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Competitiveness in university research and its impact on professors' mental health: an exploratory analysis of demands and resources

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Abstract

The adoption of a highly competitive university model that emphasizes excellence and national accreditation has induced substantial transformations and systemic pressures on Spanish academics. When engaged in teaching, research, and managerial roles, university professors face challenges that adversely affect their mental health. This research explores this topic further by adopting the job demands–resources theoretical framework to analyse the relationships between role stress (RS), social support (SS), and mental health (MH), including work engagement (WE) as a mediator construct. The empirical study, conducted through surveys, administered a questionnaire to 340 Spanish academics in the field of social sciences. Using partial least squares (PLS) and necessary condition analysis (NCA), the study validates the hypothesized relationships, demonstrating the strong and direct impact of job demands and resources on the mental health of university academics. The results indicate that RS had a relationship of necessity and a negative correlation with MH through WE. In contrast, SS had a direct positive effect on MH both independently and through the mediation of WE. Finally, WE revealed not only a relationship of necessity but also a direct positive impact on MH. This paper contributes valuable insights that have the potential to shape policies and interventions aimed at fostering a healthier, less competitive, and more supportive academic environment.

Keywords: *mental health, role stress, social support, work engagement, university, academics*

JEL Classification: I23, J24, J28, M50, M54

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1. INTRODUCTION

In the evolving landscape of higher education, the dynamics of academic staffing and employment trends have become a focal point of analysis for policy-makers and educational scholars alike. This sector is confronted with considerable difficulties in the recruitment (Ogunode & Emmanuel, 2023) and retention of qualified faculty members. On a global scale, issues such as insecure employment contracts, limited financial resources, and an aging workforce are contributing to an increasing scarcity of academic personnel (Yin et al., 2024).

The Spanish higher education system, a microcosm of global academic shifts, presents a unique case study in this regard. With an increasing emphasis on flexibility and diversity in teaching staff, Spanish universities have been navigating a transformative era, marked by both growth and challenges. The Spanish Ministry of Universities in its 2023 report, presents a document indicating the current state of higher education in Spain, accompanied by a detailed analysis. It includes comprehensive statistical data on the number of faculty members, the distribution between permanent and temporary contracts and employment conditions. The data paint a complex picture: the Spanish Ministry of Universities, in its annual report, has noted a trend since 2012, namely, an approximate increase of 9% in the total number of academic and research personnel (encompassing both public and private universities). Concurrently, there has been a noticeable decline of nearly 15% in the number of permanent research teaching staff

during the same period. Furthermore, the most recent data available for the academic year 2022-2023 reveal that associate lecturers now represent a substantial portion of the academic workforce, comprising 43.2% of the total contracted academic staff (Ministerio de Universidades, 2023). This trend reveals that a significant percentage of the teaching workforce at Spanish universities comprises nonacademics, individuals whose primary professional commitments are outside the academic institution.

Statistical analysis also highlights the challenge of demographic diversity in this field. Individuals under 30 years barely reach 2.3% of the total, whereas professors aged over 50 constitute a dominant majority, exceeding 50% of all academic and research staff (Ministerio de Universidades, 2023). Consequently, many scientific areas are already expressing concern about generational transition and the looming difficulties in filling these vacancies. The prevalence of temporality, unfavourable working conditions, and precarious contractual arrangements (Torrado & Duque-Calvache, 2023; Bone, 2021; Murray, 2019) significantly deter candidates from considering an academic career as an appealing option for their future. Owing to these circumstances, previous studies in many countries have reported alarming insights into the negative impact on professors' work-related well-being and mental health (Creely et al., 2022; Salimzadeh et al., 2020).

Given the challenges prevalent in the professional world at large and the dynamic nature of higher education in particular, understanding how various stressors (referenced in studies by Han et al., 2020; Teles et al., 2020) and resources impact the mental health and engagement of faculty members is crucial. This understanding is essential for addressing the specific needs and pressures faced by this group within the academic landscape. In this context, numerous scientific studies across diverse workplaces and sectors have consistently shown that work engagement has a positive influence on overall well-being (Mazzetti et al., 2023; Hauff et al., 2022; Wang et al., 2022; Tisu et al., 2020; Knight et al., 2019).

Previous research, including Ghislieri et al. (2022), highlights the increasing demands placed on academics that extend beyond teaching to encompass research responsibilities. While imparting knowledge was traditionally the primary focus of university professors, the contemporary academic landscape has undergone a significant transformation (Ahmad et al., 2022). This change reflects a broadened scope of responsibilities and expectations for those in academic roles. Therefore, owing to the unique challenges and specific resources inherent in the academic context, the well-established job demands–resources (JD–R) theory model, originally proposed by Demerouti et al. in 2001, was selected for testing and expansion, with a focus on university professors. This expansion includes examining the relationship between work engagement and mental health in this demographic, offering new insights into how the model applies in the unique context of academia. First, this research proposes that job demands negatively impact both the work engagement and the mental health of academics, and second, it suggests that job resources positively influence these two constructs.

Multiple professional sectors, including the health care and hospitality industry (Agarwal, 2021; Søvold et al., 2021; Shi et al., 2021; Vanhaecht et al., 2021), have extensively investigated the mental health and well-being of their employees. Moreover, most research related to educators' mental health has focused on the specific challenges and assets among teachers in primary and secondary educational settings (Toropova et al., 2021; Asaloei et al., 2020). However, within this framework, a major gap exists, especially regarding Spanish university professors, concerning the examination of the distinct demands faced by academics: namely, role stress arising from the dual responsibilities of teaching and research, as well as the positive impact of specific resources such as social support. Additionally, few studies address the influence of

work engagement as a mediating factor of academics' mental health within the job demands–resources model.

Previous studies on academics (Han et al., 2020; Salimzadeh et al., 2020) have focused primarily on job satisfaction, with significantly less attention given to mental health. Given the increasing importance of mental health, particularly among university professors, this study addresses a critical gap in the literature. Unlike previous studies that have targeted different objectives, such as emotional exhaustion or perceived stress (Xu & Wang, 2023; Fernández-Suárez et al., 2021; Teles et al., 2020), our work focuses on the relevance of mental health, distinguishing itself by examining the unique demands and resources inherent to the academic profession. This focus includes factors such as social support from family, supervisors, and colleagues, as well as role stressors such as role ambiguity and role conflict. Furthermore, incorporating work engagement as a mediating variable strengthens the study, offers new perspectives and contributes to the existing body of knowledge. Additionally, unlike other works (Mousa et al., 2023; Creely et al., 2022), this study applies various statistical techniques to test its hypotheses.

The aim of this study is to bring attention to this issue through the application of the JD-R model, showing how the different demands and resources affect work engagement and mental health of university professors. Therefore, this paper proposes that certain job demands and resources act as precursors to work engagement and mental health. Our research suggests that role stress impacts negatively both work engagement and academics' mental health, while social support has a positive influence on them. Also, work engagement directly influences positively professors' mental health.

Aligning with the views expressed by Ahmad et al. (2022) and Martini et al. (2019), it is imperative to conduct empirical investigations. These investigations should aim to thoroughly examine how specific demands and resources in the academic environment impact professors' overall mental health. This approach is crucial for comprehensively understanding and effectively addressing the unique challenges faced by university faculty in the current academic landscape.

The paper is structured as follows. Section 2 introduces the theoretical background outlining the current state of the art and the research hypotheses. Section 3 presents the sample, the methodology and the data analysis. Section 4 shares the main results and findings of the research, followed by a discussion highlighting the contributions of the research and contextualizing them within the literature. Finally, Section 5 presents the conclusions and limitations and suggests directions for future studies.

2. THEORETICAL BACKGROUND

The examination of the Job Demands-Resources (JD-R) model in the context of university settings, is crucial for understanding the dynamics of academic work. This model is particularly relevant as it provides a structured approach to exploring the influence of job demands and resources on work engagement and mental health among academics. Furthermore, while there is growing awareness of mental health issues within academia, empirical studies specifically examining these challenges through the JD-R model are limited. By focusing on this research gap, our study aims to provide a deeper understanding of how job demands and resources as well as work engagement affect the mental health of academic staff, thereby contributing to the development of effective support systems within higher education institutions.

