model's suitability was examined using fit indicators recognized to be adequate for large samples, namely CFI (comparative fit index), GFI (goodness-of-fit index) and NFI (normed fit index), with values over 0.90 indicating model's optimal suitability; we also used RMSEA (root mean square

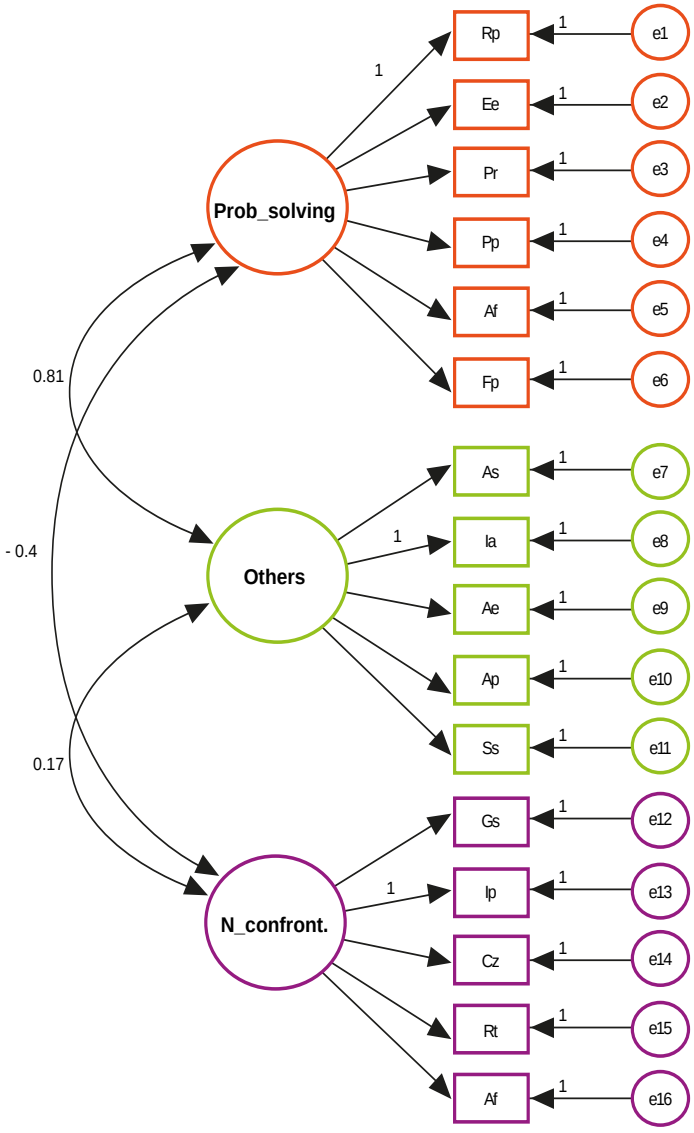

Figure 2 - Proposed structural model for the Portuguese ACS scale version. Obtained results for the scale's global structure are displayed. All adjustment indexes present p values < 0.001. Global structure - $\chi 2_{(62)}$ = 579.23. p < 0.001, CFI = 0.94, GFI = 0.96, NFI = 0.93 and RMSEA = 0.07.

error of approximation), with values of 0.10 or below considered relevant for adequate suitability.

The independent analysis of each of the three coping styles followed by that of the global structure revealed adequate fit indices in both (Fig. 1 and 2).

Coping strategies and styles by gender

In our group of participants, the most widely used strategies by adolescents are: *'preocupar-se'*; *'concentrar-se na resolução do problema'* and *'esforçar-se e ter êxito'*. According to our model, all these parameters are included in the problem-focused coping style. As shown in Table 4, there are gender differences regarding the coping strategies that were used.

Male adolescents use comparatively more the following strategies: *'ação social'* ('social action'); *'fazer atividade física'* ('physical recreation') and *'ignorar o problema'* ('ignore the problem'). In contrast, female adolescents more commonly use the following: *'culpabilizar-se'* ('self-blame'); *'preocupar-se'*; *'procura de pertença'*; *'procurar apoio espiritual'*; *'reduzir a tensão'* and *'suporte social'*.

Regarding coping styles, we found that problem-focused style is mostly used by the adolescents in our group of participants. Gender differences were significant for non-productive and reference to other coping styles, both with higher mean values in the female subjects.

