Revista de Educação e Pesquisa em Contabilidade
Journal of Education and Research in Accounting

Periódico Trimestral, digital e gratuito publicado pela Academia Brasileira de Ciências Contábeis | Available online at www.repec.org.br

REPeC, Brasília, v. 15, n. 4, art. 3, p. 425-449, Oct./Dec. 2021 | DOI: http://dx.doi.org/10.17524/repec.v15i4.2836 | ISSN 1981-8610

Stress Among Accountancy Professors: Modulation from the Perspective of the Demand-Control-Support Theory

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Abstract

Objective: To identify and analyze the influence of demand, control, and support levels on self-reported stress among professors in Accountancy programs at Brazilian Higher Education Institutions (HEI).

Method: A survey addressed the biopsychosocial condition of 614 professors, including stress perception measured by the Teacher Stress Inventory and demand, control, and emotional support measured by the Job Demand-Control-Support.

Results: Support and Control significantly ($p<0.01$) contribute to decreasing professors' perceived stress. The demands imposed by HEIs increase ($p<0.01$) stress levels though. Additionally, age, positive perception of mental health, and general satisfaction with the job and students are factors that negatively modulate professors' stress levels ($p<0.01$). Being a woman, teaching in the morning shift, and being a professor in a public HEI, on the other hand, increase the respondents' stress levels ($p<0.01$).

Contributions: Considering that an individual's ability to adapt is limited, this study enables unveiling the circumstances that can aggravate the effects caused by stress, considering increased physical and emotional demands, possibly leading to psychosomatic diseases.

Keywords: Education, Higher; Stress; Teaching; Mental Health; Accounting Sciences.

Published in Portuguese and English. Original Version in Portuguese.

Round 1: Received in 1/21/2021. Ask to Revise on 3/8/2021. Resubmitted on 4/20/2021. Round 2: Received in 4/20/2021. Ask to revise on 10/6/2021. Resubmitted on 10/7/2012.Accepted on 10/21/2021 by Dr. Iracema R.N. Neves Aragão (Assistant Editor) and by Dr. Gerlando Augusto Sampaio Franco de Lima (Editor). Published on 12/23/2021. Organization responsible for the journal: Abracicon.

1. Introduction

College professors constantly face the challenge of encouraging students to engage with the difficulties and facilities of disciplines by creating evaluation systems that meet the institution's requirements and also reflect the actual level of students learning, developing pedagogical practices and techniques that enable professors to interact with students and devising mechanisms to condone the students' idiosyncrasies. In addition, dealing with increasingly younger students (compared to professors' age) and diverse social contexts (Blevins-Knabe, 1992; Jardilino, Amaral, & Lima, 2010), ageism (Joye & Wilson, 2015), social role stereotypes (El-Alayli, Hansen-Brown, & Ceynar, 2018), and other variables that affect the professors' wellbeing (Goebel & Carlotto, 2019; Xu, 2019) are also challenging.

In this sense, regardless of its origin, persistent stress experienced in the work environment may cause cardiovascular diseases, neoplasm, and immunological disorders – especially when there is a genetic predisposition –, in addition to mental disorders (such as depression, low self-esteem, and Burnout syndrome, among others) (Maslach & Jackson, 1981; Landsbergis et al., 1993; Arnetz, 1996; Lipp, 2005; Castro, 2010). Additionally, the perception of stress is directly associated with an individual's resilience and the ability to adapt to stressful events. The individuals' ability to adapt is limited though.

Physical or psychological stress is not always negative, as stressors can also be interpreted as challenges. In many cases, stress promotes adaptation or the development of cognitive and behavioral faculties, while the individual remains in good mental and physical health, a phenomenon that is known as eustress (Selye, 1956, Nickel, 2004). Adaptation or learning is usually called coping strategies (Lazarus & Folkman, 1984).

Inability to develop physiological or cognitive skills to deal with stressors means an individual is distressed. In this condition, a professor cannot promote the students' learning with the expected level of quality. Hence, negative repercussions in the classroom often mean that one's ability as a professor has been compromised.

Teaching is an activity in which sharing, experimentation, and inter and intrapersonal relationships are paramount; hence, wellbeing should predominate for learning to take place (Pocinho & Perestrelo, 2011). Therefore, stress may either encourage professors to be more engaged in their profession or exhaust their psychophysiological resources to the point they experience burnout.

Another situation that stands out among some professors teaching in Brazilian higher education institutions is working a double shift. Many professionals teach in the evening shift while concomitantly performing a business activity during the day, in addition to being involved with research and extension activities and even administrative tasks (e.g., committees, coordination position, and others) (Santana, 2011; Nascimento, Aragão, Gomes, & Nova, 2013). Even though it is interesting that professors apply and update their knowledge, taking part in innovations that originate in professional experience, working in more than one job may aggravate the effects of stress, considering an excess of physical and emotional demands imposed by experiencing two different environments.

Therefore, the context (institutional, career, and relational) in which teaching takes place directly affects the quality of teaching in the Accounting field, resulting in more or less qualified and prepared future professionals. This context generates frustration in students when they realize that their training will not ensure personal satisfaction or financial remuneration according to expectations, mainly because their potential was not fully developed. Additionally, the market tends to undervalue (from the organizational and financial points of view) low-skilled workers and even seek professionals from other fields (when there are no regulatory restrictions) to meet corporate needs.

Given the previous discussion, there is a concern with identifying factors that may affect the performance of faculty members from Accountancy programs, and consequently, the program's quality. Therefore, we sought evidence to answer the following question: **What is the influence of demand, control, and support on self-reported stress of professors teaching in Accountancy programs from Brazilian higher education institutions?** In this sense, this study's objective was to find evidence that enables identifying and analyzing the influence of demand, control, and support levels on self-reported stress of professors from Accountancy programs from Brazilian HEIs. Additionally, we sought to verify the effect of socioeconomic variables on professors' stress.

This study's results are expected to improve understanding of professors' health-disease continuum caused by stressful events to enable the academic community to mitigate distress situations and promote personal and job satisfaction so that HEIs ensure faculty members properly perform their teaching and administrative activities. When these expectations are met, students benefit directly from an academic environment conducive to learning, that is, an enjoyable, stimulating, and friendly environment.