Universities are not only educational institutions but also centers of research and innovation. Analyzing the following different constructs through the Job Demands-Resources (JD-R) model will provide a global context of how universities manage and balance the diverse demands placed on them and the resources available to their academic staff. This perspective helps in understanding the environment in which faculty staff operate, revealing how systemic factors affect their engagement and mental health. From a broader perspective, universities play a pivotal role in promoting long-term societal progress by facilitating critical thinking, social mobility, and cultural development. By addressing the needs of both students and society at large, universities contribute to the creation of more informed, equitable, and sustainable societies.

2.1 Job Demands–Resources Model for Universities

Universities are constantly facing new scenarios that lead to significant changes in conventional research methods as well as in the criteria for assessing quality, consequently affecting their growth and progress.

The job demands–resources model (JD–R model) aims to demonstrate the effects of the work environment on employee well-being and performance (Demerouti et al., 2001). Since its initial formulation, the JD–R model has been used in many studies. Bakker et al., (2023), Bakker & de Vries (2021), and Lesener et al., (2019), among many others, use it to predict variables such as work engagement, job satisfaction and burnout (Mazzetti et al., 2023; Barello et al., 2021).

This model presents a theory from the perspective of both job demands and available job resources. The first perspective refers to the psychological or organizational aspects of work, which can generate physical and emotional exhaustion in employees. The second perspective encompasses work-related elements that help workers achieve their goals and objectives and reduce stress while improving their well-being. Equipping employees with appropriate work resources—including autonomy, promotion opportunities, and social support—will lead to increased engagement and job satisfaction. Consequently, this assistance is expected to result in improved job performance (Bakker & Demerouti, 2014; Bakker & Demerouti, 2007). The model underscores the importance of providing a supportive and empowering work environment to foster employee well-being and productivity.

While this model has diverse applications in various occupational domains, such as health care and hospitality (Eder & Meyer, 2023; Midje et al., 2023; Lei et al., 2021; Öksüz, 2021), the lack of attention to the well-being and mental health of academics, as noted by Huang & Wang (2022) and Signoret et al. (2019), highlights a gap in the literature. This gap underscores the need for more focused research in this specific area to better understand and address the unique challenges faced by this group. In addition to their primary duty of teaching, professors in higher education are also actively engaged in academic research. This dual role underscores the multifaceted nature of their responsibilities within the academic environment (Pace et al., 2021) according to the Humboldt model (Schimank & Winnes, 2000). This model, which was formulated by Wilhelm von Humboldt at the beginning of the 19th century, postulates the idea of the university as “the unity of teaching and research”. This model has gained significant popularity and widespread adoption among European universities.

The landscape for academics has undergone significant transformations due to numerous reforms. Factors such as reduced funding, precariousness, heightened job insecurity, conflicting research and teaching demands and limited opportunities for promotion have further exacerbated the situation (Spina et al., 2022). In a context marked by limited resources and

pressures from institutional rankings, these circumstances place academics in a heightened state of vulnerability. This environment often leads to negative consequences for academics' mental well-being as they navigate the challenges of balancing demanding roles with limited support structures.

Within the framework of the job demands–resources (JD–R) model, the multifaceted role of academics introduces a variety of demands. These include but are not limited to heavy workloads, administrative tasks, and role stress, as noted by Converso et al. (2019). Furthermore, potential power abuses, highlighted in the work of Goodboy et al. (2022), and the challenging endeavour of achieving good work–life balance are also important elements. These demands collectively contribute to the complex and often stressful work environment faced by university professors. Simultaneously, academics benefit from resources such as social support and job control, which play pivotal roles in helping them navigate the intricacies of their profession (Martini et al., 2019).

2.2 Job Demands of Academics: Systemic Pressures and Role Stress

The National Agency for Quality Assessment and Accreditation (ANECA, representing the Spanish acronym) has assumed a substantial role in academic accreditation, evaluation, and assessment in Spain (García-Juanatey et al., 2019). ANECA holds the responsibility of conferring accreditation to various academic categories within both public and private universities (Hinojo-Lucena et al., 2023). Therefore, scaling to specific academic positions needs not only the fulfilment of individual university requirements but also a favourable appraisal.

ANECA ensures consistency and transparency and serves to maintain high-quality standards and promote excellence in Spanish universities. However, certain studies, such as Ràfols & Molas-Gallart (2022), have raised concerns regarding the inflexibility of assessment criteria and the administrative procedures involved in individuals' pursuit of entry or progress. Additionally, other studies have questioned the efficiency of evaluation processes, in addition to excessive technical judgement (López-Cozar et al., 2022; Repiso et al., 2020). Amidst these circumstances, researchers are under pressure and face difficulties in their professional development. These systemic pressures lead to a negative impact on both work climate and mental well-being, increasing academics' stress levels (Mula-Falcón & Caballero, 2023). Therefore, systemic pressure was included as a control variable in our study.

Moreover, age was also designated as a control variable. Considering age in the study of university professors' mental health is crucial because of its significant impact on well-being (Heiden et al., 2021). Age is correlated with different career stages, responsibilities and work-life balance, all of which influence how professors experience and manage stress (Guillén-Gámez & Mayorga-Fernández, 2020; Teles et al., 2020) and how it affects their mental health. While younger professors might contend with precarious employment, temporary contracts, and unfavourable working conditions, older professors may have the advantage of job security but may also be required to fulfil more administrative responsibilities, mentoring roles, or higher research expectations. By examining age, this study can provide insights into how specific stressors impact mental health in academia and highlight the unique issues faced by professors at different life and career stages.

In addition to these pressures, faculty members confront difficulties in their daily demands, particularly through the complexities of role stress, encompassing both role conflict and role ambiguity (Han et al., 2020; Xu, 2019). According to Newstrom (2011), a role is defined as the

expected set of behaviours an individual exhibits while involved in activities associated with others. In the contemporary workplace, role stress is recognized as a critical psychosocial risk. It is significantly correlated with emotional exhaustion and depersonalization, profoundly impacting individuals' health and well-being (Tang & Li, 2021).

On the one hand, role ambiguity occurs when an individual lacks adequate information regarding their occupational responsibilities (Rizzo et al., 1970; Kahn et al., 1964). The absence of clarity includes uncertainty about work objectives and achievement expectations (Raub et al., 2021), which contributes to worse job performance (Fried et al., 2008). Additionally, empirical evidence reveals that role ambiguity contributes to a decline in self-esteem, reducing work motivation and employee engagement (Maden-Eyiusta, 2021) owing to high stress levels (Orgambídez & Benítez, 2021). On the other hand, role conflict arises from incongruent work requirements (Rizzo et al., 1970; Kahn et al., 1964), inconsistencies in tasks or conflicting expectations (Awan et al., 2021), which negatively impact well-being (Nemteanu et al., 2021).

The nature of a university professor's role involves balancing strict research deadlines, heavy teaching loads, and increasing administrative duties. In fact, the responsibilities attached to each role often clash, resulting in conflicting demands that strain academics' well-being (Ahmad et al., 2022; Pace et al., 2021; Zábrodská et al., 2018). Role stress, as discussed by Cao et al. (2020), further exacerbates this situation. Managing challenging interactions with students, adhering to the parameters set by ANECA, and meeting the expectations placed upon them can significantly affect their overall performance (Yousefi & Abdullah, 2019). Moreover, this mental burden not only impacts their work performance but also spills over into their personal lives, affecting their work–life balance (Dorenkamp & Ruhle, 2019) and mental health (Hammoudi et al., 2023). Therefore, this framework leads to the following hypothesis:

H1: Role stress negatively impacts the mental health of university professors.

2.3 Job Resources of Academics: Social Support

Job resources encompass physical, mental, and social aspects within the workplace that serve dual purposes. According to Jolly et al. (2021), Mensah (2021), Fiorilli et al. (2019), and Foy et al. (2019), these resources not only alleviate job demands but also aid in achieving work-related goals. Additionally, they play a crucial role in fostering personal and professional development (Bakker et al., 2007; Demerouti et al., 2001). They are typically categorized as either internal or external resources. In terms of external resources, social support has been shown to enhance well-being and mental health (Hou et al., 2020). According to Williams and Cooper (1998), social support should be understood as the help one obtains by discussing problems or situations with other people.