DISCUSSION

The positive response rate of our study allowed for accomplishment of the our originally proposed statistical methodology, similar in many respects to the original version and encompassing a total of 70 items assessing 16 coping strategies, grouped in three general styles. In order to reinforce the validity of the results we used the socio-demographic results of the biggest study on health behaviour in Portuguese adolescents, the HBSC 2010[30] (also carried

Table 4 - Comparisons between coping strategies and styles by gender through Independent-Samples Student's t-test. Those presenting significant differences are shown in bold. (SD = standard deviation; n.s. = non-significant).

	Male (*n* = 586)		**Female (*n* = 755)**		
Strategy	**Mean**	**SD**	**Mean**	**SD**	***p***
Ação Social	**1.62**	0.59	1.56	0.54	**0.014**
Concentrar-se na resolução do problema	3.63	0.72	3.67	0.67	0.21
Culpabilizar-se	2.49	0.92	**2.74**	0.98	**< 0.001**
Esforçar-se e ter êxito	3.58	0.65	3.61	0.64	0.20
Fazer atividade física	**3.53**	0.96	3.11	0.88	**< 0.001**
Focar-se no positivo	3.20	0.73	3.14	0.74	0.13
Guardar para si	2.80	0.97	2.72	0.97	0.11
Ignorar o problema	**2.11**	0.77	2.02	0.74	**0.01**
Investir em amizades íntimas	2.93	0.89	2.91	0.84	0.60
Não se confrontar	1.94	0.78	1.92	0.79	0.72
Preocupar-se	3.77	0.75	**3.96**	0.69	**< 0.001**
Procura de pertença	3.49	0.75	**3.62**	0.70	**< 0.001**
Procurar ajuda profissional	1.78	0.82	1.74	0.84	0.44
Procurar apoio espiritual	1.84	1.01	**2.00**	1.04	**0.001**
Reduzir a tensão	1.86	0.64	**2.25**	0.70	**< 0.001**
Suporte Social	2.80	0.82	**3.16**	0.85	**< 0.001**
Estilo geral	**Mean**	**SD**	**Mean**	**SD**	***p***
Focado na resolução do problema	3.54	0.52	3.53	0.49	0.77
Referência a outros	2.18	0.53	**2.26**	0.52	**0.002**
Não produtivo	2.24	0.58	**2.32**	0.59	**0.006**

out in adolescents attending public schools), and we further assessed similarities with our group of subjects. From this observation (Table 1), we found strong socio-demographic similarities between both samples, suggesting an adequate suitability of the sample used.

The results of the first-order PCA (carried out in three stages), suggested a 16-dimension structure (coping strategies), smaller than the original structure comprising 18 dimensions. This may be due to alternative interpretations imposed by existing cultural differences between the original study and the Portuguese subjects. As described in the introduction, previous studies have described cultural, geographic and socio-economic differences influencing coping variables.[10-12]

The dimensions *'iludir-se'* (adapted from the English '*wishful thinking'*) and *'procurar atividades relaxantes'* (adapted from the English '*seek relaxing diversions'*) were not identified in our study. In the validity ACS study for the Argentinian Spanish version[22] the dimension '*wishful thinking'* was also deleted. So far, no clear explanations have been found in the available literature for this phenomenon. As such we raise the hypothesis that this concept does not have a clear meaning in the Portuguese context and therefore the items of this dimension for our subjects would obtain a more coherent meaning with other coping dimensions (for example *'pensar de forma positiva'*, *'ignorar o problema'*)..

In addition, our participants seem to consider leisure activities with a strongly social character, as revealed by the joint organization of contents for activation of social networks and contents related to relaxing activities, not differentiating the latter from the former. Leisure activities seem to reinforce and contribute to searching/coming closer to others, consequently, strengthening the social network, a crucial aspect for an adequate coping.[31]