This paper is divided into five sections: introduction, literature review, methodological procedures, data analysis, and final considerations. Section 2 presents the literature review that supported this study. Section 3 includes the methodological aspects, such as sampling, instruments used, detailing the study variables, and analysis procedures. Section 4 reports the results and analysis, including a population description. Finally, section 5 provides some considerations regarding data, limitations, and suggestions for future studies.

2. Literature Review

The framework of studies addressing stress is based on Claude Bernard's work from the end of the 19th century. He developed studies on the adaptation of living beings, stating that only with a constant and stable internal environment would an organism find sufficient conditions to survive (Faro & Pereira, 2013). In addition to the biological aspects, Walter Cannon also described behavioral changes to deal with emergencies and restore balance, introducing the fight-or-flight response to deal with social or physical threats (Baptista, 2009). Later, Walter Cannon studied the specific mechanisms of response to changes in the external environment and their efficiency in maintaining stability, namely sensory mechanisms that communicate the body's state to the brain (Baptista, 2009).

From this relationship between the organism with the external environment and its adversities, Cannon developed the concept of homeostasis, which enabled him to study changes in the nervous and endocrine systems to regulate the metabolism in response to environmental changes and health deterioration when the system is deregulated (Quick, Spielberger, 1994). He verified that the body has a primary defense system for maintaining the baseline levels of physiological functioning, called homeostasis, which holds a state of balance, enabling the organism to adapt to constant changes in the external environment, directly or indirectly absorbed by the internal environment (Faro & Pereira, 2013).

> At the beginning of the 20th century, Harvard physiologist Walter Cannon expanded upon Claude Bernard's views of a flexibly stable *milieu interieur* […] in his investigation of the response of the sympathetic-adrenal medullary system to emergency situations. This system swiftly mobilizes the body's energy resources by increasing epinephrine (adrenaline), which in turn increases blood pressure, heart rate, and blood sugar, as well as hastening blood coagulation, clearing fatigue products from muscles, and decreasing digestion (Ganzel, Morris & Wethington, 2010).

Based on these findings, Selye (1956) verified a similar and consistent response pattern to events challenging the body's balance (homeostasis), regardless of how the challenge was imposed. The animals tested presented unspecific responses to challenges; whether the challenges were temperature increases or infectious or toxic agents, i.e., there was a universal response pattern he called general adaptation syndrome (Baptista, 2009). This response was composed of three stages: alarm, in which stressors are identified and a defense strategy is organized; the second response, resistance, is when the body implements changes necessary to deal and eliminate an agent; and finally, the last stage refers to exhaustion, when a stressor is not eliminated and may lead to death (Baptista, 2009).

Selye (1956) indicated that stress concerns an orchestrated set of endocrine responses activated to deal with the action of harmful stimuli that alter the homeostasis state. Based on this concept, initially conceived as a biological syndrome, Selye (1956) urged the scientific community to study adaptive responses. The interest was identifying the threshold between survival capacity and health decline according to the challenges imposed.

From a functional point of view, stress was biologically developed to rapidly activate and mobilize one's attention to perform a cognitive task that preserves life when a threat is identified. Therefore, the stress' primary role is to promote individuals' adaptation when facing a potentially threatening situation (from an organic point of view). Hence, stress is intended to preserve the organism's homeostasis, i.e., it concerns the organism's physiological effort in recovering internal balance, preserving life (Lipp, 2005; Ganzel, Morris & Wethington, 2010).

Therefore, stress is a human body's normal response that is fundamental and indispensable to survival, without which individuals would not be able to face situations of great danger (Meleiro, 2007). Hence, failure to enter an alert state caused by stress means inattention and potential motor paralysis when facing a situation of great danger, indicating a lack of response that would preserve life.

A paradox arises when we consider physiological and psychological adaptation though. When we think about stress as a means of survival when individuals are facing death, for example, the attack of a wild animal, the stress mode will speed up breathing while pupils and blood vessels dilate, showing that all this organic effort is intended to preserve the body so it can return to a state of balance (homeostasis).

Hence, the impact on biological functioning is confirmed, but the explanatory focus is primarily from the individual to the environment. Therefore, a fundamental concept of stress in psychology is that there is a specific relationship between the individual and the environment, making it essential to understand all psychological and social resources that mediate this contact (Faro & Pereira, 2013).

From this perspective, França and Rodrigues (2005, p. 30) consider stress as "the organism's state after adaptation struggle, which may deform response capacity, affecting one's mental and affective behavior, physical condition, and relationship with others." This definition leads Nickel (2004) to consider that these authors address stress both as a process, which consists of tension (a state in which individuals deviate from their natural relaxing level) whenever facing a threat or a challenge and as a condition, category in which responses are classified as eustress or distress. Hence, Nickel believes that eustress emerges when people respond well to a given demand, providing a positive response, leading individuals to offer more effective and creative responses. On the other hand, distress occurs when the response is negative, triggering an inadequate adaptive process, leading to exhaustion (Nickel, 2004).

Therefore, stress is a process that develops in stages. It is possible to experience temporary stressful events of low or high intensity, experience the resistance stage while dealing with the factor generating unbalance or be in an intense burnout state, which favors the emergence of diseases (Lipp, 2005). Rudow (1999) states that stress should be considered a relational process. From an explanatory perspective of individual differences, we need to understand the reason for varied responses to deal with stressors, such as psychological exposure to health risk or the intensity of adaptive responses. Therefore, the focus is on the particularities of the interaction between the psychological apparatus, social environment, and biological functioning, primarily seeking to clarify how it works and the extent to which it quantitatively and qualitatively differentiates an individual's adaptability (Faro & Pereira, 2013).

Thus, there is an inverted U-shaped relationship between exposure to stressors and adaptation, i.e., adequate amounts of exposure to a stressor (stimulation or challenge) lead to a moderate increase in health and improved physiological and mental functions. In contrast, high and persistent exposure to stressors is related to adverse health outcomes (Ganzel, Morris & Wethington, 2010). This relationship is shown in Figure 1.