In most research, social support in the workplace refers to personal interactions involving connections between supervisors and coworkers (Uddin et al., 2023; Jolly et al., 2021; Velando-Soriano et al., 2020). Indeed, numerous studies have established links between employees' perceptions of social support and various aspects of their work life, including quality of work, productivity, and work engagement (Fauchil et al., 2020; Wood et al., 2020).

With respect to academic background, Taylor & Frechette (2022) highlight that when university faculty members perceive a lack of social support, there is a heightened risk of compromising their well-being, leading to burnout and emotional exhaustion. Moreover, social support might serve as a buffer against the stress and pressure caused by unclear role expectations and conflicting demands between teaching and research (Heng et al., 2020).

However, while numerous studies focus on the relationships among supervisors and coworkers, it is equally important to emphasize the familial context (Usman et al., 2023; Molina, 2021). The influence and impact of family and friends on an individual's mental health and job performance are equally noteworthy. The support and interactions within these personal relationships play a critical role in shaping overall well-being and effectiveness in the workplace. This context has received limited attention from academics. Professors who feel recognized in their inner circle and are perceived as capable of handling their tasks experience lower levels of dissatisfaction while their motivation and engagement increase (Wang et al., 2022; Moeller & Chung-Yan, 2013).

Therefore, it is logical to consider social support as an essential resource in this profession, encompassing not only the workplace but also the familial sphere. Recognizing the integral role of social support in both professional and personal contexts is crucial (Li et al., 2022) for obtaining a holistic understanding of the factors contributing to job performance and overall well-being. Hence, this framework leads to the following hypothesis:

H2: Social support positively impacts the mental health of university professors.

2.4 The mediating role of work engagement in the relationships between role stress and the social support and mental health of university professors

Kahn (1990) defines engagement as the performance of organizational members in their job roles. This author notably led the way regarding the understanding of work engagement, stipulating that three specific psychological conditions must be fulfilled: meaningfulness, security, and psychological availability. Conversely, Bakker et al. (2008) conceptualize engagement as a positive, rewarding, and affective-motivational feeling and thus the antithesis of burnout syndrome. Schaufeli et al. (2002) conceptualize it as a positive work-related state of fulfilment characterized by vigour, dedication, and absorption and created the Utrecht Work Engagement Scale (UWES) to evaluate it. ‘Vigour’ is defined by elevated levels of energy and mental resilience during work activities. ‘Dedication’ indicates a profound emotional connection to one's tasks, encompassing feelings of importance, enthusiasm, and inspiration. Finally, 'absorption' is a state of full involvement and deep immersion in work, resulting in difficulties in detaching from professional duties. The definitions of vigour, dedication, and absorption within the UWES significantly align with Kahn’s categories of the physical, emotional, and cognitive aspects of work engagement (Bakker & Demerouti, 2007).

Previous research has shown that engaged employees are more likely to approach their work tasks from a standpoint of personal commitment, energy, enthusiasm, and passion (Xu et al., 2023; Dooris et al., 2021; Aryanti et al., 2020; Stojanovic et al., 2020), resulting in better performance (Borst et al., 2020). Work engagement among faculty members is a key factor, as it is a crucial predictor of not only their performance (Namaziandost et al., 2023) but also their well-being (Greenier et al., 2021) and mental health (Tisu et al., 2020), thereby fostering a stronger sense of belonging (Bjorklund et al., 2020) as well as professional and personal growth. Therefore, this framework leads to the following hypothesis:

H3: Work engagement positively impacts the mental health of university professors.

The concept of work engagement has gained significant attention from academics (Meng & Sun, 2019; Suong et al., 2019). Despite the traditional perception of universities as stable and prestigious environments, recent years have seen significant shifts. The amplified focus on research, coupled with an emphasis on teaching quality, as well as financial pressures and

increasing job precariousness (as discussed by Albayrak-Aydemir & Gleibs, 2023), has notably increased role stress among academic staff. This heightened role stress significantly impacts academics' engagement (Xu et al., 2023), challenging the previously held notions of academic work environments. Consequently, this framework leads to the following hypothesis:

H4: Work engagement negatively mediates the relationship between role stress and the mental health of university professors.

All these factors also have detrimental effects on academics' mental health (Johnson & Lester, 2022; Bone, 2021; Pace et al., 2021). According to Baba et al. (1998), work-related mental health is a state of unease in which individuals may experience anxiety, tension, stress, depression, and burnout due to unfavourable expectations and demands. Considering this scenario, factors such as work engagement (Tisu et al., 2020) as well as resources such as social support (Martini et al., 2019) might prove to be essential for professors to thrive in their roles, preserving their levels of well-being, mental health and work-life balance (Opoku et al., 2023). This framework leads to the final hypothesis:

H5: Work engagement positively mediates the relationship between social support and the mental health of university professors.

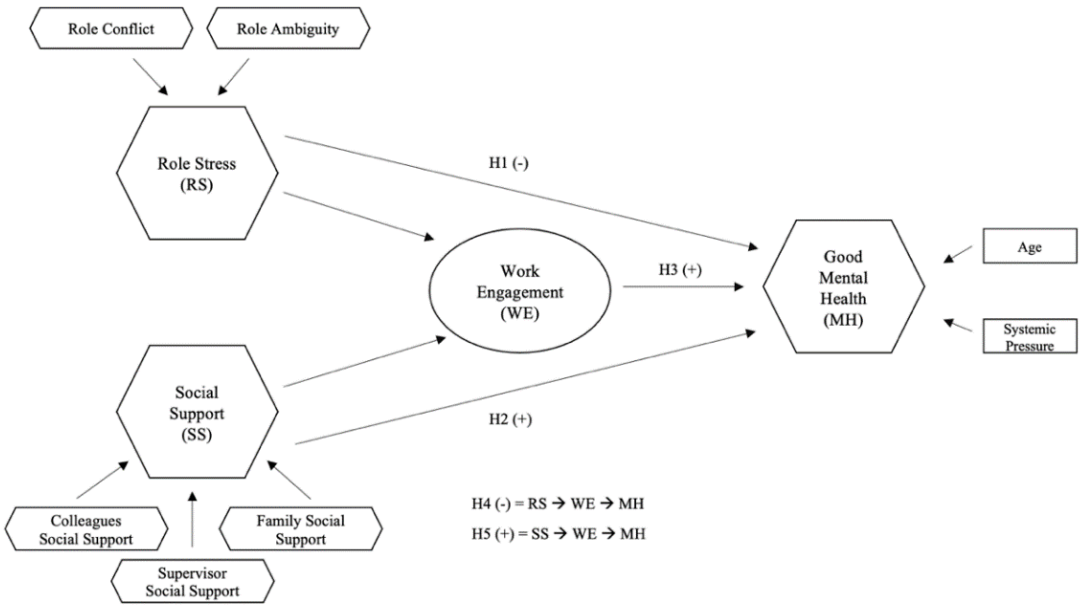

Fig. 1 – Research model. Source: own research

Nonetheless, a review of current research on work engagement and mental health in Spanish academia reveals a significant gap. Only a few studies have explored the connection between university professors' work engagement and its impact on mental health, specifically within the framework of the job demands–resources model (Han et al., 2020; Boyd et al., 2011). This gap indicates a need for more focused research to understand the intricate dynamics of these factors in the academic setting and prompts our specific research model (Figure 1).

3. RESEARCH OBJECTIVE, METHODOLOGY AND DATA

3.1 Procedures and Participants

This research specifically targets academics affiliated with Spanish universities in the social sciences area. The reason for this focus is the significance of this field, which comprises the largest proportion of Spanish professors (Ministerio de Universidades, 2023). Based on a report issued by the Spanish Ministry of Universities, the estimated population of specialized academics in social sciences is approximately 43,000 individuals, constituting 33% of the total scientific community.

The instrument chosen for data collection was an online survey. This tool was chosen since the digital format gives individuals more flexibility in responding. Moreover, before its distribution, six experts were selected for a preparatory phase that involved testing and piloting.

This survey was disseminated through several mailing campaigns, targeting approximately 1,300 individuals. The distribution efforts included contacts with board members of various associations, aiming to reach a broad and relevant audience within the academic community, particularly in the social sciences area at Spanish universities: the Academy of Innovation, Entrepreneurship, and Knowledge Conference (ACIEK), the Association of Young Researchers in Economic Sciences and Business Management (AJICEDE), the European Academy of Management and Business Economics (AEDEM), the Spanish Association of Academic and Professional Marketing (AEMARK), and the Spanish Association of Accounting and Business Administration (AECA). In addition, direct contact was made with various departments of Spanish universities from October 25th to November 30^{th,} 2023.