We should remark an interesting result, which also

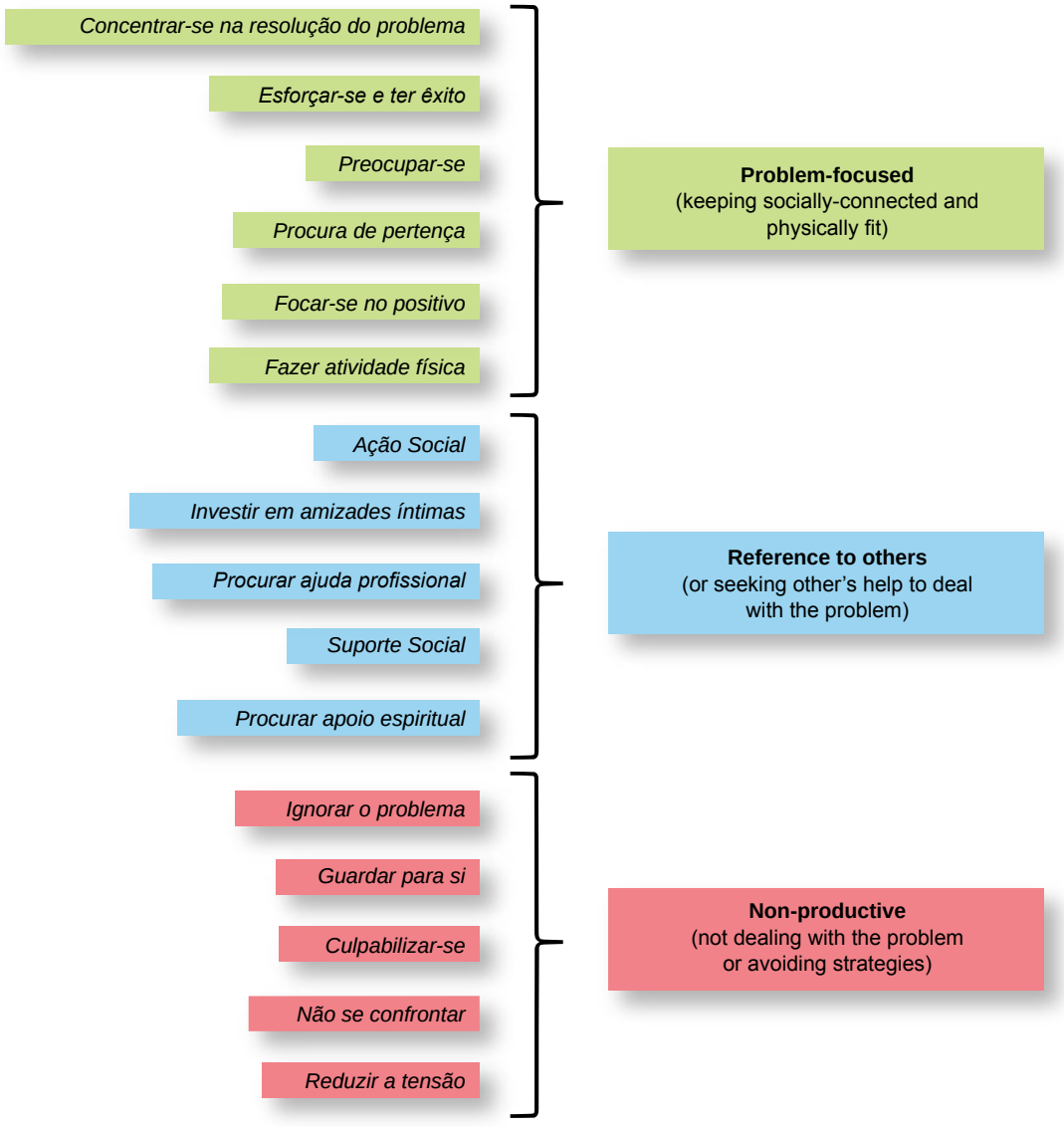

Figure 3 - Diagram of the ACS Portuguese adapted version. The 16 coping strategies are shown on the left column and the way they are grouped into the three coping styles is shown on the right column.

occurred in the original ACS replication study[16] in which the authors observed that the scale *'não se confrontar'* ('not coping') was separated in two factors: *'somatização'* ('somatisation') and *'desespero'* ('despair'). This also occurred in our study causing two items to be individually grouped and descriptive somatisation symptoms to be deleted.

Regarding the second-order factor analysis, we found that the individual and global expected coping styles were grouped according to the original model, except for the strategy *'preocupar-se'* ('worry'), which in the original version was included in non-productive coping style and *'investir em amizades íntimas'* which originally was included in problem-focused coping style. These two differences carry statistical support (with high saturation values) but their justification is challenging from a theoretical point of view.

