

# Testing the Psychometric Properties of the Challenging Parent Standard Questionnaire (CPSQ) in the Italian Educational Context.

**Alessandro Pepe**

University of Milano - Bicocca  
Milano, Italy

**Loredana Addimando**

University of Milano - Bicocca  
Milano, Italy

The *Challenging Parent Standard Questionnaire (CPSQ)* is a measurement tool aimed at surveying the field of parent-teacher relationships to assess the frequency of challenging parental behaviours as well as the occupational stress experienced by teachers in response to those behaviours.

The present study examined the factor structure and the main psychometric properties of the CPSQ in a sample of Italian in-service primary and lower secondary teachers ( $N = 1,025$ ). In order to investigate the most appropriate factor structure for the Italian version of the questionnaire, researchers compounded three different factor retention methods: K1 rule (Kaiser, 1960), scree test (Cattell, 1966) and parallel analysis (Horn, 1965).

The results show a practical and robust five-factor measurement model describing the challenging behaviours of parents: 'Excessively worried about education', 'Unsatisfied', 'Uncooperative', 'Overprotective' and 'Uninvolved'.

In Italian primary and lower secondary schools, the CPSQ factor pattern partially differs from the pattern found in studies conducted in different educational contexts (i.e., Lambert & McCarthy, 2006; Van der Wolf & Everaert, 2005). Recommendations for a more accurate factor retention process in testing factorial invariance in measurement tools are discussed.

**Keywords:** Parallel Analysis; Exploratory Factor Analysis; Teacher Stress; Psychometric Properties; Challenging Parent Standard Questionnaire

## Introduction.

The field of parental involvement in children's schooling is a steadily growing area of research in educational psychology. In the last few decades, scientific publications about the issue of the school - family relationship have been focused on exploring the ways in which parents (and in a broader sense, caregivers) can be directly involved in educational organizations (Castelli & Pepe, 2007).

The main rationale justifying the full inclusion of caregivers and guardians in school life is the

relationship that exists between such practices and pupils' academic achievements (Brooks, Bruno & Soden, 1997; Henderson, 1987; Sheldon & Epstein, 2001; Van Hoornis, 2001), motivation to learn (Brooks, Bruno & Soden, 1997; Grolnick & Slowiaczek, 1994) and misconducts (Cotton & Wiklund, 2001; Deutscher & Ibe, 2003).

Other studies have recognized that the involvement of families in education provides benefits not only to children but also to parents and teachers (Eldridge, 2001; Loughran, 2008).

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Correspondence concerning this article should be addressed to Alessandro Pepe, e-mail: a.pepe1@campus.unimib.it

The evidence is so strong that in contemporary educational setting the statement 'When parents are involved, children achieve greater academic success' can almost be considered a truism. A robust literature suggests that a high-quality teacher-parent relationship represents a means to build a strong partnership between home and school: in other words, it creates a bridge that provides a fundamental tie between classroom learning activities and at-home learning activities. However, interactions among individuals constantly change in response to both modifications in the environments in which interactions exist and changes in the individuals within the relationship (O'Connor, 2010; Pianta, 1999). Consequently, those interactions sometimes go wrong. If we are ready to recognize the positive aspects of parental involvement, then as educational researchers we must also be willing to look at the drawbacks. Unfortunately, to our knowledge, little attention has been devoted to exploring both empirical and practical effects of parental 'undesired' behaviours on teachers' occupational stress.

In fact, if the main consequence of the implementation of policies and practices directed toward parental participation is a greater inclusion of parents in school life, then the stress arising from teacher - parent relationship may result in adverse effects on teachers' work. In our experience, teacher-parent collaboration can also be also depicted as a 'vicious circle' (where the term 'circle' stands for a complex chain of events that reinforces itself through a feedback loop that generates greater instability) rather than a 'virtuous circle': a situation in which the relationship between them may become extensively characterized by misunderstandings, anxiety, feelings of mistrust and, finally, open clashes. When there is an excessive number of 'vicious circles', the problem of challenging parental behaviours becomes a major source of occupational stress for teachers (Sakharov & Farber, 1983; Pranke, Van Peet & Van der Wolf, 2007).

Obviously, we are well aware of the importance of building good parent - teacher relations and we support the positive aspects (such as teachers' perceptions of parents as being helpful, committed, and trustful) that result from daily good-quality interactions between them. However, as already stated, sometimes parent - teacher interactions have unwanted outcomes.

When a relation goes wrong because of a conflict, a reciprocal lack of interest or a misunderstanding, the consequence of the failures among involved individuals needs to be explored to prevent and manage mistakes more effectively. In other words, we are called to gain a deeper understanding into the effects of negative relations on teachers' occupational stress in the same way that system designers and engineers are called to apply *failure mode and effects criticality analysis*<sup>1</sup> approaches to the functioning of their systems.

Therefore, the aim of the present paper is twofold. First, we propose a more robust method to assess the dimensionality of a given dataset. The method is particularly useful in testing hypotheses about the factor structure of a measurement tool translated in a language different from the original one. The data used in the present study were gathered as part of a wider international survey aimed at exploring the impact of parental challenging behaviours on teacher occupational stress by using a questionnaire translated into five different languages. In this kind of investigation, the International Test Commission's guidelines suggest the following: "when a test user makes changes in test format, mode of administration, instructions, language or content, the user should revalidate the use of test for the changed conditions" (ITC, 2001, p.41). According to such guidelines, the structure of the Italian version of the questionnaire needs to be carefully explored during the developmental early stages to gain a concrete understanding of its 'real' dimensionality. The procedure we applied in this work is intended to support decisions about the number of factors in a given dataset; it is based on compounding two classical methods of factor retention, i.e. the K1 (Kaiser, 1960) and the scree test (Cattell, 1966) with a new Monte Carlo simulation technique: the parallel analysis (Horn, 1965).

After describing the methodological procedure, we outline the main psychometric properties of the *Challenging Parent Standard Questionnaire* (CPSQ) in a sample of Italian in-service primary and lower secondary teachers (N = 1,025). To this end, results from exploratory factor analysis (EFA)

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<sup>1</sup> In hard science and system design, a common methodology based on a structured analysis of a system to identify potential failure situations, their causes, and the effects associated with each failure outcome; see Wasson (2006) for more details.

and confirmatory factor analysis (CFA), as well as convergent validity and scale descriptives (mean, standard deviation, reliability analysis) are reported.