Once the participants consented to take part in the survey, they were presented with an initial explanation that outlined the primary objectives of the research. This introduction served to inform them about the purpose and significance of the study, ensuring that their participation was both informed and aligned with the research goals. The survey captured 352 responses from research assistants to full professors (the response rate was over 25%).

The sampling followed a simple random method with a margin of error of approximately 5% and a confidence interval of 95%. The confidence interval and sampling error were selected for this study in accordance with the widely accepted standard for social science research (Simundic, 2008). After participants with more than 5% missing values and inconsistent responses were excluded, the final sample size was 340. The main demographics of the survey participants are displayed in Table 1.

Tab. 1 – Demographics. Source: own research

Gender	***n* (%)**
Male	177 (52%)
Female	157 (46%)
Missing values	6 (2%)
Age (years)	***n* (%)**
Under 30	23 (7%)
30 to 44	99 (29%)
45 to 55	132 (39%)
Over 55	76 (22%)
Missing values	10 (3%)

Academic Position	***n* (%)**
Full Professor	119 (35%)
Senior Lecturer	62 (18%)
Lecturer	52 (16%)
Assistant Professor	35 (10%)
Associate Lecturer	26 (8%)
Graduate Teaching Assistant	25 (7%)
Research Assistant/Predoctoral Fellow	17 (5%)
Missing values	4 (1%)
Seniority (Years of Experience)	***n* (%)**
Under 5	34 (10%)
5 to 10	113 (33%)
11 to 15	81 (24%)
16 a 20	85 (25%)
Over 20	21 (6%)
Missing values	6 (2%)
Income Level (Yearly)	***n* (%)**
Under 20,000 €	30 (9%)
20,000 € to 35,000 €	68 (20%)
35,000 € to 50,000 €	92 (27%)
50,000 € to 65,000 €	75 (22%)
65,000 € to 80,000 €	42 (12%)
Over 80,000 €	23 (7%)
Missing values	10 (3%)
University Type	***n* (%)**
Public	246 (72%)
Private	59 (18%)
Missing values	35 (10%)

3.2 Measures

The dependent variable of this research is the mental health of Spanish academics employed in either public or private universities. It is evaluated through the General Health Questionnaire (GHQ-12), which was originally introduced by Goldberg (1972). The questionnaire comprises 12 items crafted to assess recent emotions over the past few weeks. Examples of these items include questions such as "Have you recently been able to concentrate on whatever you are doing?" and "Have you recently lost much sleep over worry?". The participants rated their responses on a scale from 1, indicating "less than usual," to 4, indicating "much more than usual." This format is designed to capture a nuanced understanding of the participants' recent emotional states and experiences. All the items of the questionnaire are listed in Table 2.

This research also includes two independent variables, job demands (role stress) and job resources (social support), as well as a mediator, the work engagement construct. Moreover, the study controls two variables. First, the professors' age, and second, the level of pressure perceived by professors from the agency (ANECA) responsible for supervising the quality of university studies in Spain, are designated as systemic pressures. The latter is measured on a scale from 1 to 5, with 1 representing "extremely low pressure" and 5 representing "extremely high pressure".

The assessment of demands, focused on role stress, consists of two lower-order constructs: role conflict (5 items) and role ambiguity (5 items). These are measured via the subscale UNIPSICO (Llorca-Rubio et al., 2022), an adapted version of the scale initially developed by Rizzo et al. (1970), which is scored on a 5-point scale from 0 “never” to 4 “very frequently: every day”. Role conflict includes items such as “I receive incompatible demands from two or more people” and “I am asked to perform tasks for which I am not authorized” to evaluate stress or tension arising from contradictory demands. Meanwhile, items such as “I am aware of what my responsibilities are in my job” and “I know the criteria by which I am evaluated” refer to uncertainty about expectations or responsibilities (role ambiguity).

On the other hand, the measurement of job resources applies Caplan's (1975) social support scale, comprising items associated with supervisors, colleagues, and the family context. This questionnaire contains 12 items such as “How easy is it to talk to your colleagues?”, “How much does your immediate supervisor go out of his/her way to do things to make your work life easier?” and “How much are your family and friends willing to listen to your personal problems?”. These items are rated on a 4-point scale from 1, indicating "not at all," to 4, "very much."

Finally, work engagement is described in terms of vigour, dedication, and absorption, measured by the nine-item version of the Utrecht Work Engagement Scale (UWES–9S) developed by Schaufeli et al. (2006). Example items include the following: “At my work, I feel bursting with energy” (vigour), “I am enthusiastic about my job” (dedication) or “I am immersed in my work” (absorption). The responses are on a 7-point Likert scale ranging from 0 (never) to 6 (always, every day).

3.3 Data Analysis

This paper proposes that certain job demands and resources serve as precursors to work engagement and mental health. Moreover, our research suggests that role stress negatively impacts both work engagement and academics’ mental health, whereas social support has a positive influence on them. Additionally, work engagement positively influences professors’ mental health.

A cross-sectional survey is employed alongside partial least squares (PLS-SEM), a variance-based structural equation modelling technique, to test the research model. PLS-SEM contributes significantly to establishing the robustness and credibility of the theoretical framework by verifying the reliability and validity of measures associated with theoretical constructs while evaluating the proposed relationships (Roldán & Sánchez-Franco, 2012). SmartPLS 4.0.9.7 software is employed for statistical testing of the measurement and structural models (Ringle et al., 2015).

The adoption of the two-stage approach for multidimensional (higher-order) constructs (Wright et al., 2012) facilitates dealing with complex data, allowing for a deeper exploration and interpretation of the research findings. Initially, the constructs related to the demands and resources of our research model align with a composite measurement model (Henseler, 2021). Additionally, component scores are employed to represent higher-order constructs (role stress and social support) under the disjoint two-stage approach (Sarstedt et al., 2019).

Several factors contributed to the selection of PLS-SEM for this study. First, the study aims primarily to explore the dependent variable, so a method that supports an exploratory focus is needed (Henseler, 2018). Second, the sample size (n=340 participants), while not large, aligns

with the requirements of PLS-SEM (Richter et al., 2016). Additionally, the research model is characterized by diverse relationship types such as direct and mediation connections within hypotheses and thus is suited to PLS-SEM.

Although the PLS-SEM technique enables the examination of relationships between dependent and independent variables, to expand the analysis, necessary condition analysis (NCA) is employed to identify the existence of necessary conditions (Dul, 2016). Simultaneously, employing PLS-SEM and NCA provides a powerful approach that offers complementary insights. PLS-SEM is adept at uncovering relationships between variables in a model, while NCA helps in identifying essential conditions that must be present for a particular outcome to occur. Combining these methods can achieve a more comprehensive and nuanced understanding of the dynamics at play. This combined methodology allows for the examination of both must-have factors and should-have criteria, contributing to theoretical testing (Richter et al., 2020). Additionally, to combine NCA and PLS-SEM, the use of latent variable scores obtained from PLS-SEM analysis is recommended (Richter et al., 2022).

Finally, in this research, the constructs incorporate items measured through two primary modes: reflective (Mode A) and formative (Mode B) (Hair et al., 2017). The reflective mode employs indicators as manifestations of the construct, and each measure is determined by the corresponding construct. On the other hand, in the formative mode, indicators represent characteristics that collectively explain the concept measured by the construct (Jarvis et al., 2003).

4. RESULTS AND DISCUSSION

4.1 Measurement Model

As Carmines & Zeller (1979) suggested, the first step of the PLS-SEM technique should be to review reliability measures, such as internal consistency. The external loadings meet the requisite standards, with values of approximately 0.7, indicating adequate reliability (Henseler et al. 2014).

Moreover, Hair et al. (2011) suggest that the rule concerning the exclusion of weak items should not be excessively strict since the incorporation of weaker indicators can provide valuable information that enhances the overall scoring of the latent variable. Additionally, weights are included to offer information about the contributions of individual items to their dimensions or constructs (Chin et al., 1998).

