

# Development and Preliminary Validation of a Scale for Measuring Perceived Professional Stress (SPP) in the Workplace

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## Abstract

**Introduction:** Occupational stress is the second occupational disease after Musculoskeletal Disorders (MSDs). Its assessment tools are well known in the northern countries. In the countries of the South, however, rare are the studies devoted to the development of a valid instrument for its estimation while the factors highlighting its existence have been reported by several studies. **Objective:** The objective of this study is to design and validate a scale for measuring the SPP adapted to the Burkinabe business environment. **Methodology:** Several waves of purposive surveys (ranging from a small sample to a large sample) were performed with company employees (30; 20; 20; 446). The design and the validation of the measurement scale have been carried out on the basis of recent measurement recommendations in psychometrics. The data collected has been processed following content analysis and MASQDA software for qualitative data and SPSS 21 and AMOS 25 software respectively, for factor analysis Exploratory and confirmatory factor analysis. **Results:** a 16-item scale with four dimensions: physical, Emotional, cognitive, and behavioral of the SPP was designed. These dimensions met the validity criteria (AVE index = .77 > .50) and reliability (Cronbach alpha of .87 and Joreskog Rho index .88 > .70) psychometrics recommended by the authors. **Conclusion:** The scale of measurement Perceived Occupational Stress (PPS) proposed has shown its validity and reliability on confirmatory factor analysis. It can be used to estimate the level of stress among company employees. However, large-scale studies should be undertaken to confirm its psychometric validity.

## Keywords

Company, Experienced Stress, Perceived Stress, Confirmatory Factor Analysis

## 1. Introduction

Stress in the workplace is a source of mental and physical instability and generates very significant human and socio-economic costs. Its physical, mental and socio-economic consequences have aroused particular interest among researchers in recent decades (Chouanière et al., 2003). Nowadays, stress is the second most widespread health problem in the sphere of work and affects 28% of workers in Europe with a cost of least 20 billion euros per year (Légeron, 2004). In the countries of the South, surveys have shown that professional stress is a reality in companies (Boudarene & Kellou, 2005) because with globalization and the evolution of the nature of work, the populations of developing countries are increasingly exposed to this risk (Houtman, Jettinghoff, & Cedillo, 2008). If in industrialized countries, occupational stress is known, studied, and taken care of (OIT, 2016), it is poorly known in developing countries, explaining at the same time the scarcity of in-depth studies that can allow a complete analysis of the phenomenon, as well as cultural specificities and differences in behavior from one country to another (Houtman, Jettinghoff, & Cedillo, 2008). Nevertheless, the results of some research show that the phenomenon of stress at work remains a reality, especially in companies and public Africa. In a population of taxi drivers in Morocco, the authors recorded a prevalence of 46.3% of occupational stress (Berraho et al., 2006). Another study in Morocco carried out among employees showed that the limitations of the levels of evolution in the career or ceiling of career were an important source of stress at work (Benraiss, Marbot, & Perretti, 2000). Moreover, stress and worry have been identified as causes of hypertension among workers in the Autonomous Port of Abidjan (Koffi et al., 2001). Similarly, it has been reported that the risk of hypertension is twice as high if it is associated with a psychological work environment combining high psychological demands and low decision latitude (Taleb et al., 2003). Respectively among staff serving refugees, and asylum seekers in Dakar and among workers of an insurance company in Benin, occupational stress prevalences of 40.38% and 80.8% were estimated (Dia et al., 2018; Hinson et al., 2017). Like in other developing countries, the phenomenon of occupational stress in Burkina Faso is a reality but is not well-known to employees, nor are the of work-related illnesses and accidents. Psycho-Social Risks (RPS) are generally not listed (Décret, 2015). However, a prevalence of 38.80% of occupational stress was estimated among employees of the public transport Society in Ouagadougou [SOTRACO] (Zagré, 2007). Similarly, it has been reported that stress was the fourth negative effect of work felt among CHU employees in Ouagadougou with a prevalence of 18.54% after back pain, infections and asthenia (Sawadogo, 2009). Several findings emerge from these studies:

- professional stress is a daily experience for company employees in Africa, in this is the case among employees of private Burkinabe companies;
- the prevalences estimated in these studies and surveys were carried out for the large majority using stressor assessment instruments.