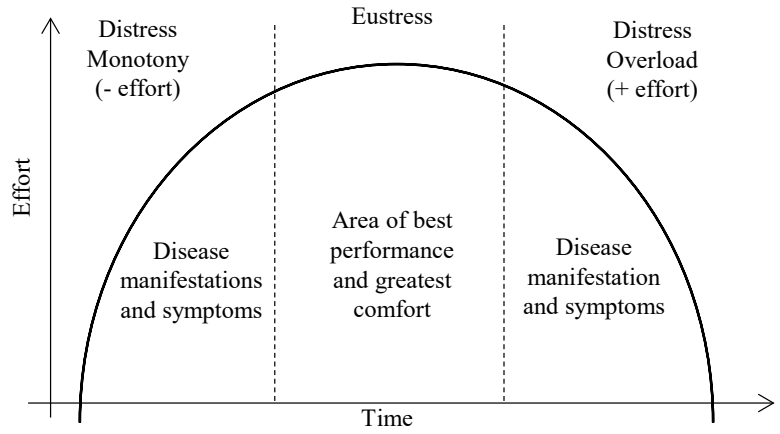

Figure 1. Stress Curve

Source: França and Rodrigues (2011, p. 42)

From the perspective proposed here, a stressor can be characterized according to its timing; individual perception (desirable or undesirable, beneficial or harmful); whether a given demand is self-imposed or not; and according to its source (e.g., friend, manager, police, or institutional standard, etc.) (Lazarus & Folkman, 1984; Le Fevre; Matheny & Kolt, 2003). As suggested by Ganzel, Morris, and Wettington (2010), modeling the stress process requires a much higher level of specificity of the underlying mechanisms of homeostasis and maintenance of the individual's psychobiological health.

Historically, the concept and measurement of health are based on the idea of lack of diseases. This focus on the pathological aspect likely emerged from the fact that, in the past, health was obtained by overcoming illness. However, in the mid 20th century, people realized that diseases no longer affect people the same way they did centuries ago, which motivated a new concept of health (Arnetz, 1996). According to Breslow (1972), this new perspective encouraged the World Health Organization (WHO) to define health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (WHO, 2015a).

Even though this definition was not changed, it is constantly the object of criticism (WHO, 2015a) because of the use of the word "complete," considering that such plenitude, as argued by Dalmolin, Backes, Schaurich, Colomé, and Gehlen (2011), is utopic. The previously mentioned authors state that this conception, differently from what is currently constructed, suggests balance and the existence of a happy and productive life despite illnesses, disorders, or other conditions. From this perspective, health is a subjective assessment that exists beyond organic, natural, or objective evidence, nor is it associated with a balanced state, as it is an intrinsic judgment through which a person performs self-assessment, considering socio-cultural values and meanings assigned to the living process (Dalmolin et al., 2011).

From this perspective, the health-disease continuum depends more on structural evidence, i.e., external factors in the social environment, than on objective analyses or connections with different health determinants. However, it is specifically submitted to life and work, cultural, environmental, and familial conditions. Consequently, considering that many factors are combined to affect the lives of individuals and communities, the context in which people are inserted is vital to explain their health state or illness processes. Hence, understanding these two conditions (health and disease) goes through analyzing one's social, economic, and physical environment and individual and behavioral characteristics (WHO, 2015b).

These factors unfold into others, creating a complex relationship between the individuals and their social and physical environment, i.e., how variables such as income and social status, education, physical environment, social support networks, genetics, health service, and gender, among others, relate with health (WHO, 2015b). Hence, determinants and conditioning factors of the health-disease continuum are multifactor and complex. In summary, health and disease are processes considered on a continuum and are related to economic, social, and cultural aspects as well as to one's personal experience and lifestyle (Seidl & Zannon, 2004).

It is in this context that the model proposed by Karasek (1979, p. 287) is the most indicated for a college education context, considering that:

> The model postulates that psychological strain results not from a single aspect of the work environment, but the joint effects of the demands of a work situation and the range of decision-making freedom (discretion) available to the worker facing those demands. These two aspects of the job situation represent, respectively, the instigators of action (workload demands, conflicts, or other stressors which place the individual in a motivated or energized state of "stress") and the constraints on the alternative resulting actions. The individual's job decision latitude is the constraint, which modulates the release or transformation of "stress" (potential energy) into the energy of action. Thus, this is a stress-management model of strain, which is environmentally based. If no action can be taken (Zeigarnik, 1927), or if the individual must forego other desires because of low decision latitude (Henry and Cassell, 1969: 179), the unreleased energy may manifest itself internally as mental strain.

This model privileges three psychological dimensions: social support, control over one's job, and the psychological demand arising from work (Araújo, Graça, & Araújo, 2003). The authors explain that, based on a combination of these three dimensions, the model distinguishes specific work situations imposing different health risks. Karasek Jr. (1979) developed an inventory to assess these aspects: the Job Strain Model, later renamed Job Demand-Control-Support.

Initially, Karasek Jr. (1979) developed a scale to measure stress based on workers' perception regarding demand and control level, the American Quality of Employment Survey, with 49 questions. Later, using the Swedish version of the original questionnaire, Theorell et al. (1988) adopted a Likert Scale and reduced the instrument from 49 questions to 17, and included the support dimension (five questions for the demand dimension, six for the control dimension, and another six dimensions for the support dimension).

These scales enable classifying stress perception under four conditions: high demand and low control (high demand); low demand and high control (low demand); high demand and high control (active jobs); low demand and low control (passive jobs) (Karasek Jr. (1979). According to this model, high-demand jobs represent the highest risk for health outcomes (Macedo *et al.*, 2007).

Various studies use the model developed by Karasek Jr. (1979), including those in the education field. For example, Greco, Magnago, Prochnow, Beck, and Tavares (2010) found a positive association between the outcome and high demand at work (high psychological demand and low control) when compared to professors classified under low demand (low psychological demand and high control).

Other studies sought to identify the perceptions of college professors regarding stress levels and found significant results: more than 50% of the interviewed workers presented chronic stress levels (Gmelch; Wilke, & Lovrich, 1986; Blix et al., 1994; Carloto, 2004) – a context experienced in varied contexts, such as in Brazil. Garcia and Benevides-Pereira (2003) found that 1/3 of the sample experienced emotional burnout, 1/5 depersonalization, and 1/4 experienced decreased professional self-realization. Carlotto (2004) addressed stress among college professors from the burnout perspective and found high levels of burnout in the sample, providing additional information regarding burnout among college professors, reporting that the lower the level of autonomy or task identity, the greater the emotional burnout professors experience. Regarding the context of Brazilian college professors, Soares, Mafra, and Faria (2019) found that the mean score obtained was higher than those reported for most of the occupations they analyzed. It means that the results portray a harmful context among college professors in Brazil because stress weakens the body's defense system, activates mechanisms that trigger inflammation, or deactivates mechanisms that inhibit inflammation, undermining one's health conditions (Soares, Mafra & Faria, 2019).