Regarding the strategy *'preocupar-se'* ('worry'), it clearly reached saturation in the productive coping factor (factor 1 = 0.753; factor 2 = 0.158 and factor 3 = 0.111). Although statistically there are no doubts, again, the theoretical discussion gets more complex. In fact, this is a first step towards solving the problems,[32] in most studies we find that increasing worrying values are related to a proportional deficit in *'orientação do problema'* ('orientation for problem') which, in turn, constitutes the initial part of the behavioural process of problem solving[32,33] (in fact, the presence of an excessive or pathological worry may result in lack of motivation for its resolution). There are obviously different levels of worry and many adolescents, when answering this item, may not be thinking in 'pathological' or 'non-productive' worrying. It is also very relevant to describe certain cognitive abilities that are necessary to the worrying cognitive process and that may only be developed at the end of the adolescence,[34] so that the distinction between worry as first step towards problem solving or excessive worry may be unclear to many young participants in our study, explaining the obtained result.

Regarding *'investir em amizades íntimas'* ('investing in close friends') strategy, its re-positioning presents a strong statistical support, with a much higher saturation of the 'reference to others' factor (factor 2 = 0.631), although charged with a moderate cross-loading from the problem-focused coping factor (factor 1 = 0.322). We found acceptable its inclusion in coping by 'reference to others' from a theoretical point of view.

The three coping styles found in our study are conceptually similar, with the exception of the dimension *'preocupar-se*', to those originally described in the ACS scale, enhancing the results that we found and suggesting that our proposed factor solution is suitable for the Portuguese population. The structure of the adapted ACS scale Portuguese version is shown in Fig. 3.

The suitability of our proposed structure has been confirmed by the remaining preliminary results suggested by the study, namely the confirmatory factor analysis, which seems to reveal a good fit of the structure of data measurement for our group of participants, reliable internal consistency values (Cronbach's alpha) of first and second-order dimensions and gender differences which are in line with previous studies.

Regarding internal consistency, all the values are above 0.60 (ranging between 0.63 and 0.86), except for a 0.55 value in the dimension *'redução de tensão'*. Nevertheless, this dimension has been kept as, in preliminary studies on complex psychological measures (as is the case of coping) and in scales with great number of items, internal consistency values above 0.50 are usually considered.[4] In fact, in this kind of studies, internal consistency values do not generally exceed the values obtained in our adaptation. In the study of ACS replication,[16] the authors decided to maintain the dimension *'procurar atividades relaxantes'* despite a Cronbach's alpha value of 0.59. It is important to remark that this value refers to the original population (Australian adolescents). Other studies for ACS adaptation show internal consistency values slightly below 0.60.[22]

In addition, this seems to be a regular limitation of several coping measurement scales. In the study of the Portuguese adaptation of the Brief COPE scale,[35] one dimension presented a 0.55 value. Also in the Portuguese adaptation of the Ways of Coping Questionnaire scale,[35] two dimensions presented a Cronbach' alpha value slightly below 0.60.

We should also remark that the values of internal consistency are higher in measures based on specific events,[36] unlike in this scale, whose instruction refers to coping strategies in general and is not focused on a particular situation.

Regarding gender effect, we found different coping strategies and young girls seem more focused than boys to strategies oriented to social network activation and also to more emotional strategies as self-blaming or tension-reduction. In addition, male adolescents use comparatively more active strategies – searching for social support, physical activity – or they choose ignoring the problem. These data are in line with previous results[8,9] and these similarities give support to the fact that the final structure has a good fit in the present study.

Our study presented as major limitations the following:

As coping is a complex concept, we would expect variations according to the populations studied, due to social and cultural influences or even variations with a more structural/biological origin;[4] in this context, we should remark that the present data reflects the reality of the young students attending the public schools from a metropolitan area of a large Portuguese city (Lisbon) alone. Therefore, it is possible that that are differences regarding its comparison to populations from other urban areas. However, we would mainly expect, in accordance to previous studies,[11] that of the main differences would occur in comparison to groups of adolescents from a rural area. Other limitation pertain to the exclusion of private school students, previously shown to influence the results, as exemplified by a large study with adolescents (using the Spanish version of the ACS scale)[12] with public and private school participants. .

The data presented in this study represent one part of the Portuguese validity protocol of the scale, namely its linguistic adaptation and the study of its internal consistency and factor structure. As previously referred, the application of the ACS scale was included in a questionnaire designed within a wider study[28] and, due to logistic reasons, it was necessary to plan the remaining study of the construct and criterion validity (a protocol that will include a set of instruments adequate to the study of the convergent-discriminant validity) for a second stage. For this reason, the use of this adapted scale must be carefully considered and the results carefully explained. This is particularly relevant in the case of the dimensions that presented lower internal consistency values.