Second, in the context of multidimensional constructs and dimensions, all the items have composite reliabilities (CRs) greater than 0.7 (Nunnally & Bernstein, 1994), thereby establishing the robustness and credibility of the measurements (see Table 2). Third, to ascertain the convergent validity of the reflective constructs, the average variance extracted (AVE) was calculated and found to be greater than 0.5 for all the constructs (Fornell & Larcker, 1981). Fourth, Table 2 illustrates the loadings, weights and VIFs for the higher-order constructs (HOCs).

The construction of HOC applied a disjoint two-stage approach using latent variable scores from each dimension. Fourth, the variance inflation factor (VIF) of formative constructs remains below 5 (Ringle et al., 2015). In this case, the highest VIF for items is 2.683, indicating that there is no issue of multicollinearity in this study.

Tab. 2 – Measurement model. Source: own research

Construct/*Dimension*/Indicator	**Loadings**	**Weights**	**VIF**	**CR**	**AVE**
Role Stress (RS) (HOC Mode B)					
Role Conflict (composite Mode A)	0.901**	0.738**	1.141	0.896	0.569
RC1. I have to do things differently than I think they should be done.	0.699**	0.281**			
RC2. I am asked to perform tasks for which I am not authorized.	0.805**	0.286**			
RC3. I have to work with two or more groups that do things quite differently.	0.636**	0.137**			
RC4. I receive incompatible demands from two or more people.	0.838**	0.305**			
RC5. Functions are assigned to me without the necessary resources and materials to carry them out.	0.775**	0.297**			
Role Ambiguity (composite Mode A)	0.723**	0.463**	1.141	0.867	0.634
RA1. I know the degree of authority I have in my job.	0.788**	0.281**			
RA2. The goals and objectives of the job are clear and planned.	0.780**	0.286**			
RA3. I am aware of what my responsibilities are in my job.	0.825**	0.137**			
RA4. I know the criteria by which I am evaluated.	0.753**	0.305**			
RA5. I know exactly what is expected of me in my job.	0.833**	0.297**			
Social Support (SS) (HOC Mode B)					
Supervisor Social Support (composite Mode A)	0.857**	0.184**	1.168	0.925	0.756
SSS1. How much does your immediate supervisor go out of his/her way to do things to make your work life easier?	0.840**	0.281**			
SSS2. How easy is it to talk with your immediate supervisor?	0.874**	0.286**			
SSS3. How much can your immediate supervisor be relied on when things get tough at work?	0.899**	0.137**			
SSS4. How much is your immediate supervisor willing to listen to your personal problems?	0.863**	0.305**			
Colleague Social Support (composite Mode A)	0.695**	0.421**	1.168	0.882	0.654
CSS1. How much do your colleagues go out of their way to do things to make your work life easier?	0.715**	0.188**			
CSS2. How easy is it to talk with your colleagues?	0.782**	0.338**			
CSS3. How much can your colleagues be relied on when things get tough at work?	0.870**	0.358**			
CSS4. How much are your colleagues willing to listen to your personal problems?	0.858**	0.337**			

Family Social Support (composite Mode A)	0.532**	0.408**	1.022	0.881	0.651
FSS1. How much do your family and friends go out of their way to do things to make your work life easier?	0.694**	0.207**			
FSS2. How easy is it to talk with your family and friends?	0.875**	0.473**			
FSS3. How much can your family and friends be relied on when things get tough at work?	0.792**	0.255**			
FSS4. How much are your family and friends willing to listen to your personal problems?	0.854**	0.282**			
Work Engagement (WE) (Mode A)				0.937	0.627
WE1. At my work, I feel bursting with energy.	0.856**	0.184**			
WE2. At my job, I feel strong and vigorous.	0.871**	0.181**			
WE3. I am enthusiastic about my job.	0.875**	0.153**			
WE4. My job inspires me.	0.868**	0.146**			
WE5. When I get up in the morning, I feel like going to work.	0.814**	0.142**			
WE6. I feel happy when I am working intensely.	0.786**	0.140**			
WE7. I am proud of the work that I do.	0.797**	0.144**			
WE8. I am immersed in my work.	0.653**	0.077**			
WE9. I get carried away when I am working.	0.543**	0.062**			
Mental Health (MH) (Mode B)					
MH1. Have you recently been able to concentrate on whatever you are doing?	0,571**	0,143	1.566		
MH2. Have you recently felt that you are playing a useful part in things?	0.440**	-0.121	1.589		
MH3. Have you recently felt capable of making decisions about things?	0.568**	0.277**	1.802		
MH4. Have you recently been able to enjoy your normal day-to-day activities?	0.649**	0.061	2.049		
MH5. Have you recently been able to face up to your problems?	0.451**	-0.199**	1.754		
MH6. Have you recently been feeling reasonably happy, all things considered?	0.727**	0.243**	2.149		
MH7. Have you recently lost much sleep over worry?	0.464**	-0.154	2.062		
MH8. Have you recently been constantly under strain?	0.649**	0.157	2.371		
MH9. Have you recently felt that you couldn't overcome your difficulties?	0.736**	0.222**	2.187		
MH10. Have you recently been feeling unhappy and depressed?	0.440**	0.373**	2.683		
MH11. Have you recently been losing confidence in yourself?	0.568**	0.363**	2.489		
MH12. Have you recently been feeling reasonably happy?	0.649**	-0.165	2.274		

CR: composite reliability; AVE: average variance extracted; RC: Role Conflict; RA: Role Ambiguity; SSS: Supervisor Social Support; CSS: Colleague Social Support; FSS: Family Social Support; WE: Work Engagement; MH: Mental Health.
The significance of loadings was estimated by bootstrapping with a 95% confidence interval, two-tailed test (10000 samples).
$*p < 0.05$; $**$ $p < 0.001$

The discriminant validity in this work is subsequently measured by both the Fornell–Larcker and the heterotrait–monotrait (HTMT) criteria (Henseler et al., 2014), as displayed in Table 3. Employing the Fornell–Larcker criterion reveals satisfactory discriminant validity, given that the diagonal elements significantly surpass the off-diagonal elements within their corresponding rows and columns. Finally, the HTMT correlation ratio is needed for assessing construct validity, and values below 0.85 reflect the independence of the measured constructs (Kline, 2015).

Tab. 3 – Fornell–Larcker and HTMT. Source: own research

	RC	RA	SSS	CSS	FSS	WE	Age	SP
RC	*0.754*	0.415	0.329	0.320	0.147	0.280	0.083	0.083
RA	*0.352*	*0.796*	0.360	0.208	0.210	0.466	0.155	0.124
SSS	*-0.332*	*-0.317*	*0.869*	0,433	0.131	0.363	0.087	0.329
CSS	*-0.265*	*-0.181*	*0.372*	*0.809*	0.144	0.315	0.044	0.058
FSS	*-0.120*	*-0.196*	*0.121*	*0.121*	*0.807*	0.197	0.108	0.061
WE	*-0.278*	*-0.428*	*0.358*	*0.296*	*0.188*	*0.792*	0.190	0.095
Age	*-0.023*	*-0.153*	*0.095*	*0.024*	*-0.091*	*0.193*	*1.000*	0.082
SP	*0.069*	*0.135*	*-0.062*	*-0.017*	*0.011*	*-0.095*	*-0.082*	*1.000*

RC: Role Conflict; RA: Role Ambiguity; SSS: Supervisor Social Support; CSS: Colleague Social Support; FSS: Family Social Support; WE: Work Engagement; SP: Systemic Pressure. The Fornell–Larcker criterion is shown in the lower-left corner (in italics), and the heterotrait–monotrait ratio is shown in the upper-right corner.

4.2 Structural Model

Table 4 presents the main parameters for the two models. Model I (Figure 2) shows direct relationships without the mediator variable, whereas Model II (Figure 3) shows the mediating effect. By applying the bootstrapping technique (10,000 samples), t values are obtained to evaluate the statistical significance of the relationships. Given the direction of the hypotheses specifying positive and negative relationships among variables, a one-tailed Student's t-distribution is employed in the analysis. For this study, a specific model is used that incorporates direct and indirect paths. Next, bootstrap resampling is executed, culminating in the multiplication of the direct paths constituting the indirect paths. Moreover, confidence intervals are included for hypothesis testing (Hair et al., 2021). Within this framework, four of the five hypotheses proposed in Model II are confirmed.