A situation similar to that of the Brazilian context is also reported in other countries. For example, El-Ibiary, Yam, and Lee (2017) addressed professors from a Pharmacy program in the United States and verified that 41% of the professors were at the risk of burnout due to stress. Furthermore, the authors noted that the risk of burnout is greater among women, professors with fewer years of experience, those with young children, and working many hours a week. In another study addressing the American context, Blix, Cruzeiro, McBeth, and Blix (1994) verified that professors in their sample presented good adaptation to academic stress but perceived stressors in their work context for at least 50% of the time. Because of this constant state of alertness, professors reported burnout, stress-related health problems, decreased productivity, inability to deal with stress at work, and were considering changing jobs. However, Blix et al. (1994) argued that difficulty in dealing with anxiety could be modulated if professors could manage their demands.

These findings support Mcclenahan, Giles, and Mallett (2007), in which a sample from a university in the United Kingdom was addressed. These authors found moderate stress levels (mean of 36% of the scale) and verified that, as proposed by Karasek Jr. (1979), demands, control and support have a moderating effect, which corroborates studies reporting that high levels of stress perception and persistent stressors at work are linked to health problems and job dissatisfaction. Moeller & Chung-Yan (2013) also reached the same conclusions, reporting that greater perceived situational control allied with high social support improves the individuals' perceived ability to deal with stressors. Hence, while demand control and emotional support buffer job stress, demands exacerbate them. It is worth noting that Moeller and Chung-Yan (2013) conducted their study in Canada, and the level of the professors' self-reported stress was approximately 70% of the scale. Therefore, the theory proposed by Karasek Jr. (1979) finds evidence of its applicability even in different contexts, whether with high levels of stress (Moeller & Chung-Yan, 2013) or with low-stress levels (Mcclenahan, Giles & Mallett, 2007).

The results show that professors experienced depression, muscle pain, emotional burnout, insomnia, low self-esteem, and other psychophysiological problems associated with high-stress levels. This problematic situation affects many professors worldwide, and according to Karasek Jr. (1979), it is due to two main factors: excessive demand and a low degree of emotional support, and autonomy assigned to individuals to control demands. This phenomenon was called Demand-Control-Support Model.

The results previously reported show that comparatively (Soares, 2016, Soares, Mafra & Faria, 2019), the stress level found among professors is higher than in various professions, thus teaching is one of the professions at an increased risk of experiencing syndromes/disorders and other consequences of persistent stress. Furthermore, because of the high demand professors face and because teaching is a strictly relational activity (with students, colleagues, coordinators, leaders, and secretaries, among others), professors perceive high-stress levels, exhausting their physical, psychological and emotional resources to cope with stress. This situation may lead to diverse consequences, the less harmful of which would be withdrawing from activities, though it has the potential to compromise one's mental health, even leading to suicide.

Specifically, in the context of Accounting Sciences programs and the remaining programs in Applied Human Sciences, stress is considered a highly prevalent problem affecting professors (Farias et al., 2019). Because of various components (teaching, research, extension, student advisory, university management), the Brazilian college context is permeated by stressors that undoubtedly affect teaching experiences, which in turn may cause distress among professors experiencing acute stress (Ferreira et al. (2020), insecurity, and physical and mental exhaustion (Coutinho, Magro, & Budde, 2011). This situation deserves attention because the way professors perceive their jobs directly affects their performance at work and even their personal lives (Paiva & Saraiva, 2005; Petroski, 2005).

Regarding the previous discussion, Greco et al. (2010) note that even though teaching allows certain freedom and creativity (in the pedagogical sense and within the classroom), enabling greater control over some issues inherent to the job, professors have to concomitantly work with extra class activities, long work days, perform short-term tasks, and work in multiple jobs. The sum of these situations favors adverse effects on professors' health.

3. Methodological Procedures

The instrument used to collect data was composed of two blocks: descriptive variables and stress perception. It was applied online. The professors were contacted through their emails identified in the HEIs' institutional websites, and 614 professors from diverse Brazilian regions returned. The instrument was registered in the *Plataforma Brasil* under CAAE: [suppressed to ensure blind review]. The instrument's first part was composed of questions addressing the respondents' biopsychosocial profile and aspects related to their jobs, variables associated with stress (Gmelch, Wilke, & Lovrich, 1986; Gillespie et al., 2001; Calais, Andrade, & Lipp, 2003; Garcia & Benevides-Pereira, 2003; Kataoka et al., 2014; Saeed & Farooqi, 2014; Shen et al., 2014; Silva et al., 2014; Faro, 2015; Goebel & Carlotto, 2019, Xu, 2019; Layte et al., 2019).

The professors' perceived stress was determined with the scale proposed by Boyle, Borg, Falzon, and Baglioni Jr. (1995), the Teacher Stress Inventory (TSI), with 26 questions, divided into five dimensions rated on a five-point Likert scale and adapted to the Brazilian context by Silva Morgado and Gomes (2009). This instrument presented good validity considering theoretical surveys and also empirical goodness of fit (e.g., Griffith, Steptoe, & Cropley, 1999; Silva, Morgado, & Gomes, 2009; Klassen & Chiu, 2010; Boshoff et al., 2018; Clément et al., 2020), with a Cronbach's alpha above 0.8 in these studies. Hence, the result of the respondents' perception of stress is expressed by the following equation:

$$EE_i = \sum E_i \quad (1)$$

Where:

EEi is the score obtained by respondent *i*, in the aspects addressed in the questions concerning all the items of the Teacher Stress Inventory; and

Ei is the grade respondent *i* assigned to each of the items in the Teacher Stress Inventory.

To determine whether the professors' perceived stress could be mediated by demands control and emotional support, we opted for using the theory of Job Demand-Control-Support (DC-S) by Karasek Jr. (1979), though based on the short version developed by Theorell, Perski, Åkerstedt, Sigala, Ahlberg-Hultén, Svensson, and Eneroth (1988) and translated into Portuguese by Mello Alvesa, Chorb, Faersteinc, Lopesc and Werneckd (2004). The Brazilian version presented a minimum Cronbach's alpha of 0.67 (in the control dimension) and a high degree of validity for the Brazilian context, considering the large number of studies adopting this theory.