In the future, we will deepen the study of the instrument's convergent-discriminant validity, as well as the effect of subject's age, in order to better understand the scale's discriminative capability and its psychometric behaviour.

CONCLUSION

Our study produced an adapted Portuguese version of an important coping assessment instrument in adolescents, the ACS scale; the results that we obtained showed very acceptable psychometric values.

Our approach allowed for the preservation of a very similar structure to the original: 70 items in total, assessing 16 coping strategies grouped in three coping styles; we consider that this structure is supported by adequate principles regarding its suitability for coping assessment in Portuguese adolescents.

We consider this study as a useful and important contribution for the study of coping with Portuguese adolescents, despite current limitations.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the *Fundação para a Ciência e Tecnologia (FCT)* for their partial financial support to this study. We also wish to acknowledge the Ministry of Education for their collaboration and especially to Izabel Baptista. We also wish to acknowledge the schools and teachers that collaborated and of course the students and their parents, without whom this study would not be neither possible nor relevant. We also wish to acknowledge Inês Mirra for her support in field work and Anne Rodrigues for her support in linguistic aspects. Our last acknowledgement goes to Erica Frydenberg who, at a distance, gave her support to the linguistic adaptation as well as to the theoretical discussion.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript. Due to copyright issues, it is not possible to include in attachment the PCA Portuguese adapted version, which will be sent to the ACS editor (Australian Council for Educational Research) who has agreed to make it available to interested researchers.

FINANCIAL SOURCES

Diogo Frasquilho Guerreiro was awarded a FCT scholarship which has been used as partial financial source for this study (FRH/SINTD/ 60041/2009). Beyond this, there were no other external financial sources.

REFERENCES

1. Lazarus R, Folkman S. Stress, appraisal, and coping. New York: Springer Publishing Company; 1984.
2. Holahan CJ, Moos RH. Personal and contextual determinants of coping strategies. J Pers Soc Psychol. 1987;52:946-55.
3. Lazarus RS. Coping theory and research: past, present, and future. Psychosom Med. 1993;55:234-47.
4. Frydenberg E. Adolescent coping: advances in theory, research and practice. London: Routledge; 2008.
5. Seiffge-Krenke I. Stress, coping and relationships in adolescence. New Jersey: Lawrence Erlbaum Associates; 1995.
6. Sampaio D. Lavrar o mar. Lisboa: Editorial Caminho; 2006.
7. Shaffer D, Kipp K. Developmental psychology - childhood & adolescence. Belmont: Wadworth; 2007.
8. Frydenberg E, Lewis R. Boys play sport and girls turn to others: age, gender and ethnicity as determinants of coping. J Adolesc. 1993;16:253-66.
9. Borges AI, Manso DS, Tomé G, Matos MG. Ansiedade e coping em crianças e adolescentes: Diferenças relacionadas com a idade e género. Análise Psicol. 2008;4:551-61.
10. Frydenberg E, Lewis R, Kennedy G, Ardila R, Wolfgang F, Rasmiyah H. Coping with concerns: an exploratory comparison of Australian, Colombian, German, and Palestinian adolescents. J Youth Adolescence. 2003;32:59-66.
11. Elgar FJ, Arlett C, Groves R. Stress, coping, and behavioural problems among rural and urban adolescents. J Adolesc. 2003;26:577-88.
12. de la Paz Bermudez M, Teva I, Buela-Casal G. Influencia de variables sociodemograficas sobre los estilos de afrontamiento, el estres social y la busqueda de sensaciones sexuales en adolescentes. Psicothema. 2009;21:220-6.
13. Davis SK, Humphrey N. The influence of emotional intelligence (EI) on coping and mental health in adolescence: divergent roles for trait and ability EI. J Adolesc. 2012;35:1369-79.
14. Rao K. Recent research in stress, coping and women's health. Curr Opin Psychiatry. 2009;22:188-93.
15. Compas BE, Jaser SS, Dunn MJ, Rodriguez EM. Coping with chronic illness in childhood and adolescence. Annu Rev Clin Psychol. 2012;8:455-80.
16. Frydenberg E, Lewis R. A replication study of the structure of the adolescent coping scale: multiple forms and applications of a self-report inventory in a counselling and research context. Eur J Psychol Assessment. 1996;12:224-35.
17. Folkman S, Moskowitz JT. Coping: pitfalls and promise. Annu Rev Psychol. 2004;55:745-74.
18. Compas BE, Connor-Smith JK, Saltzman H, Thomsen AH, Wadsworth ME. Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. Psychol Bull. 2001;127:87-127.
19. Moos RH, Billings AG. Conceptualising and measuring coping resources and processes. In: Goldberger L, Brenitz S, editors. Handbook of stress: Theoretical and clinical aspects. New York: Free Press; 1982. p. 212-30.
20. Frydenberg E, Lewis R. Adolescent Coping Scale: administrator's manual. Melbourne: Austr Council Educl Res; 1993.
21. Frydenberg E, Lewis R. Escala de afrontamiento para adolescentes. Madrid: TEA; 1996.
22. Richaud de Minzi MC. Coping assessment in adolescents. Adolescence. 2003;38:321-30.