Yet in the literature, it is specified that the scales for estimating the level of perceived stress are specific and must be contextualized to the professional environment of the study; no study to our knowledge has embarked on the path of design and scientific validation of a stress level measurement scale professional perceived in particular that felt by employees of private companies of the city of Ouagadougou. To objectify the stress factors, Nana and her collaborators, respectively (Nana et al., 2019, 2021). Reported through the Karasek and Siegrist questionnaires the following stress factors: high psychological demand, low decision latitude, low social support and an imbalance between effort and reward. Stress is therefore a reality among employees of formal private companies in Burkina Faso. The existence of stress factors among company employees in the city of Ouagadougou is certainly undeniable, but this stress is neither objectified nor expressed. Africans, in this case the Burkinabe employees of companies, experience stress on a daily basis without being able to describe it to themselves, that is to say, to put a word to this malaise. On the other hand, among Westerners stress is expressed and commonly used in everyday language to express daily “hassles”, worries, burnout, etc. From the above, it appears that the expression of professional stress depends on each cultural context since its factors remain universal while its expression differs from one culture to another. If Westerners have this facility to express the feeling of their stress, Africans (employees of companies) during our surveys, on the other hand, use the terms “fatigue, malaise, illness, stiffness,” some even speak of malaria, etc. to express their stress. The universality of the experience of stress in the work context is undeniable because environmental, organizational and relational stressors present themselves in the same way in all sectors of activity. On the other hand, its perception turns out to be subjective and personal and depends to a large extent on the social environment. It is in this sense that the question should be asked: “can the existing scales for measuring perceived stress be used in all contexts?” In this regard, the literature strongly recommends the design and validation of a new tool that is culturally and contextually adapted. Thus, some authors maintain that it is more judicious nowadays in terms of stress measurement to build or develop its own specific measurement tool adapted to its identified professional population for several reasons (Steiler, 2006) different professional sectors have specific stressors that are often not listed in standard tools; each employee is unique when faced with stressful events. Also, authors affirm that the perception of stressful events is carried out according to various contextual variables (family, professional, cultural) and personal (personality, meaning of the event for the person) (Steiler, 2006). For the latter, stress is the result of a series of minor events depending on the content, the meaning, the value that these events take on in the personal life of the individual. Frequently, repeated microevents end up being more pathogenic in the long term than dramatic life episodes for which objective control and coping strategies can be easily developed (Guillet & Hermand, 2006). The evaluation of stress turns out to be multifactorial and no

longer reduced to a quantification of events. It is in this sense that the authors emphasize that an objective event is cognitively transformed by the individual who experiences it (Cohen, Kamarck, & Mermelstein, 1983). This event becomes a subjective element depending on personal and contextual processes. The stress resulting from this cognitive process is no longer defined as objective stress but as perceived stress resulting from an evaluation of objective stressful events, coping processes and personal factors (Cohen, Kamarck, & Mermelstein, 1983). In a communication presented at the Côtés de Carthage, on the international adaptation of measurement scales between universalism and culturalism: “application to the measurement of the business environment”, the debate focused on the “cultural” and “the universal” in the international adaptation of measurement scales (Besson & Haddadj, 2003). On the cultural aspect, the authors affirmed that: “the choice of a measurement scale validated in a given country is not enough to guarantee its validity in other countries” (P. 3). Moreover, in their article, researchers have pointed out that the differences between two means in the distribution of a variable may not be significant if the differences in reliability concerning these means are large enough (Davis, Douglas, & Silk, 1981). Thus, questions arise: how to account for a reliable and relevant evaluation of cultural differences and similarities, when in each of the countries where the questionnaire is administered, the constructs are never identical and therefore the reliability and validity of the constructs do not are not a priori data? (Besson & Haddadj, 2003: p. 4). These authors propose as a solution: the construction of a new measuring instrument that is purely adapted to the context in which the study must be carried out. Many researchers have asserted that measurement scales are strongly culturally connoted and require culturally-related contextual adaptations that go beyond the more problem of translation (Douglas & Craig, 1984). For example, in social psychology, testing, the translation of a English questionnaire on a Japanese sample, applied to circadian rhythms, authors conclude that it is impossible to separate the strictly linguistic problems of translation from the semantic cultural aspects (Smith, McCarthy, & Anderson, 2000). It is in this sense that it is noted “that it is easier to obtain an equivalence of measurement between socio-demographic variables than between psychographic variables” (Usunier, 1990: p. 97). Two measurements that are faithful in their respective national context can be unfaithful in terms of comparison between the two countries, insofar as the two constructs that they are supposed to represent are not directly comparable (Usunier, 1992). In this respect, the question of the specificity of the question of equivalences arises. Indeed, do cultural differences intervene at the level of the real, that is to say, on the construct to be measured itself, or on its “putting into words”, that is to say, at the level of the linguistic expression of the construct? To answer this question, it is mentioned to take into account methodological precautions (Besson & Haddadj, 2003). For these authors, the adoption of precautions makes it possible to establish adaptations of the measurement scale which eliminate as much as possible the language effects,