Since the CPSQ (24-item version) is devoted to teachers, practitioners, and policy makers with the aim of examining both perceived stress (most troublesome) and the frequency of behaviours that teachers have found most challenging during interactions with students' parents, it goes without saying that data from the questionnaire can be fruitfully used to explore the impact of parental challenging behaviour on teacher' stress. Other potential applications of the CPSQ are the promotion of a deeper understanding of what behaviours are typical in a given educational context (for instance by analyzing inter- or intra-organizational data variability) and the planning of more targeted stress-reduction interventions for in-service teachers.

### **Theoretical Background.**

#### *Teachers' occupational stress and parental challenging behaviors.*

The teaching profession has been increasingly described as an occupation beset by high levels of stress (Johnson, Cooper, Cartwright, Donald, Taylor & Millet, 2005). Actually, the work-related stress phenomenon is spread across different national labour systems and professions: approximately one third of all workers in Europe reported that they perceive their jobs as a source of high - stress (Levi, 2000). In Japan, the number of highly - stressed employees has been shown to be higher than in other parts of the world (Harnois & Gabriel, 2000). A survey conducted by the International Labour Organization (ILO) remarked that, in economical terms, the cost of work-related stress conditions across the world affects about 10% of gross domestic product each year (Midgley, 1997) particularly for what regards absenteeism (Cartwright & Boyes, 2000). In line with these numbers, roughly one - third of all teachers also referred to themselves as 'very' or 'extremely' stressed due to high work demands (Chan & Hui, 1995; Gevin, 2007; Kyriacou, 1987).

Among the several ways of conceptualizing stress (i.e. Cumming & Cooper, 1998; Edwards, 1998; Seyle, 1955), Lazarus' *transactional model* (Lazarus & Folkman, 1984) sheds light on the concept of *stress* by arguing that the feeling of

stress occurs when people experience *imbalances* between personal life demands and the availability of resources to cope with such demands. According to this model, Kyriacou and Sutcliffe (1978) define teacher stress as "*a response syndrome of negative affects (such as anger or depression) resulting from aspects of the teacher's job and mediated by an appraisal of threat to the teacher's self-esteem or well-being and by coping mechanisms activated to reduce the perceived threat*" (ibidem, p. 159).

In this framework, a *job stressor* is defined as a work-related complex stimulus that can potentially affect the wellbeing of an individual (Hurrell, Nelson & Simmons, 1998). Under these premises, workers exposed to environmental *job stressors* are afflicted by *negative affects* that undermine their physical and psychological health. There are of course other theoretical approaches to describe work-related stress issues (ranging from organizational explanations to bio-psychological models); however, by defining the stress as a subjective perception mediated by environmental demands and individuals' responses (Hinton & Rotheiler, 1998), the *transactional model* is particularly useful because it takes into account general aspects that any stress definition should consider (Kyriacou, 1988). From this point of view, a potential stressor should be seen as an antecedent of teachers' stress.

Several researchers examining teacher stress have tried to account for the occurrence of job stressors in the classroom and school contexts and have concluded that interpersonal demands, lack of professional recognition, discipline problems, heterogeneity of tasks, lack of support, workload, time pressure, and lack of resources should be considered job stressors (Durham, 1992; Chan, 1998; Wilson, 2002; Burke, Greenglass, & Schwarzer, 1996; Pithers, 1995; Travis & Cooper, 1996). Negative teacher - parent relationships as well as unsatisfactory interactions with other adults in the work environment (i.e. colleagues, headmasters, and scholastic staff) are other *job stressors* (Prakke et al., 2007). Moreover, the continual exposure to parental challenging behaviours can seriously deplete teachers' emotional and physical resources, leading to self-doubt, loss of satisfaction from the teaching profession and feelings of anger or guilt (Van der Wolf & Everaert, 2005).

If it is crucial to remark that a job stressor is a perceived threat resulting from the interaction between individuals and their environment,

in dealing with the concept of *challenging behaviours* educational psychologists should be aware of the role played by cultural and social issues in defining what a *challenging behaviour* could actually be.

The main idea is that the degree to which a challenging behaviour is perceived as a threat is rooted in the complex network of social norms, cultural values, and personal habits from which teachers derive the boundaries of their relations with parents. Bearing in mind that "a behaviour becomes problematic when it is troublesome to someone" (Jones, Charlton & Wilkin, 2005, p.140), Emerson (1995) offered a more useful definition of challenging behaviours: "a culturally abnormal behaviour of such intensity, frequency, or duration that the physical safety of the person or other is likely to be place in serious jeopardy" (p.3). Again, the subjective facet is involved in the process of labelling something as 'troublesome' and it prevails over the objective one. The results of a questionnaire that locally gathers information about the consequences of parental challenging behaviours in regard to teachers' occupational stress would provide an important measurement instrument in the 'toolbox' of researchers in education.

#### *Factor Retention Methods.*

In modern social sciences, *factor analysis* is crucial to test the validity of psychological constructs being measured (Nunnally, 1978), perhaps owing to the close association between such technique and the *validity* of constructs under study (Nunnally & Bernstein, 1994). In the field of *factor analysis*, determining the number of factors to be extracted is a central step in adequately representing the relationship that exists in a group of empirical indicators (or variables).

Broadly speaking, *factor analysis* refers to a set of multivariate statistical procedures mainly aimed at reaching a more parsimonious understanding of the measured variables through the determination of a set of underlying dimensions (factors) that account for as much variance as possible in the given set of observed indicators (Fabrigar, Wegener, MacCallum & Strahan, 1999). Therefore, the determination of the most 'appropriate' number of factors to be extracted from a dataset represents a complex task because both over-extraction and under-extraction have empirically

demonstrated deleterious effects on research evidence (Fava & Velicer, 1992)

*Factor analysis* procedures can be dichotomized between EFA and CFA: the former is widely adopted when researchers need to develop measurement scales or when little theoretical indications are available to a priori determine the appropriate number of dimensions (Hurley, Scandura, Schriesheim, Brannick, Seers, & Vandenberg, 1997). The latter should be applied when strong theory is a guiding force or as a subsequent analysis after performing EFA (Ledesma, 2007).