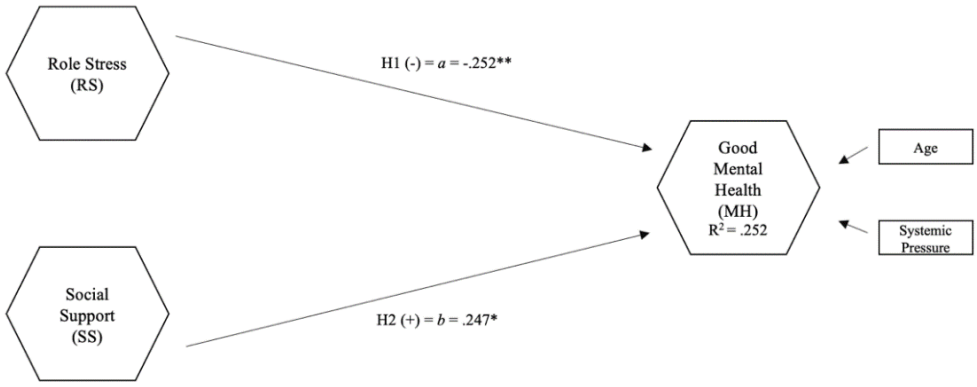

Fig. 2 – Model I. Source: own research

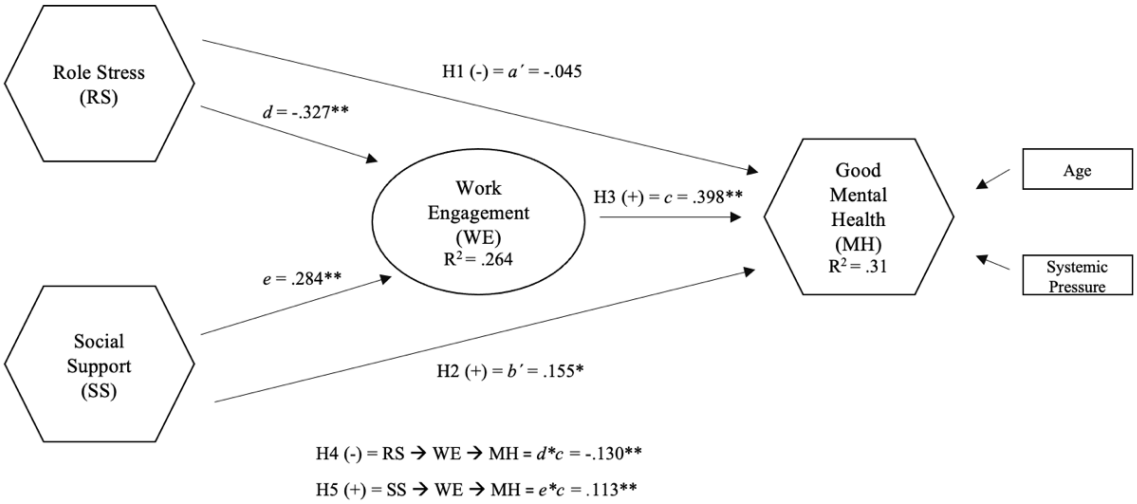

Fig. 3 – Model II. Source: own research

Falk & Miller (1992) suggest that an R^2 value of at least 0.10 is acceptable. The results present a moderated predictive relevance of mental health (R^2 = 0.31) when considering work engagement as a mediator and the effects of control variables (Chin et al., 1998). The increased R^2 value observed in Model II compared with Model I (0.252) for mental health reflects the significant role of work engagement, thus enhancing its explanatory capacity.

For Model I, there is a negative direct effect of role stress and mental health (path coefficient = -0.252). However, Model II did not support the direct and negative impact of role stress on mental health, rejecting Hypothesis H1. On the other hand, the first model presents a positive direct effect of social support on mental health (path coefficient = 0.247), which remains positive and significant for Model II (path coefficient = 0.155), thus supporting Hypothesis H2. Moreover, when the relationship between work engagement and mental health is examined, the model reveals a direct positive relationship (path coefficient = 0.398), validating Hypothesis H3.

Tab. 4 –Direct structural effects. Source: own research

	Model I R^2_{MH} = 0.252		**Model II** R^2_{MH} = 0.31 R^2_{WE} = 0.264		
Relationships	**Path Coefficient**	**Support**	**Path Coefficient**	**Percentile 90%**	**Support**
H1: RS → MH	-0.252**(3.662)	Yes	-0.045 (0.564)	[-0.148; 0.056]	No
H2: SS → MH	0.247 *(2.945)	Yes	0.155* (2.114)	[0.072; 0.258]	Yes
H3: WE → MH			0.398**(0.073)	[0.277; 0.516]	Yes
Age	0.224* (2.887)		0.138*(3.138)		
SP	-0.077 (1.310)		-0.056 (1.040)		

RS: Role Stress; SS: Social Support; WE: Work Engagement; MH: Mental Health; SP = Systemic Pressure.
T values in parentheses: based on t (9999), one-tailed test.
∗p < 0.05; ∗∗ p < 0.001

Finally, the indirect effects reflected in Table 5 are consistent and significant through work engagement. The structural model indicates the indirect negative mediation of RS → WE → MH (-0.130) and the indirect positive mediation of SS → WE → MH (0.113), thus again supporting Hypotheses H4 and H5.

These findings provide empirical evidence to support the mediating effect of work engagement on the impacts of role stress and social support on mental health. Both direct and indirect relationships are significant; however, direct connections have larger coefficients than mediated connections do; in this case, the mediation is partial.

Tab. 5 –Mediating (indirect) structural effects. Source: own research

Relationships	Indirect effects	Percentile 90%	Support
H4: RS → WE → MH	-0.130** (3.851)	[-0.178; -0.091]	Yes
H5: SS → WE → MH	0.113**(3.756)	[0.079; 0.156]	Yes

RS: Role Stress; SS: Social Support; WE: Work Engagement; MH: Mental Health
t values in parentheses: based on t (9999), one-tailed test.
$*p < 0.05$; $**$ $p < 0.001$

4.3 NCA Analysis

PLS–SEM latent variable scores were subsequently used for necessary condition analysis (NCA). Following the analysis, significant necessary conditions were identified for the constructs of role stress and work engagement. Necessary condition analysis (NCA) facilitates the examination of different types of necessary relationships between a condition (X) and its outcome (Y). This analysis is particularly useful for pinpointing specific "corners," or instances where the presence or level of a condition is crucial for achieving a certain outcome (Dul et al., 2020).

In this research, relations are identified in the following corners: corner 2, where a low value of X is necessary for a high Y; corner 3, where a high value of X is necessary for a low level of Y; and corner 4, where a low value of X is necessary for a low level of Y. For this purpose, the NCA tries to identify an empty space (ceiling line) for the distribution of the data that reflects Y's dependency on X, establishing a relationship between the two variables.

The ceiling regression–free disposal hull (CR–FDH) technique was employed to determine the ceiling lines. The effect size, which indicates the degree of constraint by X on Y, was subsequently assessed. An effect size d greater than 0.1 serves as the benchmark to identify necessary conditions from a practical view (Richter et al., 2020). Dul (2016) states that $0.1 \leq d < 0.3$ may be considered a medium effect, $0.3 \leq d < 0.5$ a large effect, and $d \geq 0.5$ a very large effect.

As Table 6 shows, RS is a necessary condition for mental health, with medium effect sizes in corner 2 (effect size = 0.141) and corner 3 (effect size = 0.133).

Tab. 6 – Necessary Condition Analysis. Source: own research

	Corner 1	Corner 2	Corner 3	Corner 4
ROLE (RS)	0.011	0.141*	0.133*	0.069
ENGA (WE)	0.097	0.009	0.109	0.119*

RS: Role Stress; WE: Work Engagement
$*$ $p < 0.05$

This result implies an inverse relationship of necessity between RS and MH (see Figure 4 and Figure 5). Furthermore, work engagement could also be considered a necessary condition in kind ($p < 0.05$) for mental health (see Figure 6), so, low levels of work engagement are necessary for low levels of mental health. Therefore, for this relationship, the results present a medium effect size in corner 4 (effect size = 0.119).