and make it possible to postulate the identity of the constructs. However, it should be kept in mind that any comparison remains imperfect (Usunier, 1990; Usunier, 1992). While some authors have supported the culturalist thesis of measurement tools. Others, on the other hand, refute this thesis and affirm that the scales of measurement have a universal character (Nyeck, Paradis, & Xuereb, 1996). These authors develop the thesis according to which, the cultural connotation tends to disappear because of the increasing globalization. To this end, it is mentioned that the tastes, needs, and styles of behavior of consumers tend to homogenize (Levitt, 1983). Do not shed enough light on the universal use of measurement scales (Davis, Douglas, & Silk, 1981). The tests of these authors do not confirm the reliability and the validity of the hypothesis of cultural differences having statistically significant effects on the differences between culturally differentiated samples. In short, to overcome this culturality/universality paradox of measurement scales, it is advocated a decentralized method “to build valid and reliable scales for all countries where the research is carried out” (100-101) (Usunier, 1992). In other words, this principle leads to not to be satisfied with a “technically completed” translation, but to give importance priority to the reliability and validity of the scale (Besson & Haddadj, 2003) because the difference are significant and must be taken into account in the construction of measurement tools (Forgues, 1995). In the light of the foregoing, it appears necessary to develop and validate a scale of measurement of perceived occupational stress adapted to the context of formal private companies in the Burkina Faso.

## 2. Materials and Methods

The process of developing and validating the scale for measuring perceived professional stress among company employees in the city of Ouagadougou was based on the simultaneous use of exploratory and confirmatory factor analyzes. It was a four-phase approach based in part on the Churchill paradigm (Churchill, 1979) and on the latest methodological advances in terms of measurement scale validation from (Avignon, 2013; Alem, 2013; Streiner & Norman, 2008; DeVellis, 2003). There are thus three stages: the design stage comprising two phases, the evaluation stage and the validation stage.

### 2.1. The Design Step (See Table 1)

It comprises two phases and consists on the one hand of determining the format of the tool based on the literature and on the other hand of developing the items through the panel of expert judges. In the first phase, a semi-directive interview was carried out in order to highlight the indicators to which employees refer to express their stress. The analysis of the verbatims consisted of a double processing (Content analysis and MAXQDA software, version 12). These analyses revealed themes that were used to design the first version of the scale. For second phase or the validation of the content of the initial pool of measure-

ment items: it was a question of formulating the items from the keywords of the respondents' verbatim, choosing the type of scale and selecting expert judges (the expert refers to the profiles of the individuals to be recruited). This choice strongly conditions the nature and validity of the results. The expert's opinion is a judgment based on knowledge and experience on the subject to which it applies to give details in order to calculate the content Validity Ratio (CRV).

For this study, the measurement scale that was used to produce the questionnaire is of the Likert type with four response levels ranging from Never (0); Sometimes (1); Often (2) and Always (3). It is an easy-to-understand scale that is not very sensitive to the mode of data collection (Vernette, 1991). Validation by expert judges is necessary because the quality of content validation closely depends on the precision with which the concept has been defined and the agreement of experts about its facets (Alem, 2013). The use of experts during the validation of a scale represents a form of pretesting questionnaire (Gall, Gall, & Borg, 2003). For the evaluation of the work of the experts, the method which was used and that of Lawshe (Lawshe, 1975; Ayre & Scally, 2014). This method made it possible to calculate the CVR and the CVI (Content Validity Index). The CVR of each item is obtained from Lawshe's formula and is between  $-1$  and  $+1$ . The CVR for each item was calculated using the following **Figure 1**.

**Table 1.** Summary of the scale design and validation process.

Steps	Phases	Procedures	Techniques	Sample
DESIGN	Phase 1	Determine the format of the tool.	Review of literature	30 employees by choice.
		Produce a typology of indicators of perceived stress.		
EVALUATION	Phase 2	Develop the items;	Panel of experts Technique of Lawshe (1975)	20 experts judges by reasoned choice.
		Validate the contents of a pool initial of measurement items;		
		Check the characteristics of clarity and relevance of items;		
		Select items demonstrating the best qualities;		
EVALUATION	Phase 3	check the completeness of the list items;	EFA technique Consistency internal	Small/medium sample (20 and 120 employees by choice reasoned).
		Review items.		
		Do a pre-test;		
		Carry out a pilot test;		
VALIDATION	Phase 4	Analyze the items;	Big sample AFC MSE	446 employees by reasoned choice.
		Review items;		
		Assess the consistency of the tool;		
		Evaluate the modalities of handover.		
VALIDATION	Phase 4	Assess reliability;		
		Assess validity (convergent discriminant and predictive).		

$$\text{CVRt} = \frac{ne - N/2}{N/2}$$

**Figure 1.** Lawshe's formula.

*ne*: Number of experts stating that the item is “essential”;

*N*: Total number of panel experts.

The content validity ratio or CVR allow to measure the degree of agreement between experts on the relevance of the items. It is between  $-1$  and  $+1$ .

To further refine the assessment, Lawshe came up with another ratio called CVI (Content Validity Index), which is the average of all CVRs of the selected items. In general, the validity of the content of an item is acquired, if more than 50% of the Members of the panel judged that this item is essential.