Although various authors have already discussed the importance of deciding how many factors to retain when applying factor analysis (i.e. Fabrigar, Wegener, MacCallum, & Strahan, 1999; Hayashi, & Marcoulides, 2006), in statistical literature a full agreement about the best procedure to retain the most appropriate number of factors has not been reached yet.

A solid standpoint (and perhaps the first historical attempt) is represented by the analysis of *Eigenvalues*. In this framework, the *Eigenvalue* represents the solution to the *Eigenproblem*. Any given  $[n \times v]$  matrix (where  $v$  stands for variable and  $n$  stands for the number of observations) presents an associated set of  $q$  *Eigenvalues*, which are scalars but not necessarily distinct. In Principal Component Analysis (PCA), *Eigenvalues* are namely "the variance of their corresponding component" (Jolliffe, 2005, p.542). Therefore, through the identification of the number of eigenvalues, researchers should be able to retain as many factors as needed to balance parsimony with explanatory power of the underlying factor structure.

The most used method to solve the *Eigenproblem* is Kaiser's rules (1960), or *mineigen greater than 1 criterion* ( $K_1$ ), which suggests retaining all factors with an associated *Eigenvalue* greater than one (Kaiser, 1974). The method is not flawless mainly because of the stringency of the rule itself. First of all, some inconsistencies have been proven when the *Eigenvalues* are just higher or lower than the threshold 1.0 (Fabrigar et al., 1999) and, generally speaking, this criterion tends to overestimate the number of dimensions (Hayton, Allen & Scarpello, 2004).

A second alternative procedure is Cattell's scree - test, a procedure based on the visual inspection of the plotted *Eigenvalues* in search of discontinuities in the graphical representation (Cattell, 1966). The method requires one to

identify points at which the graph seems to behave “like rocks falling on a scree down a hill” (Raiche, Riopel & Blais, 2006, p. 6).

It must be remarked that Cattell’s method works appropriately in the presence of both strong and empirically distinct factors, but it compromises the interpretation of results when changes in slope are either not as clear - cut or when there are two or more evident interruptions. In these situations, the method of choice may be affected by an excessive degree of subjectivity.

A comparison between K1 and Cattell’s scree test has shown, however, that the latter performs better than the former, despite its ambiguity (Zwick & Velicer, 1986).

To improve the procedure and accurately identify differences in slope on the plotted segment, Nelson (2005) proposed a non-graphical interpretation of the *Eigenvalues* by using linear regression methods. The main rationale of the author was that the best proportion of explained variance can be accounted for by computing the straight line that has the best fitting equation upon the scree plot. Using linear regression analysis, researchers could thus estimate the  $R^2$  statistics in search of the best fitting equation to the series of residual *Eigenvalues*. By adopting a step-by-step omitting strategy (in descendent order), a series of  $R^2$  statistics can be computed until the best fitting equation to residual *Eigenvalues* is finally found (see Nelson, 2005 for further details). All factors before that point should be retained and used to support subsequent analysis.

The third strategy, *parallel analysis*, is recommended by the Educational and Psychological Measurement Guidelines because of “its proven merit and accuracy among factor retention methods” (Thompson & Daniel, 1996). From a computational perspective, the *parallel analysis* can be considered a Monte Carlo simulation method because significant *Eigenvalues* are obtained by simulating a normally distributed random sample that ‘resembles’ empirical data with respect to sample size and number of variables.

The procedure to conduct a parallel analysis on a given [ $n \times v$ ] matrix is rather simple, and it passes through four different steps (more details in Hayton, Allen & Scarpello, 2004).

The first step requires random generation of a new matrix *dimensionally equivalent* to real data. The term *dimensionally equivalent* means that the new matrix should be composed of the same

number of variables ( $v$ ) and observations ( $n$ ), as well as maximum and minimum item values of the observed variables (in the present study,  $n = 966$ ,  $v = 24$ , and values range from 0 to 4).

To extract all *Eigenvalues*, the second step requires that EFA (or PCA, according to one’s own strategy) be performed with the new randomly generated data. In this case, it is important to note that owing to the risk of sampling bias (randomly generated data are subjected to sampling error, and software-generated numbers are far from being genuinely *random*) and to handle a reasonably large sampling base (Horn, 1965), steps 1 and 2 must be repeated at least 50 times (Hayton, Allen & Scarpello, 2004).

With the 50 new sets of *Eigenvalues*, researchers are now able to calculate the average value for each *Eigenvalue* across all 50 randomly generated sets (step 3), so that the mean of the first *Eigenvalue*, the mean of the second (and so on) are calculated until a new final set of averages values is reached.

The final step consists of comparing actual and randomly generated *Eigenvalues*: factors from observed data with an *Eigenvalue* greater than the equivalent obtained from casual matrices are confirmed and should be finally retained.

To perform a more conservative comparison between actual and randomly generated *Eigenvalues*, Glorfeld (1995) suggested using the 95th percentile of random *Eigenvalues* instead of the plain arithmetical mean as a more robust benchmark to identify the appropriate dimensionality of the dataset.

Given the importance of deciding which factors to retain, the present paper compounds the three methodologies as a means to identify the underlying factors of the *Challenging Parent Standard Questionnaire* (CPSQ) in a more robust and reliable way.

## Method.

### *Measures: Challenging Parent Standard Questionnaire*

The *Challenging Parent Standard Questionnaire* (CPSQ) is a questionnaire originally developed (Van der Wolf & Everaert, 2005) to explore teacher - parent relationships in the Dutch context; it subsequently has been translated in English and finally in Italian language. The instrument measures several dimensions, each

referring to a specific category of *parental challenging behaviour*. The theoretical background from which developers moved is Seligman's work (2000): he used data from focus groups with American special education teachers, and he suggested the existence of 11 categories of *parental challenging behaviours*. In 2004, a pilot study based on 49 closed-ended questions in a sample of Dutch general education teachers allowed for the 'correct' identification of seven dimensions: *excessively worried, unsatisfied, uncooperative, neglectful, over-protective, uninvolved, and fighting parents*.

A subsequent study (Van der Wolf & Everaert, 2005) that used a shorter 25-item version of the questionnaire concluded that, due to some inconsistencies in factor structure, only six dimensions of parental challenging behaviours should be used in educational contexts.