23. Leclercl D, Pronovost J, Dumont M. Échelle de Coping pour Adolescent: validation cannadienne-française de l'Adolescent Coping Scale de Frydenberg et Lewis (1993). Rev Quebecoise Psychol. 2009;30:177-96.
24. Câmara SG, Castellá SJ, Remor EA. Análise fatorial da escala de afrontamento para adolescentes (ACS) em uma amostra de jovens de Porto Alegre. Aletheia. 2002:15-31.
25. Omar K, Bujang MA, Mohd DT, et al. Validation of the Malay version of Adolescent Coping Scale. Int Medical J. 2011;18:288-92.
26. Hawton K, Rodham K, Evans E, Weatherall R. Deliberate self harm in adolescents: self report survey in schools in England. BMJ. 2002;325:1207-11.
27. O'Connor RC, Rasmussen S, Miles J, Hawton K. Self-harm in adolescents: self-report survey in schools in Scotland. Br J Psychiatry. 2009;194:68-72.
28. Guerreiro DF. Comportamentos auto-lesivos em adolescentes em idade escolar: a sua relação com mecanismos de coping, temperamento e psicopatologia. Lisboa: Faculdade de Medicina da Universidade de Lisboa; 2014.
29. Field AP. Discovering statistics using SPSS. 3rd ed. Los Angeles: SAGE Publications; 2009.
30. Matos MG, Simões C, Tomé G, Camacho I, Ferreira M, Ramiro L. A saúde dos adolescentes portugueses: Relatório do estudo HBSC 2010. Lisboa: Centro de Malária e Outras Doenças Tropicais /IHMT/UNL; 2012.
31. Trainor S, Delfabbro P, Anderson S, Winefield A. Leisure activities and adolescent psychological well-being. J Adolesc. 2010;33:173-86.
32. Dugas M, Letarte H, Rhéaume J, Freeston M, Ladouceur R. Worry and problem solving: Evidence of a specific relationship. Cognitive Therapy Res. 1995;19:109-20.
33. Laugesen N, Dugas MJ, Bukowski WM. Understanding adolescent worry: the application of a cognitive model. J Abnorm Child Psychol. 2003;31:55-64.
34. Vasey M. Development and cognition in childhood anxiety: The example of worry. In: Ollendick T, Prinz R, editors. Advances in clinical child psychology. New York: Plenum; 1993, p.1-39.
35. Pais-Ribeiro J, Rodrigues AP. Questões acerca do coping: a propósito do estudo de adaptação do Brief Cope. Psicol Saúde Doenças. 2004;5:3-15.
36. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. J Pers Soc Psychol. 1989;56:267-83.

Diogo Frasquilho GUERREIRO, Diana CRUZ, Maria Luísa FIGUEIRA, Daniel SAMPAIO

Adaptation and Psychometric Proprieties Study for the Portuguese Version of the Adolescent Coping Scale – *Escala de Coping para Adolescentes*

Acta Med Port 2014:27:166-180

Publicado pela **Acta Médica Portuguesa**, a Revista Científica da Ordem dos Médicos

Av. Almirante Gago Coutinho, 151
1749-084 Lisboa, Portugal.
Tel: +351 218 428 215
E-mail: submissao@actamedicaportuguesa.com
www.actamedicaportuguesa.com
ISSN:0870-399X | e-ISSN: 1646-0758