In the model proposed by Karasek Jr. (1979), stress is regulated by demand, the effect of which is mediated by its interaction with an individual's control over demand and social support received (the latter was added when the model was complemented). Hence, individuals working in environments characterized by high demand, low control, and low social support experience the highest stress level. The DC-S comprises 17 questions divided into three dimensions: demand, control, and support, rated on a Likert scale (never, almost never, rarely, sometimes, and often).

For this reason, and to enable the respondents to be classified in one of the model's vertices (low demand, active job, passive job, or high demand), and to analyze and include data in the model, all the dimensions were included in the model separately. Therefore, the equations expressed in 2, 3, and 4 were used to analyze the Demand-Control Model according to its vertices:

$$ED_i = \sum D_i \quad (2)$$

Where:

EDi is the score obtained by respondent *i*, in the questions addressing the Demand dimension; and

Di is the grade assigned by respondent *i* to the items in the Demand dimension.

The score of the dimensions Control and Support is given by:

$$EC_i = \sum C_i \quad (3)$$

Where:
ECi is the score obtained by respondent *i*, in the questions addressing the Control dimension; and
Ci is the grade assigned by respondent *i* to the items in the Control dimension.

$$ES_i = \sum S_i \quad (4)$$

Where:
ESi is the score obtained by respondent *i*, in the questions addressing the Support dimension; and
Ci is the grade assigned by respondent *i* to the items in the Support dimension.

Based on this proposal, a respondent reporting low demand (e.g., when the sum of the items in this dimension – Demand – totals up to 12 points, considering the total score is 25) and high levels of control and support (when the sum of the items in these two dimensions – Control and Support – is higher than 30 points, considering that each dimension can individually reach 30 points), would be classified under low demand, according to what is proposed by Karasek Jr. See Figure 1.

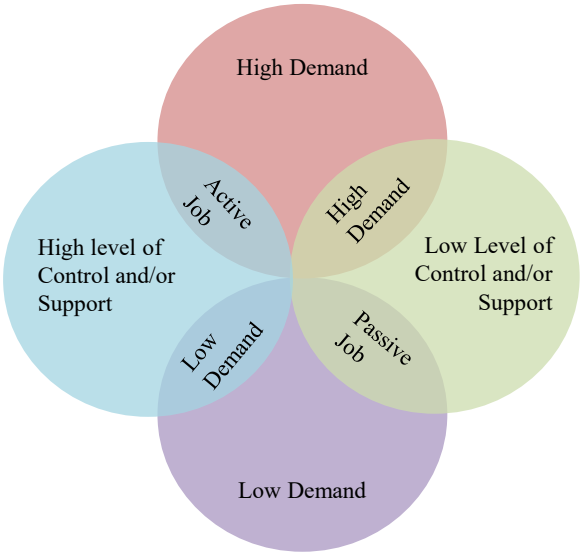

Figure 2. DC-S Classification

Source: based on Kasarek Jr. (1979).

Regarding the data analysis, we opted for a multiple linear regression model, as shown in equation 5, in addition to absolute and relative frequencies. After estimating the linear regression, we performed tests to verify problems related to heteroscedasticity, multicollinearity and specification error,

$$EE_I = \alpha + DCSX_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \cdots + \beta_k X_{ki} + e \quad (5)$$

Where:
EEi is the level of stress perceived by respondent *i*;
α is the model's constant;
DCS are the variables associated with Job Demand-Control-Support;
Bj (j=1, 2, .,., k) are the coefficients of each control explanatory variable;
Xj (j=1, 2, .,., k) are the explanatory variables;
i (i=1, 2, .,., k) represents each of the observations of the sample under analysis; and
e is the error term of the estimated model.

Regarding the analysis of differences between the groups' means, the Shapiro-Francia test was initially used to verify the distribution of the quantitative variables (p-value below 0.05). Then, the Mann-Whitney Test or Spearman Test was used for the quantitative variables that are not normally distributed when variables had two groups, and the Kruskal-Wallis test was used in the remaining cases (when at least one variable was qualitative and the other was quantitative). Finally, the Student's t-test was applied when the variables were normally distributed. Whenever the objective was to analyze an association between qualitative variables, ANOVA (Chi-square) was used to determine whether associations were statistically significant.

4. Data Analysis

Initially, we verified that the participants were 44 years old on average (77% were older than 37); most were male (57%); married or in a stable union (73%); with at least one child/dependent (70%); and an average family income of approximately R$10,800. Regarding the sample's professional profile, 52% worked one shift only, and the other half (48%) taught two or more shifts. Most respondents (62%) were hired by private HEIs and reported teaching was their vocation (78%). Regarding academic degrees, only 32% of the professors had a doctoral degree. In general, they presented an average of 14.4 years of teaching experience (the professors were 30 years old on average when they initiated their careers, a median equal to 29, and a standard deviation of 6.7). The faculty members of the Accounting Sciences Programs included professors from various fields of knowledge, considering the highest degree: Business Administration (23%), Accounting Sciences (45%); Law (3%); Economy (4%); Production Engineering (5%), and other fields (21%).

The professors' responses concerning their workload show that the respondents taught 16.1 hours/classes on average, most (50%) of the respondents taught only in the evening shift. A variation was found in this item due to the respondents' sex (women reported 17.2 hours/classes on average, while men reported 15.2, p-value=0.01). Those teaching only one shift spent 14.8 hours in a classroom, while those who taught two shifts spent 17.6 hours/classes a week. The respondents teaching three shifts spent approximately 17.5 hours/classes a week. These differences were considered statistically significant (p-value=0.01).

A difference was also found in the number of hours taught by the professors in private HEIs compared to other HEIs, a difference considered statistically significant (p-valor=0.00). These professors reported they spent 17.4 hours in a classroom, while a substitute teacher taught 16.5 hours/classes, and a public servant (tenured professor) spent 13.8 hours/classes on average. When asked whether they had another job, 55% of the respondents reported another job.

Regarding the respondents' perception regarding their physical and mental health, most considered themselves healthy; 78% reported their mental health was good or very good, even though their perception regarding their physical health was slightly inferior (72%). As for a negative perception, approximately 1/3 of the respondents reported their physical health was either very poor, poor, or fair. Another 1/4 of the respondents rated their mental health as either very poor, poor, or fair.