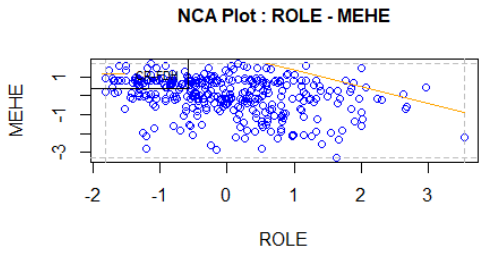

Fig. 4 – Ceiling lines (Corner 2)
Source: own research

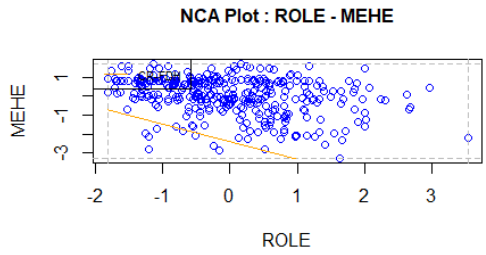

Fig. 5 – Ceiling lines (Corner 3)
Source: own research

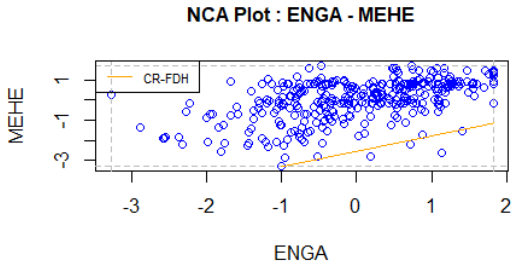

Fig. 6 – Ceiling lines (Corner 4)
Source: own research

Finally, the bottleneck table offers another perspective on the ceiling lines, explaining the specific values of the necessary conditions in terms of degree (see Table 7).

Tab. 7 – Bottleneck analysis. Source: own research

MH	RS (Corner 2)	RS (Corner 3)	WE (Corner 4)
0	NN	NN	NN
10	NN	NN	NN
20	NN	NN	NN
30	NN	NN	NN
40	NN	NN	NN
50	98.3	1.0	NN
60	87.7	11.2	96.1
70	77.1	21.4	83.2
80	66.5	31.7	70.4
90	55.9	41.9	57.5
100	45.3	52.1	44.7

RS: Role Stress; WE: Work Engagement; MH: Mental Health

The values displayed in the table suggest an inverse U-shaped relationship between the role stress and mental health, indicating that a specific level of role stress is essential for achieving optimal mental health among academics. According to the relationship in corner 2, for the mental health to reach high values, the role stress cannot present its maximum values. However, not just any value of the role stress would guarantee the highest mental health levels (corner 3).

In essence, a heightened role stress is detrimental to the mental health of academics, although a minimum level of role stress is required to obtain high levels of mental health. Interestingly, a similar pattern emerges with work engagement: attaining the highest levels of mental health requires a moderate level of engagement. These results make sense since a controlled level of demand can help academics stay alert and face challenges; however, too much would be harmful. Similarly, excessive engagement can lead to an obsession with work, thus negatively impacting mental health.

The aim of this study is to address this issue through the application of the JD–R model, showing how different demands and resources affect the work engagement and mental health of university professors. Applying PLS and NCA to a sample of over three hundred Spanish university professors reveals significant insights and conclusions that deeply reflect the fundamental aspects of the profession (Gil-Cordero et al., 2023).

First, role stress (role conflict and role ambiguity) reflects the professors' incompatibilities with respect to conflicts between teaching and research responsibilities as well as ambiguity in accreditation criteria. Second, social support is relevant to both the workplace environment and familial support. Third, age and systemic pressures were designated as control variables in this research. Given that precarity is predominantly experienced by younger individuals, this demographic characteristic leads to poorer mental health outcomes (Bone et al., 2021), exposing them to heightened levels of stress and pressure.

The empirical validation of the JD–R model was supported by most of the hypotheses, except Hypothesis 1, which predicts a negative relationship between university professors' role stress and their mental health. However, the findings revealed that although demands do not have a direct significant negative effect on mental health, as proposed by Li & Ye (2022) or Pace et al. (2021), they certainly negatively impact the mental health of academics. This influence was established through indirect paths wherein role stress is significantly negatively related to mental health through work engagement, supporting Hypothesis 4. In addition, our findings indicate that elevated levels of social support and work engagement are associated with an improved mental health, supporting Hypothesis 2 and 3. Additionally, the indirect mediation of social support and work engagement was validated (Hypothesis 5).

Moreover, NCA reveals two key insights. First, low levels of role stress are a necessary condition for academics' good mental health (Dorenkamp & Ruhle, 2019). Second, the bottleneck analysis revealed that a certain level of role stress is also necessary for optimizing mental health. In fact, it has been confirmed that role stress is both a constraint and an enabler of optimal mental health values. This result explains the relationship between role stress and mental health, indicating that a controlled level of demands contributes to maintaining engagement (Schaufeli, 2017) and healthy competition.

In contrast, social support has a positive significant direct effect on academics' mental health, alongside indirect effects through work engagement. These findings are in line with those of previous studies (Taylor & Frechette, 2022; Heng et al., 2020; Moeller & Chung-Yan, 2013). As highlighted by Usman et al., (2023), when university professors perceive strong social

support not only from their supervisors and colleagues but also from their family and friends, they experience higher levels of physical and mental health. Fulfilling dual roles of teaching and scientific research as well as administrative duties without adequate support negatively affects both their engagement and their mental health.

Similarly, work engagement positively influences mental health, as presented by Dooris et al. (2021). However, the results also indicate that while engagement is generally seen as positive, an excessive level might lead to what previous studies (Huyghebaert-Zouaghi et al., 2021; Taris et al., 2020) have termed *workaholism*, which results in a compromised work–life balance and a decline in mental health.

5. CONCLUSION

The adoption of a new and highly competitive university model that emphasizes excellence, quality, and national accreditation has brought about significant changes as well as systemic pressures for the Spanish academics involved in both teaching and research and, occasionally, managerial roles. Earlier reforms altered the faculty landscape, focusing on temporary positions while also stabilizing precarious roles (Torrado & Duque-Calvache, 2023). Moreover, previous research has indicated that this situation is particularly pronounced in the social sciences, as new metrics and accreditation criteria were incorporated with reluctance and delay (Galán et al., 2014). For example, a recent reform (LOSU, 2/2023) was approved in 2023 to address the challenge of precariousness in the university. This reform aims to reduce the temporality of professors from 40% to 8%.

Universities are not designed only for sharing or creating knowledge; they also prepare students for future personal and professional difficulties. Therefore, the influence of academics' mental health transcends the immediate university years (Sriram et al., 2020), shaping students' attitudes and encouraging healthier and more productive individuals.

This study's most significant and purposeful contributions are twofold. First, it introduces a practical model (JD–R) aimed at enhancing both the work engagement and mental health of academics. Second, it directs attention to the crucial aspect of mental health within the university setting, highlighting its profound societal implications.

5.1 Theoretical Implications

This study offers profound contributions to the theoretical landscape, particularly in advancing the understanding and applicability of the job demands–resources (JD–R) model within the academic sector. The findings strongly align with and reinforce JD–R theory, as articulated by Bakker et al. (2023) and Demerouti & Bakker (2023), by underscoring the critical role of job resources—most notably, social support—in enhancing both work engagement and mental health among university professors. This research corroborates prior studies that have established a positive relationship between work engagement and mental health outcomes (Greenier et al., 2021) while simultaneously introducing a novel perspective on the potential adverse effects of excessive work engagement. This insight challenges the conventional assumption that higher engagement invariably leads to better mental health, suggesting instead that there is a threshold beyond which engagement may become counterproductive, leading to outcomes such as burnout or workaholism. This finding is in line with Sawang (2012), who pioneered insights into the quadratic effect of job demands on work engagement. This effect adds a nuanced layer to the JD–R model, advocating for a balanced approach to engagement to optimize mental health.

In addition, our study significantly contributes to the evolving discourse on the JD–R model by relating it to recent research on the relationship between work and study engagement and addiction. By examining the intricate relationships between work engagement, job demands, and mental health, our findings resonate with the network analysis of work and study addiction explored by Bereznowski et al. (2024) and Wang (2024). Their research emphasizes the transition from healthy engagement to compulsive behaviour, which parallels our exploration of the potential adverse effects of excessive work engagement, such as burnout or workaholism. Our findings support these authors' assertion that engagement, when unmoderated, can transition into harmful addictive behaviours, thus enriching the JD–R model by highlighting the need for a balanced approach to engagement.