## 2.2. Evaluation Step

As its name suggests, the evaluation stage consisted of doing a pre-test and a pilot test. Regarding the pretest, it involved testing the measuring instrument with a small sample of individuals. The pretest makes it possible to detect the errors made, to ensure that the questions are properly understood, the fluidity of the questionnaire, the form of the questions, their ordering, and finally to evaluate the average response time (Evrard, Pras, & Roux, 2009). As for the pilot test, it consists of passing all items of the questionnaire to a sample of the target population. Based on the data, statistical analyzes were performed to test the metrological quality of the scales of the tool. Exploratory factor analysis was privileged because it aims to explore the phenomenon to group together variables without prior questionnaire pre-test assumptions. This analysis made it possible to identify the main factors explaining the results obtained, to group together items constituting the subscales, eliminate redundant items and thus reduce the number of items and the time necessary to complete the questionnaire (DeVellis, 2003). Thus, the best items were finally selected and retained in order to be used for the construction of the final version of the quiz.

## 2.3. Validation Step

The psychometric validation of the scale requires a Confirmatory Factor Analysis (EFA) to assess and refine the measure as it is most appropriate and preferred over Exploratory Factor Analysis (EFA) for assessing instrument construct validity (Gerbing & Anderson, 1988). As specified by certain authors, the classical approach to the psychometric validation of a measurement scale integrates Structural Equation Methods (MES) composed of multiple regression analyzes and CA (Roussel, 2005). The convergent validity of the construct consists in checking whether the indicators supposed to measure the phenomenon studied are sufficiently correlated (Evrard, Pras, & Roux, 2009). Several indices can be used to test this validity. Those are:

The absolute adjustment index (Chi-square or simple Ki-square, GFI, AGFI,



MRMR, RMSEA) which make it possible to assess to what extent the theoretical model correctly reproduces the data collected (Hanana & Houfaïdi, 2016) incremental indices (CFI, NNFI, NFI) which are used to assess the improvement in the fit of the model being tested compared to a more restrictive reference model; parsimony indices (AIC, CAIC) which indicate to what extent the model has a good fit for each estimated coefficient (Roussel, 2005; Hanana & Houfaïdi, 2016). For the verification of the psychometric properties, namely the validity and reliability of the scale, recommendations were used (Straub, 1989). To do this, the data were analyzed by the structural equations approach using the IBM SPSS Amos software version 26. Thus, the following indices were calculated with the threshold values (See Figure 2). For convergent validity, the Average Variance Extracted (AVE) or Rhô ratio of convergent validity (pVC) was calculated

$$pVC = \frac{\sum(\lambda_i^2)}{(\sum(\lambda_i^2) + \sum(\delta_i^2))}$$

Figure 2. Larcker & Fornell's formula.

Lambda ( $\lambda$ ) represents the loadings or correlations between the item and the construct;

Delta ( $\delta$ ) represents the item measurement errors ( $\delta_i^2 = 1 - \lambda_i^2$ ).

Called the convergent validity index, this formula is the ratio between the variance of the measurement indicators (manifest variables) explained by the latent concept and the total variable including measurement errors (random errors and systematic errors); it must be greater than 50%.

The loyalty index or  $p$  of Jöreskog (Jöreskog, 1971) is determined by the following formula (see Figure 3) (Hanana & Houfaïdi, 2016).

$$\rho_{\xi} = \frac{\left(\sum_{i=1}^p \lambda_i\right)^2 \text{var}(\xi)}{\left(\sum_{i=1}^p \lambda_i\right)^2 + \sum_{i=1}^p \text{var}(\sigma_i)}$$

Figure 3. Jöreskog's fidelity index.

With:  $\rho_{\xi}$  = Reliability of the measurement of the theoretical variable  $\xi$   $\lambda_i$  = "Loading" correlation of the indicator  $i$  on its theoretical variable, resulting from a confirmatory factor analysis. The  $\lambda_i$  are the standardized coefficients of the variables and indicate the correlations with the latent factors; if the variables are standardized,  $\text{var}(\xi) = 1$ .  $\text{var}(\sigma_i) = 1 - \lambda_i^2$  Residual variance of indicator  $i$  (See Figure 3).

This formula represents the loyalty index or  $p$  of Joreskog. It is used to estimate the reliability of a measurement scale during confirmatory factor analysis. Its threshold must be greater than .70.

### 3. Results

The results are presented according to the different stages of development and



validation of the scale.

### 3.1. Design Step

**Table 2** highlights the key words that emerged following the processing of the analysis of content and MAXQDA software, 2015, version 12. Indeed, through content analysis, the verbatim of respondents was coded. As certain authors have stated, this coding has made it possible to bring out the different key ideas contained in the material studied (Écuyer, 1990). Thus, in each aspect, there appeared indicators whose frequencies are remarkable. For example, if we consider the first five words appearing in the list of each aspect, it is clear whether it is by content analysis or the MAXQDA software, we find the same themes on both sides with roughly similar frequencies.