In 2006, the final 24-item version of the instrument was finally translated and adapted to the Italian educational system. Each item is a behavioural descriptor and is rated twice: once for the frequency (To what extent does the parent show this behaviour?) and then for the degree of experienced stress (How stressful is it for you?). The response format is Likert-style with five categories ranging from 0 (It doesn't happen at all) to 4 (It happens a lot) for frequency ratings and from 0 (not stressful at all) to 4 (very stressful) for stress ratings. In this case, it must be noted that the chosen response format allowed teachers to consider the value '0' as the non-applicable option: in fact, if a certain behaviour did not actually happen, the respondents were instructed to use this score rather than consider a hypothetical situation.

Scales description is as follows:

*Excessively worried*: These are parents overly involved and concerned about schooling (they usually possess a higher degree of education); when achievements are less than perfect, the parent tends to express his/her concerns to the teacher. Teachers may perceive such behaviour as an interference in their job owing to the excessive pressures coming from the parent.

*Unsatisfied*: This measure refers to situations in which parents are dissatisfied with academic issues. These parents call the school to express their dissatisfaction toward teachers' work or they openly complain about teachers' decisions.

*Uncooperative*: In some cases, parents do not have enough time and resources to follow the progress of their children, but in other cases the problem is in parent - teacher relationship. Parents may express their intention to cooperate, but they actually do not follow through with the agreement. Lack of cooperation can thus be considered a barometer of the quality of the relationship (Seligman, 2000).

*Overprotective*: Overprotective behaviours are typically characterized by anxiety about a child's physical wellbeing. The parents are extremely worried about physical and psychological harms and are less concerned about the child's academic progress.

*Uninvolved*: Uninvolved behaviours refer to parents who show a general indifference toward their children's education. They tend to be disengaged and to avoid every kind of contact with teachers and school. Parents in this category are likely to believe that learning activities should take place in the classroom and that teachers are the main responsables for the child's education.

*Fighting*: This last behaviour refers to parents who openly complain about the other parent of the child and sometimes try to draw the teacher over to their side.

#### *Measures: The General Health Questionnaire*

The *General Health Questionnaire* (GHQ-12) is a 12-item tool aimed at measuring the degree of 'psychological sufferance' (Martucci et al., 1999), and it represents one of the most commonly used tools for assessing subjective psychological wellbeing (Jackson, 2007). The GHQ-12 has often been included in large social surveys (e.g. World Health Organization) as a measure of psychological distress (Winefield, Goldney, Winefield, & Tiggemann, 1989). Although, the GHQ-12 scores are not a direct measure of stress, high scores indicate high levels of anxiety or depression in respondents. In fact, the idea that levels of occupational stress and GHQ-12 scores correlate is generally accepted (Punch & Tuetteman, 1990). The Italian version of GHQ-12 (Fraccaroli & Schadee, 1993) shows a stable three-dimensional structure: *social dysfunction, anxiety/depression* and *loss of confidence*. In the present paper GHQ-12 has been correlated with stress scores in order to test convergent validity of CPSQ.

Table.1  
Sample characteristics

Group	Age (M)		SD		Work. Years (M)		SD		
	Prim.	Low. Sec.	Prim.	Low. Sec.	Prim.	Low. Sec.	Prim.	Low. Sec.	
<u>General education</u>									
M	40.6	48.8	13.5	9.8	16.7	21.8	10	11.6	
F	44.4	47.2	9.9	7.9	20.7	21.1	11.2	10.3	
<u>Special Education</u>									
M	33.0	41.0	1.4	8.3	6.1	14.3	1.7	11.0	
F	35.8	42.1	6.9	8.2	11.8	13.3	9.1	9.3	

### Sample

A sample of 1,025 full-time in-service teachers working in primary (n = 409) and lower secondary (n = 616) schools from the city of Milano, as well as other urban and sub - urban areas of Lombardy (Italy), participated; 80.1% of them were women. The average age was about 47 years (M = 46.83, SD = 8.45, min - max = 25-63). The sample is a convenience sample and does not claim to be representative of the whole population of Italian teachers (data were collected in the Northwestern part of the country).

The number of working years was close to 20 (M = 20.38, SD = 10.69, min - max = 1-40). In primary schools, the percentage of women was 96.5%, and the average age was 43 years (M = 42.89, SD = 10.07, min-max = 22-64); further details of participants' demographics are given in Table 1.

### Procedure

All participants completed the CPSQ individually and focused their answers on the perception of the most challenging parents they have had to deal with during the ongoing school year. The CPSQ has been administered in 27 different educational organizations of Milano (Italy) in both urban and suburban areas. Voluntary participation and confidentiality in all steps of the research have been assured.

To capture the interaction between teachers' occupational stress and parental behaviours, the questionnaire asked teachers to think of the most behaviourally challenging parent in the ongoing school year. Before we discuss the results, we must point out that among all interviewed subjects, approximately 130 teachers (10% of the sample) did not fill out the questionnaire because they did not have to deal with any parental challenging behaviours. Parents are not 'always' *challenging*.

### Results.

*The Challenging Parent Standard Questionnaire* factor structure.

To identify the most appropriate number of underlying dimension, a Principal Component Analysis (PCA) was performed with data from the CPSQ. The PCA technique allows one to obtain an orthogonal solution (Hartman, 1976), but with the aim of producing a more precise and robust solution, in the present study authors also applied a *Varimax* rotation to the analysis (Darton, 1980).

Beginning with the first method of factor retention, the plain K1 rule suggested retaining six factors (55% of total variance explained), because only the first six *Eigenvalues* are above the suggested bound.

Table.2  
Eigenvalues of 24-CPSQ frequency items (N = 966)

Dimensions*	Eigenvalues	Explained variance (%)	Cumulate variance (%)
F1	4.74	10.79	10.79
F2	3.15	10.23	21.02
F3	1.85	9.86	30.89
F4	1.26	9.21	40.10
F5	1.17	9.06	49.15
F6	1.04	5.93	55.09

\*Note: only factors with eigenvalues greater than 1 are reported

When visual inspection of the scree plot was applied (Fig. 1), two possible discontinuities appeared in correspondence with F3 and F5. Cattell's method suggested either a tripartite factor structure (30.9% of total variance explained) or a five-dimensional solution (49.2% of total variance explained). Unfortunately, the result was still ambiguous, and both methods required some degree of 'subjectivity' in defining the most appropriate factor model.