Moreover, while the study does not conclusively confirm a direct negative impact of role stress on mental health, it contributes valuable insights through the innovative application of necessary condition analysis (NCA). This methodological approach reveals that a controlled level of job demands is essential for fostering a stimulating work environment that can promote academic productivity and optimal mental well-being. These findings suggest a revision to the JD–R model, where job demands, when managed within a certain range, can be seen not as inherently negative but as potential motivators that contribute positively to an academic's mental health.

In addition, a key theoretical advancement of this study is the integration of partial least squares structural equation modelling (PLS-SEM) with NCA. The combined application of these methodologies allows for a more nuanced exploration of the complex causal relationships between job demands, job resources, work engagement, and mental health. This dual method approach not only enhances the empirical rigour of the study but also provides deeper insights into the differing causal logics—sufficiency and necessity—that underlie these relationships. The insights gained from this approach highlight the importance of employing multiple methodologies to test and validate theoretical models in complex real-world contexts such as academia. Furthermore, this research expands the JD–R model's theoretical framework by emphasizing the role of social support systems across multiple domains—workplace, personal, and familial. This extension of the model underscores the importance of considering the holistic environment in which academics operate, recognizing that support from supervisors, colleagues, and family members is crucial for maintaining mental health and sustaining work engagement. In the context of Spanish academia, where professors face intense psychological and emotional demands that transcend professional boundaries, this study provides a comprehensive theoretical model that accounts for these multifaceted support mechanisms. This approach represents a significant theoretical contribution, offering new pathways for understanding the intersection between job resources and mental well-being in academia.

Additionally, this study introduces the concept of "adaptive stress management" within the JD–R framework, proposing that certain stressors, when present at moderate levels, may actually enhance performance and engagement by keeping academics alert and motivated. This novel theoretical implication challenges the prevailing notion that all job demands are detrimental, suggesting instead that the relationship between demands and mental health is more complex and context dependent. This insight introduces a dynamic perspective to the JD–R model, where the interplay between demands and resources can be optimized to foster resilience and well-being among academics.

Finally, the study's focus on the dual roles of teaching and research within the JD–R model highlights the importance of role-specific demands and resources. This aspect of the research contributes to a more refined understanding of how different job roles within academia interact

with the broader framework of job demands and resources, leading to differentiated impacts on mental health and engagement. The theoretical implications are substantial, suggesting that future research should consider the specificities of academic roles when applying the JD–R model to other contexts within higher education.

In summary, this study not only confirms and extends the applicability of the JD–R model to the academic sector but also introduces novel theoretical insights that enhance the understanding of the intricate balance between job demands and resources. These findings demonstrate the importance of a supportive social infrastructure and adaptive stress management in promoting mental health and work engagement among university professors. These contributions significantly enrich the academic literature and provide a robust foundation for future research aimed at developing targeted interventions to improve well-being in higher education.

5.2 Implications for practice

This study provides valuable practical implications for universities. Challenges such as disengaging professors, precariousness, the struggle to enter academia (Bone, 2021), relationships with students and having a work–life balance (Dorenkamp & Ruhle, 2019) create tensions in this profession. Thus, it is crucial to explore ways to enhance resources such as social support and community engagement.

These findings suggest that while a certain level of demand can benefit academics, it must be controlled. When university professors experience excessive stress due to their role within the system, it undermines their mental health. Academics often find themselves burdened with additional responsibilities in addition to the lack of adequate support for both teaching and research (Ghislieri et al., 2022). The recruitment of new professors, researchers, doctoral students, and research fellows who are involved not only in a single role but multiple positions, including teaching, research, and managerial responsibilities, becomes necessary in this context. Addressing these gaps could lead to a fairer distribution of workload, fostering a more balanced university environment.

From a practical standpoint, Spanish universities can implement a range of strategies and management practices to improve the mental health of their faculty members. First and foremost, it is essential to conduct a thorough and comprehensive review of current job demands. Universities must effectively manage the workloads of teaching and research staff, ensuring that they are balanced to mitigate the risk of excessive stress. Academic leaders should strive to find an optimal equilibrium between teaching responsibilities and research commitments while seeking to reduce the administrative burden, which has significantly increased for university professors in recent years.

Additionally, granting flexibility and autonomy in managing work responsibilities can play a crucial role in alleviating professional stress among academic staff. Allowing faculty members reasonable control over their schedules and work methods can increase job satisfaction and decrease the stress associated with their roles. This autonomy in the workplace can moreover foster a stronger sense of individual responsibility and enhance both personal and professional well-being.

Second, universities must cultivate a work culture that prioritizes support and collaboration. Currently, such a culture is often lacking, partly because of the meritocratic system that characterizes Spanish universities. This meritocracy fosters intense competition for promotions

and access to prestigious positions, which often creates an environment conducive to the development of personal egos rather than collaborative teamwork.

To improve this compromised environment, it is necessary to implement practices that promote collaboration and cohesion among work teams, whether among colleagues, research groups, or members of a department or faculty. Initiatives that could be implemented include team-building activities, discussion groups, and collaborative workshops. Furthermore, mentorship programs that pair experienced faculty members with new educators can be highly effective in facilitating knowledge transfer, easing adaptation to the university environment, and providing ongoing emotional and professional support to junior faculty members.

Alleviating demands and providing resources for teaching and research staff should lead to improved mental health outcomes. University-funded well-being programs, such as stress management workshops or personalized psychological counselling, can help faculty members develop effective strategies to increase their overall well-being. Additionally, universities should launch awareness campaigns aimed at the academic community to raise awareness of the importance of mental health and reduce the stigma associated with mental health issues.

Moreover, universities should foster positive and balanced engagement that allows academics to access professional development opportunities aligned with their personal and professional interests and skills. Nonmonetary recognition systems and financial rewards that celebrate teaching and research achievements can lead to increased engagement and job satisfaction.

In addition to the measures mentioned above, improving working conditions, particularly in terms of employment contracts, job stability, and job security, is critical. These improvements can reduce precariousness, which in turn can contribute significantly to improved mental health among university faculty members.

5.3 Limitations and future research

Despite the valuable contributions this research makes to the academic field, it is essential to acknowledge and address certain limitations inherent in the study. First, despite the inclusion of participants from various Spanish universities, it is not possible to generalize these findings to all university professors across different countries. Moreover, due to the final simple size, the results should be considered with the understanding that they may not be fully generalizable to larger or more diverse populations. Given that the academic context varies across countries, with each nation having its own norms, regulations, requirements, and demands for university faculty, research should be conducted in different countries to account for this diversity. Future should also encompass other cultural contexts as well as various academic disciplines. This approach would enable the assessment of differences in variables such as role stress, engagement levels, and social support across different areas. In addition, a multigroup analysis comparing the situations of younger and older academics could be insightful.

A second limitation arises from the use of self-reported data. This approach may introduce social desirability bias, where respondents might present themselves in a more favourable light than is accurate or answer questions in a manner that they believe aligns with the expectations of the researcher. Consequently, the surveyed academics may underreport their stress levels or conceal mental health issues from colleagues, friends, and family due to the pressures of their profession. Future research could benefit from incorporating objective data or third-party assessments, such as professional mental health evaluations, to validate participants' responses.

Moreover, the use of online instruments (such as emails) for data collection added complexity in providing timely information or explanations to address any doubts or questions that respondents might have had. Future studies could thus apply other methodologies, such as other quantitative techniques (e.g., QCA) or qualitative methods (e.g., interviews or focal groups), that could be helpful for obtaining a deeper understanding of the results.

Finally, the present study employs a cross-sectional methodology, which limits the ability to establish causal relationships between the model's variables. The use of longitudinal approaches in future research would allow for the analysis of how these relationships evolve over time while enabling the observation of the long-term effects of specific practices and interventions on the mental health of Spanish academics.

In this context, this research opens new questions regarding other potential job demands, such as work–life balance or work overload, and explorations of other dependent variables, such as subjective well-being, which hold significant relevance within academia.

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