4.1 Respondents' Stress Level

The mean Cronbach's alpha obtained in this study was 0.945 (Table 1) for the 26 items, while for the six dimensions individually, the one with the lowest degree of internal structure was "Time/Resource Difficulties" and the one with the highest degree was the dimension "Student Misbehavior". The normality test indicated that the variables were not normally distributed (p-value<0.01).

Table 1 shows that the general level of moderate stress (variable produced by summing the scores of the dimensions presented by the Teacher Stress Inventory) of the respondents was 82 points, representing 63% of the maximum level measured by the instrument used. Additionally, the dimension that contributed the most to professors' stress levels was student misbehavior, and the one that contributed the least was the relationship with colleagues dimension.

Table 1
Professors' Level of Perceived Stress According to Dimension

	Data per Respondent							
Dimension	Score	Mean Score	Standard Deviation	Maximum Score	Minimum Score	Mean Rate	Cronbach's alpha	Normality test
Student Misbehavior	12.268	20.0	6.0	30.0	6.0	67%	0.895	0.00
Workload	12.022	19.6	5.5	30.0	6.0	65%	0.856	0.00
Professional Recognition	9.511	15.5	4.6	25.0	5.0	62%	0.818	0.00
Time/Resources Difficulties	9.365	15.3	4.6	25.0	5.0	61%	0.800	0.00
Relationship with Colleagues	7.097	11.6	4.0	20.0	4.0	58%	0.828	0.00
General Stress Level	50.261	82.0	20.6	130.0	29.0	63%	0.945	0.00

According to the literature, this level of self-reported stress is only below the level reported by Lorenz, Benatti, and Sabino (2010), in a study addressing the nurses of a Brazilian university hospital and that reported by Caeiro (2010) addressing primary school teachers in Portugal. These findings indicate a need for future studies to verify how the level of stress perceived by college professors compares with other professions. The high-stress level perceived by the sample addressed here is consistent with the studies conducted by Gmelch, Wilke and Lovrich, (1986); Blix et al. (1994); Carloto (2004), Moeller and Chung-Yan (2013), El-Ibiary, Yam and Lee (2017) Soares, Mafra and Faria (2019).

The Demand-Control-Support Model is a three-dimension model designed by Robert Karasek Jr. to assess the psychosocial aspects of work (Karasek Jr. 1979; Theorell et al., 1988; Melo et al., 2004). This model relates workers' levels of control and support with psychological demands arising from the workplace and the repercussions on workers' psychological and organic structure.

Psychological demands refer to situations from the work environment imposed on workers: intense concentration, work under time pressure, and the number of tasks to be performed (Reis et al., 2006). For this reason, control and support mediate stress individuals experience, working as instruments to balance or overcome distress. Control involves two groups of factors: 1) the use of skills: creativity, learning new things, different tasks, and the development of special skills; and 2) decision-making authority: freedom to decide on how to perform tasks, the possibility to give an opinion about work tasks, and to influence the managerial policy (Reis et al., 2006). The support dimension also presents two groups of factors intended to measure the relationship with co-workers: affectivity involving the relationship and support received; and the general situation of the work environment.

Karasek Jr. (1979) and Theorell et al. (1988) propose that demand and control-support levels are simultaneously assessed, relating these dimensions to assess levels/types of specific work situations. Different work situations emerge when levels of demand and control-support are combined: 1) high demand: combining high demand and low control-support; 2) active job: high demand combined with high control-support; 3) passive job: low demand is combined with low control-support; and 4) low demand: low demand is combined with high control-support.

Based on this theory, DC-S presented a general Cronbach's alpha of 0.785, the dimension with the lowest alpha was Control (0.615 – Table 2), and the highest was Support (0.887). Considering the responses of 614 professors, the normality test shows that the dimensions are not normally distributed (p-value<0.01).

Table 2
Levels of Demand, Control, and Support Presented by the Professors in each Dimension

Dimension	Score	Data per Respondent					Cronbach's alpha	Normality test
		Mean Score	Standard Deviation	Maximum Score	Minimum Score	Mean Rate		
Demand	9,038	14.7	2.1	20	7	74%	0.712	0.000
Control	12,125	19.7	2.3	24	6	82%	0.615	0.000
Support	11,505	18.7	3.5	24	7	78%	0.887	0.000

Note that the mean of the scores assigned to the dimensions was relatively high because the dimension with the lowest mean was "demand," with a mean of 14.7, representing 74% of the maximum score possible. As for the dimensions' factors, the item "How often do you work intensively (i.e., have to do much in little time)?" was the one the professors reported most frequently. In the Control dimension, the factor "Does your work demands many skills or specialized knowledge?" presented the highest mean. Finally, the item "I get along well with my superiors at work" obtained the highest mean in the Support dimension.

Regarding the prevalence of the type of Demand-Control-Support, Table 3 shows that 82% of the professors were classified under Active Job. The respondents identified many stressors in the academic environment but were not significantly affected due to the Control-Support level they enjoyed. These results indicate that the sample has not intensely suffered from stress arising from their jobs as college professors.

Table 3
Prevalence of the Type of Demand-Control Among Professors

Classification	General Frequency	
	General	%
Low Demand	74	12%
Active job	501	81%
Passive job	11	2%
High Demand	28	5%
Total	614	100%

4.2 Inferential Analysis

The regression model was estimated, as reported in the method section, to determine the effect of Demand, Control, and Support (DCS) on promoting (Demand) or modulating (Control and Support) professors' perceived stress (See Appendix 1). After estimating data, a test was performed to determine eventual restrictions concerning heteroscedasticity (White Test), multicollinearity (VIF), and specification error (Ramsey RESET). The model presented a heteroscedasticity problem (p-value of 0.0061). Therefore, the model analyzed is shown in Table 4. It was estimated according to the robust Stepwise method, assuming 5% significance. That said, the problem of multicollinearity was analyzed, which presented values below 1.26 (for the Support variable) and 1/VIF of 0.791134 (average VIF of 1.13). Finally, the specification error test indicated that the model (Robust Stepwise) presented this problem (0.0098). However, it was assumed that this issue emerges when using only significant variables in the model.