**Table 2.** Qualitative analysis of the verbatim of the interviewees.

Key Words	CONTENT ANALYSIS	SOFTWARE MAXQDA, 2015
<b>PHYSICAL ASPECT</b>		
	<b>Frequency</b>	<b>Frequency</b>
Tired	20	21
To feel disturbed	10	03
Headache	07	05
Increased heart rate	05	03
Insomnia	04	05
Physical weakness	03	03
Uncomfortable	03	02
Lack of appetite	02	02
Joint pain	01	00
<b>EMOTIONAL ASPECT</b>		
Nervousness	20	20
Aggressiveness	08	04
Isolation	07	01
Sadness	06	07
Frustration	00	01
To be on edge	02	03
Bad mood	02	01
Impulsive	01	01
Confused	01	01

## Continued

COGNITIVE ASPECT		
Lack of concentration	24	23
Oversight	08	10
Reduced alertness	07	03
Confusion in performing tasks	07	06
Incoordination	03	02
BEHAVIORAL ASPECT		
Quiet	08	08
Unusual conduct	08	09
Violence	06	05
Withdrawal	06	04
Loss of control	05	06
Isolation	04	04
Talkative	03	04
Bad task execution	03	04
Unmotivated	01	01
Stress	01	02
Decline in yield	01	00
Become ineffective	01	02
Ask a lot of questions	01	00
Drowsiness	01	01
Loss of control	01	06

**Table 3** shows that the dimensions have CVI values (the mean of the CRV of the items retained) between 54% and 57%. This shows that the dimensions all have an acceptable level of validity and that the items are representative of the different dimensions (Dwivedi, Choudrie, & Brinkman, 2006)?

### 3.2. Evaluation Step

**Table 4** shows items with loadings greater than or equal to .50. These items have strong loadings on the factors they are supposed to measure and weak loadings on the other factors (less than .30). A saturation greater than or equal to .5 of an item is very acceptable (Roussel et al., 2002).

**Table 5** below indicates that all the Cronbach's alpha coefficients are greater than .60, which the acceptable threshold is recommended for exploratory analyzes (DeVellis, 2003; Nunnally, 1979). Furthermore, Cronbach's alpha scores  $\geq .70$  are considered the most satisfactory for determining the reliability of an instrument. Thus, the "cognitive disturbance" dimension and the "behavioural dimension" of the scale present the most satisfactory scores (Gall, Gall, & Borg, 2003).

**Table 3.** Content validity summary.

Dimensions	Number total items	Total number of items retained (or significant or CRV > .42)	CVI
Physical Indicators	9	6	57%
Emotional indicators	7	6	57%
Cognitive Indicators	5	5	54%
Behavioral Indicators	11	5	56%
Total	32	22	Mean = 56%

**Table 4.** Matrix of factorial weights.

	Factor					
	1	2	3	4	5	6
COG3	.759					
COG5	.759					
COG4	.737					
COG2	.712					
IEM5						
EM6						
PH3		.726				
PH4		.644				
COM5		.	.700			
COM4			.631			
COM1			.598			
COG1						
COM2			.554			
COM3			.512			
PH2			.	.622		
PH1			.	.575		
EM3				.	.750	
EM4					.610	
EM2		.			.530	
EM1					.	
PH5						

Extraction method: Principal axis factorization. Rotation method: Oblimin with Kaiser normalization.

**Table 5.** Results of the analysis of the internal consistency of the instrument.

Dimensions	Items	Cronbach's Alpha
Cognitive Disturbance (COG)	COG2	<b>82.1%</b>
	COG3	
	COG4	
	COG5	
Behavioral Disturbance (COM)	COM1	<b>72.7%</b>
	COM2	
	COM3	
	COM4	
	COM5	
Physical Disturbance (PH)	PH1	<b>69.6%</b>
	PH2	
	PH3	
	PH4	
Emotional Disturbance (EM)	EM2	<b>67.1%</b>
	EM3	
	EM4	

### 3.3. Validation Step

**Figure 4** shows the re-specified model with covariance links between some errors of measurement.

This **Table 6** highlights the fit indices of the re-specified M4 model, which are above the recommended standards. The psychometric validation of the scale can be done on this model.

#### Verification of Psychometric Properties

For construct validation or verification of convergent, discriminant and predictive validity, this **Table 7** shows that the pCV index or convergent validity index is above the threshold of .50. For the discriminant validity, we note that all the indices located above the diagonal are **greater** than those located below. As for the predictive validity, the scale makes it possible to classify 91.5% of the subjects.