In the K1 approach, the sixth *Eigenvalue* presented a value just above the limit of 1.0, and the scree plot analysis presented at least two different breaks. In this situation, Kaiser's and Cattell's methods both failed to univocally identify the most appropriate factor structure of the translated version of the CPSQ.

To reduce subjectivity in the interpretation of the scree plot, the non-visual analysis of the scree plot had been applied. Results are reported in Table 3 and Figures 1 and 2.

Tab.3  
Results from fitting equation to residual eigenvalues

	F1	F2	F3	F4	F5	F6	F7
Eigenvalue	4.74	3.15	1.85	1.26	1.17	1.04	0.98
% of variance	10.79	10,239,869,219,065,934,09					
R <sup>2</sup>	0,52	0,61	0,830,950,960,970,98				
ΔR <sup>2</sup>	-	0,09	0,220,120,010,010,01				



Figure 1.  
Scree plot (diamonds) and regression fitting straight line (continuous) (based on 24 eigenvalues)

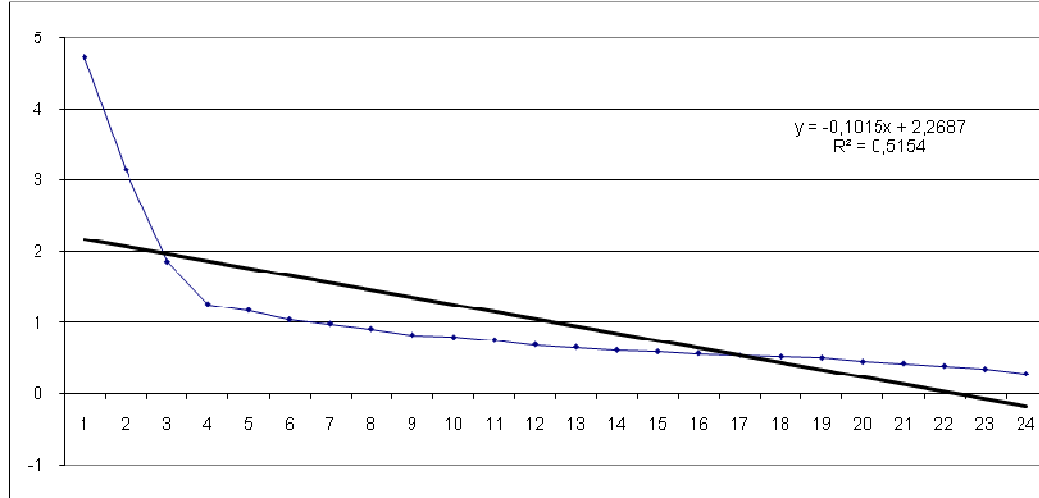
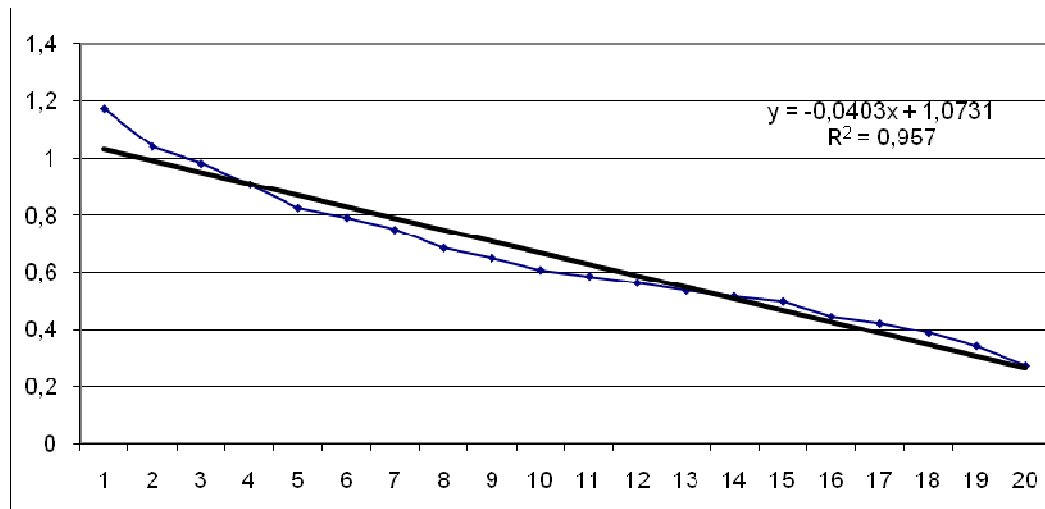


Figure 2.  
Scree plot (diamonds) and regression fitting straight line (after omitting 5 eigenvalues)



Through the analysis of the best fitting equation to residual *Eigenvalues*, the non-visual interpretation of the scree plot suggested to retain only five factors because the fitting equation obtained the minor gain in terms of  $R^2$  in correspondence of F5. With a five-dimensional structure,  $R^2$  is .96, a nearly perfect fitting of the regression equation to the residual *Eigenvalues*. Finally, results from parallel analysis are reported in Table 4 along with the real *Eigenvalues* (the same values listed in Table 2).

Parallel analysis confirmed the existence of five significant factors (the same number suggested from the non-visual inspection of scree plot) and the sixth dimension reported a value lower than the one found with randomized procedures. This evidence is further confirmed by a comparison with both plain average values and 95<sup>th</sup> percentile upper bound. As a result of such procedures, the factor structure of CPSQ can be considered to include five different dimensions: CFA and reliability analysis, along with convergent validity, will now be presented.

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Table 4.

Comparison between actual and generated eigenvalues.

Dimensions	Real eigenvalues	Mean PA eigenvalues	95th percentile PA eigenvalues
F1	<b>4.74</b>	1.30	1.34
F2	<b>3.15</b>	1.25	1.30
F3	<b>1.85</b>	1.22	1.24
F4	<b>1.26</b>	1.19	1.22
F5	<b>1.18</b>	1.16	1.18
F6	1.04	1.14	1.16

Note: Factors confirmed by using parallel analysis (PA) are in bold.

4.2 Item analysis and confirmatory factor analysis

Table 5 .