Table 4

Estimation of the Robust Model According to the Stepwise Method

Variable	Coefficient	Standard Error
Support	-1.24236***	0.20856
Demand	3.29505***	0.34544
Control	-0.86741***	0.29324
Family Income	-0.00046***	0.00011
Sex	4.42681***	1.46682
Teaching in the Morning shift	9.99983***	2.50788
Teaching in a Public HEI	3.21721**	1.50533
Perception of Mental Health	-2.73916***	0.94234
Satisfaction with Students	-2.39690***	0.81109
Job Satisfaction	-1.80456**	0.86285
Constant	102.37570***	8.60855
Prob> F		0.0000
R^2		0.3484
R^2 Adjusted		-

***p<0.01. **p<0.05 and *p<0.1

Thus, considering this study's sample, we verified that the theory proposed by Karasek Jr. (1985) presented a significant explanatory relationship with the professors' perceived stress (p-value<0.01). It means that demand had a positive effect (coefficient of 2.64) on stress, while the higher one's perception of Control (coefficient of -0.72) and, mainly, of Support (-1.40), the lower one's perception of stress, a result that corroborates Moeller and Chung-Yan (2013), Lima and Lima-Filho (2009), Katoaka et al. (2014), and Rodrigues, Hinojosa, and Ramírez (2014).

This result indicates that, when demands are combined with control and support, as defined in the model proposed by Karasek Jr. (1985), they have a similar influence on the stressor-tension relationship for the different types of stressors present in a university environment, such as students' misbehavior, workload, professional recognition, lack of resources, and relationship with colleagues, according to the dimensions of the Teacher Stress Inventory. The DC-S model proposes that when high demands are associated with high control-support (that is, active jobs), individuals are motivated to face the challenge of overcoming demands.

In effect, support-control works as a valve to relieve the pressure of demands, displacing obstacles (stressors) to motivate adaptation and keep an individual in eustress. Therefore, even though stress can contribute to distress and potential illness (Garcia & Benevides-Pereira, 2003; Murofuse, Andranches, & Napoleão, 2005), stressors might also work as motivators, as they are stimuli and cause an adaptation at another level, undoubtedly a superior state when an individual faces and overcomes a demand. Stressors, whether they are environmental, psychological, or contextual, have only the ability to trigger a stress response; that is, this response will be mediated according to each individual's ability to deal with new or adverse situations and coping strategies available or learned during their life history (Aragão et al., 2009).

If experience, previous knowledge, and deduction of circumstances are similar to those previously experienced, the discrepancy between what is observed or experienced and what is expected or planned will be reduced, eliciting compensatory responses specific to each stimulus and organism (Garcia, 2008). For this reason, based on the evidence presented here, the pertinent issue is that HEIs should ensure that professors perceive they do have control over their work environment and support to mediate their perceptions of stress experienced in the academic milieu, preventing chronic stress.

The results show that the professors' perceived stress was reasonable (note that the constant equal to 102.37 was also significant), and for this reason, they needed mediators so they would have the resources to maintain homeostasis. It is essential considering that changes in the role of professors, as noted by Byrne et al. (2013), added occupational stressors that were not traditionally characteristic of universities.

Regarding descriptive variables, the model indicates that Family Income is significant in decreasing stress perceptions. Hence, we need first to highlight that it should be understood as a predictor of social well-being, considering there were no other variables to capture the effect of this construct and that it indicates access to health, leisure, education, and security. Therefore, Family Income appears as a mediator of the respondents' perception of stress, considering its coefficient (-0,00046) and significance (p-value=0.000).

According to Faro (2015), the lower one's socioeconomic status, the greater an individual's vulnerability. On the other hand, the author notes that as income increases, the less one is exposed to stressful contexts, as more material resources minimize stressors associated with low quality of life and social adversities linked to poverty. Therefore, even though income does not entirely reflect the impact of socioeconomic status on stress, it represents an important variable in quantifying exposure and activation of adaptive psychosocial resources provided by financial status (Faro, 2015, Layte et al., 2019).

As for the fact that women have a higher perception of stress than men, some authors propose potential social and biological explanations. Gmelch, Wilke, and Lovrich (1986) and Calais, Andrade, and Lipp (2003) suggest that, from a social point of view, despite advancements in gender inequality, women still deal with more demands than men. Gmelch, Wilke and Lovrich, (1986) consider that women deal with family demands while their partners are not expected to heed these demands in the same proportion. Additionally, women perform more activities than men in HEIs. Note that the academic milieu is sensitively sexist, giving preference to men over women when distributing resources or even in the interpersonal relationship between professors and students (Gmelch, Wilke, & Lovrich, 1986).

Calais, Andrade, and Lipp (2003) report that, from a biological point of view, women are more sensitive to psychological problems related to depression, anxiety because of estrogen, which can produce neuroprotection to developmental disorders (e.g., schizophrenia) and degenerative diseases (e.g., Alzheimer), due to clinical functions, increasing their stress response.

Regarding those who teach in the morning shift, the survey reveals that these individuals are more sensitive to stress than professors teaching in other shifts. The influence of the circadian cycle may explain this. It generally peaks when waking up and decreases over the day until reaching its lowest level at night, resulting in greater sensitivity to stress in the morning (Dalri, 2013).

The model indicated that teaching in a public HEI was a situation that increased the professors' stress level when compared to other types of job contracts, in line with other studies (Gillespie et al., 2001; Kataoka et al., 2014). This fact possibly arises from the context of a teaching career (Moeller & Chung-Yan, 2013) in public HEIs. Even though these workers benefit from job stability, they are required to perform management and extension activities in addition to their roles as educators and researchers.

Regarding the respondents' mental health perceptions, this study shows that the more positive one's perception, the lower stress levels are reported. According to Lazarus and Folkman (1984), an individual's perception and cognitive interpretation when facing a given situation are crucial to triggering a stress response. Therefore, if an individual perceives that s/he has appropriate mental health conditions, s/he will be able to more efficiently mobilize energy to deal with occupational stressors.

The last variable analyzed, satisfaction, negatively mediated stress. Job satisfaction concerns how professors assess their jobs, making positive or negative assessments. Hence, one naturally expects this interaction to be one of the factors intensifying or alleviating stress (Gmelch, Wilke, & Lovrich, 1986). Gmelch, Wilke, and Lovrich (1986) highlight that the satisfaction of professors toward their students concerns an assessment of the level of appreciation they receive for the effort and investment applied to prepare classes. Hence, the more professors are satisfied with their students, the more appreciated they feel, which results from a feeling of being recognized for their efforts to improve the quality of teaching.