According to the literature, the consistency reliability is checked in the confirmatory analysis through the examination of the rho coefficient of (Jöreskog, 1971). This coefficient is presented as being less dependent on the number of items and more robust than Cronbach's alpha coefficient (Roussel, 2005). Although there are no precise rules for interpreting the Joreskog threshold, an acceptance threshold of .70 is accepted as the norm in the context of a confirmatory coefficient factor analysis (Roussel, 2005). **Table 8** shows that both reliability measures are acceptable. If the alpha coefficient is generally used in the context of an exploratory factor analysis, the Rhô of Joreskog is used to test the reliability of the compound and is used to estimate the reliability of the instrument. Taking into account the criteria recommended by (Fornell & Larcker 1981; DeVellis, 2003). The Cronbach's alpha and Joreskog's Rhô coefficients in-

indicated in the table are very satisfactory. These results reveal that the constituent items of each factor reflect the same theoretical construct and demonstrate that the scales of the measurement model have internal consistency (Nunnally, 1979).

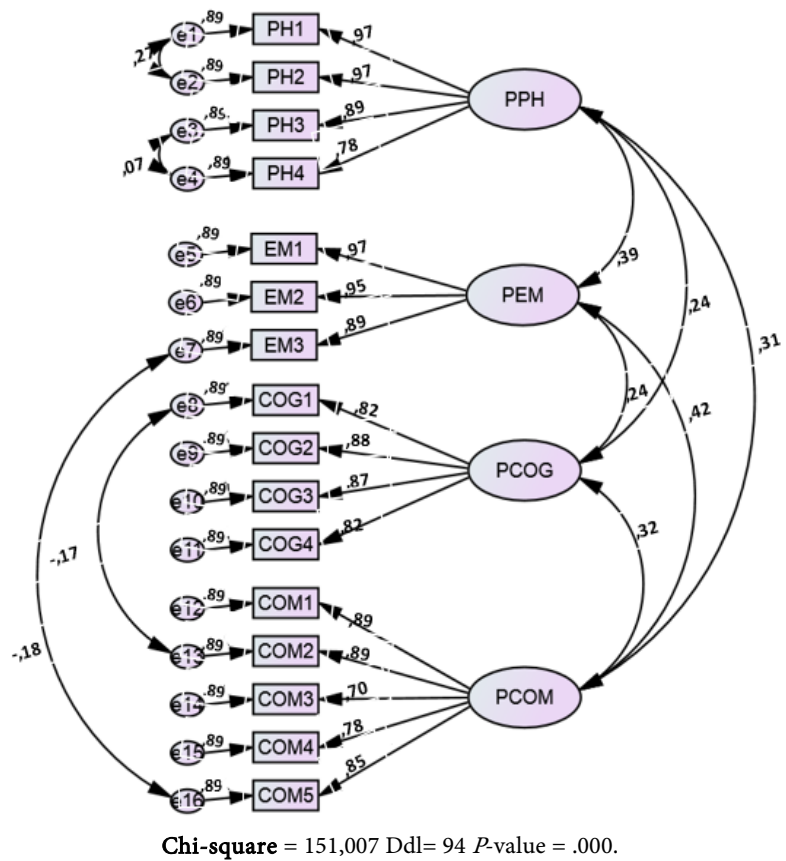


Figure 4. First-order model respecified with the standardized solution (M4).

Table 6. Re-specified M4 Model Fit Index.

Models	Fit clues absolute				Incremental clues			Clues parsimony					
	X2l	ddl	X2/ddl	GFI	AGFI	MRMR	RMSEA	NNFI	NFI	CFI	PCLOSE	CAIC	AIC
<b>M4 respecified</b>	151.007	94	1.606	.960	.942	.020	.037	.919	.915	.967	.980	449.220	235.007
Standards			<5	> .90	Near 0	<.08		>.90			Near 1	Le plus Low	

Table 7. Convergent, discriminant and predictive validity indices.

	PCOG	PCOM	PPH	PEM
pCV (≥.50)	.77	.68	.66	.79
PCOG	<b>.88</b>			
PCOM	.15	<b>.82</b>		
PPH	.18	.27	<b>.89</b>	
PEM	.11	.17	.12	<b>.80</b>

Predictive validity: order predictive power: **91.5%**.

**Table 8.** Reliability of dimensions.

Scale Dimensions	Cronbach's Alpha	Rho of Joreskog
PPH	.755	.88
PEM	.812	.92
PCOG	.814	.93
PCOM	.742	.91
total	.866	.883
<b>Recommended threshold</b>	<b>≥.70</b>	<b>≥.70</b>