Factor loadings for 21 stress-item of the CPSQ	F1	F2	F3	F4	F5
P2BQ09s The parent expresses the intention to co-operate, but does not do it.	.791				
P2BQ13s The parents promises you as teacher to help the child at home but does not do it.	.755				
P2BQ05s The homework of the child is supervised after an agreement with the parents, but this is not done	.655				
P2BQ02s The parent doesn't accept responsibility for the consequences of a particular decision	.450				
P2BQ21s This parent is very concerned about the health of the child.		.794			
P2BQ10s The parent never relinquishes control of the child and wants to protect it against all danger.		.728			
P2BQ08s The parent is excessively concerned about the child..		.715			
P2BQ04s The parent uses his/her knowledge to change the approach of the teacher.			.815		
P2BQ12s The parent uses his/her knowledge as an excuse for becoming involved in the education of the child			.772		
P2BQ23s The parent attaches an inappropriate amount of importance to the education of the child.		.493	.530		
P2BQ24s The parent is involved with the progress of the child to an excessive degree.		.502	.525		
P2BQ18s The parents over involved in your classroom..			.485		
P2BQ15s The parent calls to tell me they are unhappy.				.753	
P2BQ20s The parent threatens to go to higher authorities when he/she suspects an alleged misuse of expertise.				.699	
P2BQ14s The parent says he/she thinks you are a bad teacher.				.677	
P2BQ17s I feel harassed by the parent of the child.				.643	
P2BQ19s This parent avoid contact with you as teacher.					.745
P2BQ03s This parent hardly ever comes to school.					.627
P2BQ16s The parent takes little notice of the child.	.427				.549
P2BQ22s The child of this parent looks tired and neglected.					.519
P2BQ11s The parent shows little initiative.	.431				.474

In Table 5, item factor loadings for each dimension are listed.

A first result from EFA is that none of the 21 factor loadings reported a value below the threshold .45 (since the six dimension was inconsistent, its items were eliminated from subsequent analysis). More precisely, the values ranged from .82 (P2BQ04f) and .45 (P2BQ02f). Moreover, each dataset dimension included at least two items with factor loadings higher than .60, this results is usually necessary to facilitate the interpretation of factors (Everaert, 2007). The five dimensions are as follows: *F1 Uncooperative*, *F2 Overprotective*, *F3 Excessively worried*, *F4Unsatisfied*, and *F5 Uninvolved*.

The items P2BQ23f 'The parent attaches an inappropriate amount of importance to the education of the child' and P2BQ24f 'The parent is involved with the progress of the child to an excessive degree' reported similar factor loadings in both F1 and F5. This result is coherent with the idea that *overprotective* and *excessively worried* parental challenging behaviours present some theoretical overlaps. With regard to P2BQ11f, 'the parent shows little initiative', the item loads on both F1 and F5. In order to correctly assign the item to the proper dimension, the interpretation followed the highest factor loading rule; moreover, this item seems to be most representative of *uninvolved* behaviours.

The last step of the study of the CPSQ measurement model involved CFA. In the context of scales development, a correct CFA reflects a *measurement model* in which observed variables (items of CPSQ) define a set of constructs or latent variables (Hoyle, 2000) by providing strong evidence in regard to the best factor structure of the measure (Jöreskog, 1993). A given *measurement model* can be defined as 'appropriate' when the variance-covariance matrix

( $\Sigma$ ) reproduced (or model-implied) by the hypothetical measurement model fits with the real variance-covariance matrix (S). The degree to which the model fits data can be determined by assessing *model fit criteria*.

The most commonly adopted fit indexes are Chi-square statistic ( $\chi^2$ ), Normed chi-square (NC), Root-mean-square-residual error of approximation (RMSEA), Goodness of fit (GFI), Adjusted goodness of fit (AGFI), and Normative fit index (NFI) (for further details about the characteristics of fit indexes and their normative thresholds, see Browne and Cudek, 1993; Hu & Bentler, 1999; Jöreskog, 1969; Schumacker & Lomax, 2004).

The results of CFA performed on 21 frequency items of CPSQ are as follows:  $\chi^2 = 480.74$ , NC = 2.88, RMSEA = .044 (90<sup>th</sup> C.I. .039 - .048), GFI = .96, AGFI = .94, NFI = .95; the results strongly confirm the existence of a measurement model based on five different dimensions. Figure 3 shows the measurement model (see Appendix 1).

*Reliability of measures and convergent validity.*

The previously mentioned final five-dimensional factor structure has been computed starting from 21 frequency items. Table 6 shows the factor correlation matrix and Cronbach's alpha reliability analysis. To test internal consistency of stress scales, reliability analysis has also been applied to 21 stress items. All scales reported values acceptable for social sciences (Bland & Altman, 1997).

Table.6  
Inter-correlation among 5 dimensions and reliability analysis (N=966)

	F3	F4	F1	F2	F5	$\alpha$	n.item
F3	-	.345**		.509**	-.285**	.78	4
F4		-	.116**	.218**		.81	3
F1			-		.497**	.81	5
F2				-	-.208**	.72	4
F5					-	.77	5

Note. Not statistically significant values has been omitted, \*\* p < .01 (two-tailed).

With regard to convergent validity, we expect that CPSQ scores and GHQ-12 measures will correlate owing to the well-documented overlap between the degree of *psychological suffering* and *occupational stress* (Punch & Tuetteman, 1990). Results are reported in Table 7. Evidence confirmed both the direction and the magnitude of the correlations we used to test convergent validity.

In line with a previous study (Punch & Tuetteman, 1990), all correlations between GHQ-12 and stress scores were positive, statistically significant and moderate.

Higher correlations were found between all stress measures and *anxiety* dimension, with values that ranged between .18 ( $p < .01$ ) with *overprotective* behaviours and .25 ( $p < .01$ ) with *uncooperative* behaviours.

Table.7  
Convergent validity test between GHQ and CPSQ scores.