5. Final Considerations

This study's objective was to identify evidence concerning the effect of demand, control. and support on self-reported stress among professors from Accounting Sciences undergraduate programs from Brazilian Higher Education Institutions and their relationships with socioeconomic variables. Initially, the stress perception of professors who answered the questionnaire was moderate, considering the maximum level measured by the instrument (Teacher Stress Inventory); the mean score was 63%.

It is interesting to note that various demographic factors presented a significant association (p-value<0.1) between stress perception, when analyzed in isolation: age, sex, number of dependents, family income, type of HEI, years of experience as a professor, number of hours spent in a classroom, whether the individual has another job, perception regarding one's physical and mental health, and level of satisfaction with HEI, manager, students, colleagues, course, and remuneration.

This result confirmed what was expected: stress among professors is a complex phenomenon (Seidl & Zannon, 2004) and is a motive of great social concern. The reason is that when stressful events constantly permeate the academic environment, negative psychophysiological responses may be triggered among professors, affecting their performance and interaction with the organizational environment, consequently influencing the students' learning.

Regarding this study's primary objective, evidence supports a significant (p-value<0.01) and negative relationship between the level of stress and control and support perceived by professors. On the other hand, the more the respondents perceived demands in their workplace, the more positive their perception of stress (p-value<0.01).

The professors realize they face significant demands, as 81% were classified under Active Job; the respondents' mean score concerning the perception of demands was 14.7 (mean prevalence of 74% of the maximum score measured by the DC-S). Because of the regulating role control and social support in the work environment play, however, the respondents did not experience distress. This means that, even though the environment presents high demand levels, the professors tend to remain in a eustress state preserving their mental and physical health.

The fact is that, in general, professors enjoy a high level of autonomy (mean score of 82%) to plan their activities within and outside the classroom and perform daily tasks. Additionally, a perception that their work environment is a pleasant place permeated with good relationships with co-workers (including managers) explains the low level of emotional distress perceived. Therefore, the greater control one has over her/his work and support received, the lower the production of stress hormones, positively impacting the workers' mental and physical health.

Still, this study's results cannot be understood as if professors do not demand care, attention, or investment in the workplace. The fact that professors efficiently deal with academic stress shows a need to maintain and preserve this context. In this sense, it is worth noting that that 1/4 of the respondents perceived their physical and mental health to be somewhat inadequate, indicating potential emotional burnout. Stress disrupts internal homeostasis, demanding individuals to adapt. If one's adaptability is limited, if stressors are not suppressed, or if an individual is unable to deal with stress, physical and psychological burnout may result, and diseases manifest with the potential to be permanent or even fatal, also favoring the emergence of psychosomatic pathologies.

Considering the previous discussion and the importance of work for one's socioeconomic situation and well-being, the difficulties imposed by stress are painful, so mitigating stress is vital. Additionally, the quality of higher education depends in great measure on a high-quality faculty. Therefore, the various agents involved with teaching within higher education institutions (including professors) should seek mechanisms that enable positive coping with stressors, especially those inherent to the profession.

This study's limitations are based on two aspects: sample and data collection instrument. This first aspect is because there is no database in Brazil containing the data and characteristics of professors working in Accounting Sciences programs. Hence, it is impossible to determine a probabilistic sample to analyze how stress affects all the professors. Therefore, this study adopted a non-probabilistic convenience sample, which does not allow for the generalization of results. For this reason, we sought to reach as many respondents as possible.

The limitation concerning the instrument is associated with the fact that various measures (such as the stress inventory) are self-reported instruments, which can only provide an approximated perspective of the event, considering the questionnaire collects the respondents' perceptions. To mitigate the problem, validated tools were used to expand the reliability of data and its comparability.

Future studies are suggested to deepen knowledge regarding burnout and depression triggered by the persistence of academic stressors. Another possibility would be to investigate the stress reported by (cisgender and transgender) women teaching in Accounting Sciences programs. This study reports on something well documented: mental distress is higher among women than men and, for this reason, understanding how this situation occurs in universities could lead to coping strategies intended to mitigate the prevalence of this condition. Additionally, through a longitudinal study, the situation of most professors was classified under active job, so that it would be interesting to investigate how professors respond to adversities faced in their careers: moral harassment, lack of motivation toward their careers, coping strategies, and post-pandemic changes.

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Appendix 1

Model Estimation with all the Variables

Variables	Coefficient	Standard error
Support	-1.089650***	0.279717
Demand	3.250501***	0.365355
Control	-0.954328***	0.331342
Age	-0.023955	0.117079
Sex	4.600769***	1.548697
Married	4.168706	8.008532
Single	1.043083	8.175797
Divorced	5.268972	8.419474
Number of children	0.921707	1.142500
Dependents	-3.069958	2.556226
Teach at Evening	2.319385	1.745730
Teach at the Morning	10.606050	7.282451
Family Income	-0.000415***	0.000131
Teach in a Public HEI	3.430405*	1.820489
Doctoral degree	-0.131680	2.522063
Master's degree	0.437154	2.024721
Highest Degree in Accounting	1.969760	3.331775
Highest Degree in Business Administration	-0.119562	3.482935
Highest Degree in Economics	-0.681828	4.896584
Highest Degree in Law	0.761807	5.453118
Highest Degree in another field	0.801266	3.546956
Years of Experience with Teaching	-0.067370	0.134433
Perception Regarding Physical Health	0.234871	1.092445
Perception Regarding Mental Health	-2.761007**	1.124160
Use Chemical Substances	-1.067266	1.482670
Have a Severe Disease	2.021688	4.224041
Hours/Classes per week	0.099631	0.088608
Have Another Job	-2.438433	1.598887
Have a Management Position	1.322541	1.514128
Has a Vocation to Teach	0.128018	1.711714
Job Satisfaction	-1.682574	1.087556
Satisfaction with the HEI	-0.622341	1.120036
Satisfaction with the Manager	0.259252	0.887594
Satisfaction with the Students	-2.155764	0.898732
Satisfaction with Colleagues	-1.167080	1.120685
Satisfaction with the Courses	2.018349*	1.155641
Satisfaction with the Remuneration	-1.012969	0.821086
Constant	96.190250***	13.296200
Prob> F		0
R^2		0.3689
R^2 Adjusted		0.3284
***p<0.01, **p<0.05, and *p<0.1		