#### 4. Discussion

This study consisted in building and validating a scale to measure the level of professional stress perceived among employees of formal private companies in the city of Ouagadougou. To do this, we followed the different stages of development of measurement scales described by (Nunnally, 1979) and the recommendations of (Straub, 1989) to verify the validity and reliability of the scale. To carry out this study, several waves of surveys were carried out among employees of formal private companies. The first so-called design stage is divided into two phases. The first phase consisted in Conducting an interview with 30 employees of private companies in the city of Ouagadougou. From the keywords obtained following the content analysis and the MAXQDA software, version 12, 32 items were formulated. These items were then submitted to the evaluation of 20 expert judges who are: professionals from the business community, researchers, people who have addressed the problem of occupational stress. This is the preliminary evaluation phase of the questionnaire (phase 2). These experts were tasked with ensuring that the items designed covered all dimensions of perceived job stress. Then, a pre-test was carried out with a group of 20 employees to check understanding of the items in the questionnaire. Thus, this survey allowed the reformulation of certain questions. The second major step concerned the evaluation of the scale. To this end, a first validation (Exploratory Factor Analysis AFE) was carried out with 120 employees in order to assess the consistency of the instrument in its proposed form as well as the award procedures. This first stage, called design and evaluation, made it possible to generate a 16-item scale on a semantic support-type format with four levels. From the significant Cronbach's alphas (Table 8) that emerged from this exploratory factor analysis, we can already conclude that the statements share a common notion, that is to say that each item presents consistency with all the other statements of the scale to which it belongs (Hanana & Houfaïdi, 2016). Even if the Cronbach's alpha coefficient is often criticized in the literature (Roussel, 2005). It nevertheless helps to explain the saturation of the various factors. Also, these results reflect the fact that the principal factor analysis procedures are based on the communality of the variance of the items, that is to say that the share of the variances of the items can be expressed by common factors (Roussel, 2005). For this author, exploratory

factor analysis by the method of principal factors is a regression of indicators on common latent variables because it is assumed that the true variance is based on several factors and that rotations are carried out to find the indicators in such a way that the items which strongly saturate one factor, weakly saturate the other factors, as shown in **Table 8**. To refine this analysis, it is necessary to carry out a confirmatory factor analysis. This first stage of design and evaluation made it possible to construct a scale with 16 items divided into four dimensions. However, to make the scale operational, it is essential to assess its psychometric qualities (reliability and validity).

The second so-called psychometric validation made it possible to verify the characteristics psychometrics with 446 employees from the same target audience. For verification psychometric, the data were analyzed by the structural equations approach to using IBM SPSS Amos software version 26. Indeed, the re-specified first-order CA (**Figure 4**) allowed to highlight a first-order four-dimensional model. The obtained results reveal that the respecified first-order model exhibits fit indices very satisfying. The four dimensions (Physical Disturbance, Disturbance Emotional, Cognitive Disturbance and Behavioral Disturbance) within the latent construct of the PPS provided nine good fit indices. Thus, the re-specified first-order model was accepted as the most parsimonious and theoretically meaningful. The analysis of the results revealed that the 16-item PPS measurement scale displays levels of very satisfactory reliability and validity. In terms of reliability, it has been shown that the scale has very satisfactory internal consistency values (Cronbach's Alpha = .86 > .70 and Joreskog's Rho = .88 > .70) (**Table 7**). The four-dimensional factor structure generated by the exploratory factor analysis in the pilot phase of the study proved to be very stable through the second confirmatory study, thus offering excellent construct validity (AVE index = .77 > .50). The results also indicate a very satisfactory discriminant validity (that is to say that the relationships between the manifest variables and the constructs are very strong; square roots of the variances extracted (AVE) are greater than the values located below the diagonal). The predictive validity is satisfactory, that is to say that the scale makes it possible to distinguish the stressed subjects from the unstressed subjects in a proportion of 91.5% (binary logistic regression) characteristics of the sample observed, and whatever the size of the sample, the SPP scale presents a better stability, thus confirming its satisfactory psychometric qualities. The statistically validated multidimensional structure corresponds to the theoretical model proposed in the literature, according to which the concept of perceived stress is an abstract construct, not directly observable, which requires having several dimensions to measure it. The instrument thus developed makes it possible to identify the concept of occupational stress perceived by company employees. If the EFA made it possible to explore a posteriori the factorial structure of the concept of perceived professional stress, the AFC as for it made it possible to test the validity of the factorial structure a priori (Roussel et al., 2002) because the AFC proceeds to comparisons of



several models in order to identify the one that best fits the data (respecified M4 model). The particularity of this scale comes from the fact that all the 16 items are centered on the professional environment of Burkinabè private companies. The scale was therefore designed on the basis of the feelings of the stressors experienced in the professional context. Even if the feeling of stress depends to a large extent on the personality of each individual, it is clear that the semi-directive interview carried out in phase 1 and which made it possible to write the items is based on the four symptoms of stress.