	F3	F4	F1	F2	F5	$\alpha$
Social dysfunctioning	.07*	.14**	.14**	.10**	.11**	<b>.77</b>
Anxiety	.20**	.23**	.25**	.18**	.22**	<b>.84</b>
Loss of confidence	.12**	.19**	.16**	.13**	.13**	<b>.76</b>

Note:  $p < .05$  (two-tailed)\*,  $p < .01$  (two-tailed)\*\*

### Discussion and future direction.

This paper was chiefly devoted to present a more robust method of retaining the 'appropriate' number of factors in EFA through the analysis of the main psychometric proprieties of the *Challenging Parent Standard Questionnaire (CPSQ)*. The CPSQ is a questionnaire aimed at assessing the effects of parental challenging behaviours on teachers' occupational stress. Starting from previous reflections about the best procedure to retain factors in scale development studies, the paper explored a new procedure based on a Monte Carlo simulation technique to help researchers in assessing the dimensionality of a translated measurement tool.

From a practical point of view, the CPSQ presents a robust five-factor structure: *uncooperative parents*, *overprotective parents*, *excessively worried parents*, *unsatisfied parents*, and *uninvolved parents*. This structure can be used to explore the impact of parental challenging behaviour on teachers' stress in the educational context. The data from the questionnaire are intended to promote a better comprehension of what behaviours are typical in a given educational context, but evidence can also be used to design

stress-reduction programs for teachers that are more targeted to their needs.

From a methodological point of view, the results of the present study suggest that the decisions about the appropriate dimensionality of a dataset can be deeply improved by compounding different factor retention methods. As in other studies, in this application K1 rule showed a general tendency to overestimate the number of factors owing to some inconsistencies that are rooted in the rule itself (i.e. what shall we do when *Eigenvalues* are near 1.0?). In contrast to the results of K1, results of Cattell's scree test (particularly when the non-visual interpretation of the scree plot is applied) and Parallel Analysis converged, giving strong support for what concerns the most appropriate factor structure to be adopted for the CPSQ.

The results were further confirmed by CFA: in fact, the original sub - scale number six (*fighting parents*) did not pass the analysis, and it was thus left out from the final translated version of the CPSQ.

The psychometric proprieties of the CPSQ are generally acceptable in terms of both reliability and validity of sub - scales, but the measurement

model confirms that, taking into consideration different cultural contexts, some differences in how teachers perceive parental challenging behaviour exist.

In explaining the possible reasons for observed variations in the factor structure of CPSQ between Dutch and Italian versions, researchers should consider that the cultural milieu in which parent-teacher relations occur shapes teacher perceptions, as well as parental expressions of the so-called *challenging behaviour*. In particular, the process of labelling parental behaviours in a certain way is surely rooted in a complex network of cultural norms and social obligations, but it is also based on parent - teacher interaction

processes that are in turn based on individual habits, personal characteristics, stereotypes, and sometimes prejudices.

In terms of practical applications, it is extremely important to try to develop both strategies and interventions directed at reducing the impact of parental challenging behaviours on teachers' work while bearing in mind that teachers should move toward the involvement of parents in school life. To this end, it is relevant to aim to reduce the gap between family and school while avoiding the development of feelings of exclusion and mistrust by parents toward their children's teachers (Baker & Soden, 1997).

### References.

- Baker, A. J. L., & Soden, L. K. (1997). *Parent involvement in children's education: a critical assessment of the knowledge base*. New York: National Council of Jewish Woman Center for the child.
- Bland, J. M., & Altman, D. G. (1997). Statistics notes: Cronbach's alpha. *British Medical Journal*, 314-572.
- Brooks, N., Bruno, E., & Soden, L. K. (1997). *Reinforcing students' motivation through parent interaction.*, Saint Xavier University & IRI/Skylight, ERIC Document Reproduction Service N. ED411074.
- Burke, R. J., Greenglass, E. R., & Schwarzer, R. (1996). Predicting teacher burnout over time: Effects of work stress, social support, and self-doubts on burnout and its consequences. *Anxiety, Stress and Coping: An International Journal*, 9, 261- 275.
- Castelli, S., & Pepe, A. (2008). School-parents relationships: a bibliometric study on forty years of scientific publication. *International Journal about Parents in Education*, 2(1), 1-12.
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate behavioural research*, 1,629-637.
- Cattell, R. B., & Jasper, J. (1967). A general plasmode for factor analytic exercises and research. *Multivariate behavioral research Monographs*, 67(3), 1-212.
- Chan, D.W. (1998). Stress, coping strategies, and psychological distress among secondary school teachers in Hong Kong. *American Educational Research Journal*, 35(1), 145-163.
- Cotton, K., & Wikeland, K. R. (2001). *School improvement research series: Parental involvement in education*. Northwest Regional Educational Laboratory.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of test. *Psychometrika*, 16, 297-333.
- Cummings, T. G., & Cooper, C.L. (1998). A cybernetic theory of organizational stress. In C. L. Cooper (Eds.) *Theories of Organizational Stress* (pp. 101 -121). New York: Oxford University Press.
- Darton, R. A. (1980). Rotation in Factor analysis. *The statistician*, 29, 167-194.
- De Nobile, J. J., & McCormick, J. (2005). *Job satisfaction and occupational stress in catholic primary schools*. Paper presented at the Annual conference of the Australian Association for Research in Education, November 27th -December 1st, 2005, Sydney, Australia.
- Deutscher, R., & Ibe, M. A. (2003). *In what ways does parental involvement affect childrens' academic performance*. Paper presented at the American Educational Research (AERA), Apple Valley, California.
- Durham, J. (1992). *Stress in Teaching* (2nd Ed.). London: Routledge.
- Edwards, J. R. (1998). Cybernetic theory of stress, coping, and well-being: review and extension to work and family. In C. L. E. Cooper (Eds). *Theories of Organizational Stress* (pp. 122 - 152). New York: Oxford University Press.

- Emerson, E. (1995). *Challenging behaviour: analysis and intervention in people with severe intellectual disabilities*. London: Cambridge University Press.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of factor analysis in psychological research. *Psychological methods, 3*, 272-299.
- Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: a critical review and analysis. *Personnel Psychology, 39*, 291-314.
- Fraccaroli, F., & Schadee, H. (1993). L'analisi fattoriale confermativa applicata al General Health Questionnaire. Una comparazione della versione inglese e italiana. *Giornale italiano di psicologia, 20*(2), 319-338.
- Glorfeld, L. W. (1995). An improvement on Horn's parallel analysis methodology for selecting the correct number of factors to retain. *Educational and Psychological Measurement, 55*, 377-393.
- Goldberg, D. P. (1972). *The detection of psychiatric illness by questionnaire*. London: Oxford University Press.
- Greene, R. W., Abidin, R. R., & Kmetz, C. (1997). The index of teaching stress: a measure of student-teacher compatibility. *Journal of school psychology, 3*, 239-259.
- Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: a multidimensional conceptualization model. *Child development, 65*, 237-252.
- Harman, H. H. (1976). *Modern Factor Analysis (3rd Ed)*. Chicago: University of Chicago Press.
- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: a tutorial on parallel analysis. *Organizational Research Methods, 7*(2), 191-205.
- Henderson, A. T. (1987). *The evidence continues to grow: parental involvement improves student achievement*. Columbia, MD: National Committee for Citizen in Education, ERIC, Document Reproduction Service No. ED3115199.
- Horn, J. L. (1965). A rationale and test for the number of factor in factor analysis. *Psychometrika, 30*, 176-185.
- Howard, E. R., & Keefe, J. W. (1991). *The CASE-IMS School Improvement Process*. National Association of secondary school principals: No. ED342089.
- Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M.T., Seers, A., Vandenberg, R. J., et al. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of Organizational Behavior, 18*, 667-683.
- Hurrell, J.J., Jr., Nelson, D.L., & Simmons, B.L. (1998). Measuring job stressors & strains: where we have been, where we are, and where we need to go. *Journal of Occupational Health Psychology, 3*, 368-389.
- International Test Commission. (2001). *International Test Commission guide-lines for test adaptation*. London: International Test Commission. Retrieved January, 2009 from <http://www.intestcom.org>
- Johnson, S., Cooper, C., Cartwright, S., Donald, I., Taylor, P., & Millet, C. (2005). The experience of work-related stress across occupations. *Journal of Managerial Psychology, 20*, 178-187.
- Jolliffe, I.T. (2005). Eigenvalues/eigenvectors. In B. S. Everitt & D. C. Howell (Eds.), *Encyclopedia of Statistics in Behavioral Science*. Wiley, New York: 542-543.
- Jones, K., Charlton, T., & Wilkin, J. (1995). Classroom behaviours which first and middle school teachers in St Helena find troublesome. *Educational Studies, 21*, 139-153.
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141-151.
- Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141-151.
- Kyriacou, C. (1987). Teacher Stress & burnout: an international review. *Educational Research, 29*(2), 146-152.
- Lazarus, R.S., & Folkman, S. (1984). *Stress, Appraisal and Coping*. New York, Springer Publishing.

- Martucci, M., Balestrieri, M., Bisoffi, G., Bonizzato, P., Covre, M. G., Cunico, L., De Francesco, M., Marinoni, M. G., Mosciaro, C., Piccinelli, M., Vaccari, L. and Tansella, M. (1999). Evaluating psychiatric morbidity in a general hospital, a two-phase epidemiological survey. *Psychological Medicine*, 29, 823-832.
- Nelson, L. R. (2005). Some observation on the scree test, and on coefficient alpha. *Thai Journal of Educational Research and Measurement*, 3(1), 1-17.
- Nunnally, J. C. (1978). *Psychometric Theory (2nd Ed.)*. New York: McGraw-Hill.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory (3<sup>rd</sup> Ed.)*. New York: McGraw-Hill.
- Osburn, H. G. (2000). Coefficient Alpha and related Internal Consistency and Reliability coefficient. *Psychological methods*, 5(3), 343-355.
- Pedrabissi, L., & Santinello, M. (1997). *I test psicologici [Psychological testing]*. Bologna: Il Mulino.
- Pithers, R. T. (1995). Teacher stress research: Problems and progress. *British Journal of Educational Psychology*, 65, 387-392.
- Prakke, B., Van Peet, A., & Van der Wolf, K. (2007). *Challenging Parents, teacher occupational stress and health in dutch primary schools*. Paper presented at the ERNAPE conference, Schools and families in partnership: looking into the futures, Nicosia, Cyprus, August 29th - 31st, 2007.
- Punch, K. F., & Tuettemann, E. (1990). Correlates of psychological distress among secondary school teachers. *British Educational Research Journal*, 16(4), 369-382.
- Raiche, G., Riopel, M., & Blais, J.G. (2006). Non graphical solutions for the Cattell's scree test. Paper presented at the *International Meeting of the Psychometric Society - IMPS- HEC*, Montréal, June 16th 2006.
- Sakharov, M., & Farber, B. A. (1983). A critical Study of burnout in teachers. In B. A. Farber (Ed.), *Stress and burnout in human service professions*. New York, Pergamon Press.
- Seligman, M. (2000). *Conducting Effective Conferences with Parents of Children with Disabilities*. New York: The Guilford Press.
- Selye, H. (1955). Stress and diseases. In Cooper, C.L., & Dewe, P. (2004). *Stress: a brief history*. Oxford: Blackwell.
- Sheldon, S. B., & Epstein, J. L. (2001). Improving student behavior and discipline with family and community involvement. Retrieved May, 2007, from Johns Hopkins University, National Network of Partnership Schools.
- Thompson, B., & Daniel, L. G. (1996). Factor analytic evidences for the construct validity of scores: a historical overview and some guidelines. *Educational and Psychological Measurement*, 56, 197-208.
- Thurstone, L. L. (1947). *Multiple-factor analysis*. Chicago: University of Chicago Press.
- Travers, C.J., & Cooper, C.L. (1996) (Eds.). *Teacher under pressure: stress in teaching profession*. London, Routledge.
- Van der Wolf, K., & Everaert, H. (2005). Challenging parents, teacher characteristics and teacher stress. In R. M. Martinez-Gonzalez, M. Perez-Herrero & B. Rodriguez-Ruiz (Eds.), *Family-school-community partnerships merging into social development*. Oviedo: Grupo SM: 233-253.
- Van Voornis, F. L. (2001). Interactive science homework: an experiment in home and school connection. *National Association of Secondary School Principals Bulletin*, 85(627), 20-32.
- Wilson, V. (2002). *Feeling the Strain: An Overview of the Literature on Teacher's Stress*. Edinburgh, SCRE.
- Zwick, W. R., & Velicer, W. F. (1986). Factors influencing five rules for determining the number of component retain. *Psychological bulletin*, 99, 432-442.

Appendix 1

Fig. 3 The CPSQ Measurement model resulting from CFA