Expression of stress in general. Moreover, this empirical research made it possible to highlight not only theoretical contributions but also implications for human resource management. On the theoretical level, the results confirmed the multi-dimensionality of the concept of stress work-related professional. In addition, they will make it possible to lay the foundations for a reflection on the problem of professional stress in the business environment in Burkina Faso. In terms of management, it appears that this study will make it possible to provide human resources managers and occupational physicians in companies with a reliable and valid instrument for measuring work-related stress which will serve as a basis for identifying the manifestations of perceived job stress. This scale can be used as a tool for diagnosing the symptoms of perceived professional stress. The limitation of this study stems from the fact that there is no scale for measuring perceived professional stress in the Burkinabè context to which we can refer to compare our results. Nevertheless, respectively in the field of business administration and industrial management (Alem, 2013; Hanana & Houfaïdi, 2016), Lykert-type scales have been designed and validated to which we have referred to compare our results. Indeed, these authors in their design, used the method of structural equations involving confirmatory factor analysis for the assessment of qualities psychometrics of their instruments as recommended by psychometric researchers (Roussel et al., 2002; Churchill, 1979). From theoretical description to validation psychometrically, the PPS measurement scale followed the recommended recommendations. Her approach therefore corroborates that described by (Alem, 2013; Hanana & Houfaïdi, 2016). From the above, this scale is intended to be a tool for estimating the level of stress perceived professional. Even if the results obtained are encouraging, a reassessment of the psychometric properties of the scale in other companies proves necessary for a final confirmation. While waiting for this large-scale validation, this scale has been tested with a group of employees of companies practicing physical and sporting activities to follow the evolution of their level of perceived professional stress following a program of physical exercises of 12 weeks. At the end of the program, the analysis of the data made it possible to note very satisfactory results, thus demonstrating the best psychometric qualities of the scale.

## 5. Conclusion

Previous research has shown that the determinants of work-related stress among

employees of companies in the city of Ouagadougou are the low level of control and the high workload (Nana et al., 2019; Nana et al., 2021). However, in terms of estimating the level of stress, there are few studies that have focused on perceived professional stress in Burkinabe private companies. Whereas in terms of measuring stress, many authors recommend the design and validation of scales in the context in which the study is being conducted (Steiler, 2006; Usunier, 1990). The main objective of this investigation was to develop a reliable and valid standardized tool in order to be able to estimate perceived stress among company employees. Following the recommendations of (Streiner & Norman 2008; DeVellis, 2003) in terms of, valid and reliable instrument design and validation (confer methodology) we have designed a 16-item scale with four dimensions. Developing a reliable and valid measuring instrument requires a long process punctuated by important steps. After the content validation, the pre-test, the pilot test using exploratory factor analysis and confirmatory factor analysis showed that the 16-item scale divided into four dimensions has good reliability and validity of the built. This scale followed recommended standards for design and validation and demonstrated better psychometric indices:

- reliability index; Cronbach's Alpha of .87 and Joreskog's Rho index of .88; all above the recommended threshold of .70;

- validity index: AVE index of .77 above the threshold of .50;

This scale will contribute to the estimation of the level of stress perceived among company employees and to the implementation of intervention strategies to prevent stress.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Scale for Measuring Perceived Professional Stress

The questions below refer to physical, emotional, cognitive and behavioral feelings felt when you face a heavy workload, an organization binding; with an imbalance between the efforts made and the rewards in terms of salary, promotion etc. and you have little support (from colleagues and supervisors). Read each statement carefully and surround the answer that best expresses what you have experienced in the past month. Don't dwell on the answer to do. Your immediate reaction to each question will likely provide a better indication of what you experience than a long pondered response. Surround only one answer per question.

### In the last month:

1. I felt tired from days of work  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
2. I had headaches from days at work  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
3. I had insomnia due to working days  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
4. I had loss of appetite due to days of work  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
5. I have been aggressive due to workdays  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
6. I have been sad due to days at work  
Never (0);  
Sometimes (1);  
Often (2)  
Always (3)
7. I have been frustrated due to days of work  
Never (0);

Sometimes (1);

Often (2)

Always (3)

8. I have forgotten in the performance of my professional tasks

Never (0);

Sometimes (1);

Often (2)

Always (3)

9. I had difficulty concentrating in the execution of my professional tasks

Never (0);

Sometimes (1);

Often (2)

Always (3)

10. I had a decrease in alertness in the performance of my professional tasks

Never (0);

Sometimes (1);

Often (2)

Always (3)

11. I had incoordination in the execution of certain professional tasks

Never (0);

Sometimes (1);

Often (2)

Always (3)

12. I have had unusual behavior due to work days

Never (0);

Sometimes (1);

Often (2)

Always (3)

13. I had a withdrawal due to days of work

Never (0);

Sometimes (1);

Often (2)

Always (3)

14. I have been violent due to workdays

Never (0);

Sometimes (1);

Often (2)

Always (3)

15. I have been demotivated due to days of work

Never (0);

Sometimes (1);

Often (2)

Always (3)



16. I had a loss of control due to working days

Never (0);

Sometimes (1);

Often (2)

Always (3)