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BALANCING DEMANDS AND RESOURCES WITH CONTROL VARIABLES: A MODEL FOR SUSTAINABLE EMPLOYEE WORK ENGAGEMENT

ABSTRACT

Control variables are routinely included in research, yet their theoretical role remains largely implicit and under-specified. Addressing this gap, this study extends the Job Demands–Resources (JD–R) theory by systematically theorizing how control variables shape and condition the relationships between job demands, job resources, and employee work engagement. Specifically, the study conceptualizes control variables across five interrelated domains: general (demographic and temporal characteristics), job-domain (personality traits and individual differences), personal-domain (individual characteristics and situational factors), home-domain (social and environmental influences), and organizational-domain (leadership, management, and workplace structures and practices). Building on this integrative framework, the study develops theoretically grounded propositions that clarify the dynamic interplay between demands and resources, offering a deeper and more precise understanding of how sustainable employee work engagement is shaped.

KEYWORDS: Control Variables; Job Demands–Resources (JD-R) Theory; Sustainable Work Engagement; Employee Work Engagement

JEL: M12, M54

INTRODUCTION

Statistical analysis and study design are employed by researchers in the disciplines of psychology and management to substantiate causal inference. The broadest definition of explanatory research is the endeavor to elucidate the variability of the phenomenon of interest (the dependent variable) by attributing it to its presumed causes (the independent variables) (Pedhazur & Schmelkin, 1991, p. 212). Researchers endeavor to incorporate control into study designs to mitigate potential risks to the accuracy of their findings, which is

a fundamental aspect of empirical research (Cook & Campbell, 1979). Researchers aim to ascertain whether the primary independent variables exhibit the hypothesized relationships (Pedhazur & Schmelkin, 1991) while also minimizing the risk of confounding results that could undermine the model's explanatory efficacy (Kish, 1959; Pedhazur & Schmelkin, 1991).

Kish developed a typology of sources of variation in 1959, which comprises the following categories: (a) explanatory factors; (b) controlled extraneous variables; (c) unregulated extraneous variables that are regarded as randomized mistakes; and (d) uncontrolled extraneous variables that are confounded with explanatory variables. This article pertains to controlling extraneous variables. In an experimental design, these factors can be manipulated, included or excluded, and randomized, as per Pedhazur and Schmelkin (1991). Alternatively, the researcher may assess the variable's impact on the dependent variable using statistical methods. The variable in question is not the primary focus of the investigation; rather, it is superfluous. It can also be referred to as a nuisance, confounding, or covariate variable. According to Pedhazur and Schmelkin (1991), there is a difference between removing and adding control variables. Some of the variables must be kept constant when using elimination as a control method. Using the inclusion methodology, the researcher may consider racial variation. A further use of the inclusion strategy is a matched-group design, in which study entities (people, organizations, etc.) with varying independent and dependent variables are matched on a covariate (Breaugh & Arnold, 2007). Neither the matched-group design nor the exclusion techniques are considered in this study; instead, we examine only the statistical inclusion approach. In other words, we look at factors that are reported as unrelated to the dependent variable but may actually be related. A standard regression formula consists of independent and dependent variables, as well as error terms. When a researcher uses regression analysis to test a hypothesis, he or she considers a set of independent variables related to the proposed dependent variable. Additionally, the author develops an interaction term if they speculate about the impact of a moderating variable.

The researcher may consider any confounding effects when employing control variables in a regression equation of this nature. Control variables can establish a connection with the dependent variable in a manner that is comparable to that of their counterparts on the predictor side of the equation, thereby resembling the components of the main or interaction effects. The control variables, also referred to as covariates, are typically incorporated into the hierarchical regression process prior to the independent variables in order to determine their explanatory power (Tabachnik & Fidell, 2001).

This study aims to develop propositions grounded in the Extended JD-R theory (Demerouti & Bakker, 2023) to elucidate how demands, resources, and control variables across job, personal, organization, and home domains shape employee work engagement. Notably, by emphasizing control variables, the study clarifies the intricate interplay between demands and resources, offering a deeper theoretical understanding of their dynamic interactions.

1. LITERATURE REVIEW

1.1. Control variables

In business and social science literature, control variables are frequently applied (Becker et al., 2016; Shiau et al., 2024), especially in cross-sectional studies. Similar additional variables that might influence a relationship between the dependent and independent variable(s) are known as control variables, which help researchers confirm the validity of their results (Nielsen & Raswant, 2018).

Control variables, alternatively referred to as covariates, confounding variables, adjusting variables, distracting factors, or nuisance variables, are frequently used as purifying devices. According to Bernerth et al. (2018), they are used as a statistical "control" for variables that are not the primary focus of the study, but that might be related to the outcome variable. If failure to remove (significant) outcomes may lead to biased estimates, published results may underestimate (overestimate) path coefficients. The control variable removes the confounding and enables us to observe how what we care about (the important variables) are connected to each other (Carlson & Wu, 2012). Hence, the adoption of such principles is vital to conduct reliable, high-quality research and contribute towards theoretical knowledge as well as its practical implications (Memon et al., 2024).

1.2. Usage of control variables

In the social sciences, the misuse of control variables is a known issue in previous studies. Becker (2005) presented an extensive summary of the use of covariates in management research. In his qualitative review, Becker (2005) explains that control variables are as important as predictor and response variables for several reasons: (a) sloppy use of control variables could lead to invalid findings; (b) readers who want to replicate studies need to know what controls were used as well as how they were utilized; and (c) a control variable in one analysis can serve as a predictor, mediator, moderator or even outcome variable in another. Becker (2005) provided guidelines for control variables in management studies based on an empirical examination of 60 papers.

Becker (2005) in particular suggests "at least a brief explanation for why each was selected" (p. 285), so that the purpose of including it is explained. What is all the more important, according to Becker, is a citation or link to studies that support a claim rather than a nutshell explanation of it. Spector and Brannick (2011) also mention the "purification principle," by which researchers often add control variables for no good reason, in the belief that including them would otherwise "clean" or reveal real links. Moreover, there is a potential for scholars to add specific control variables simply because they have been employed in previous studies, rather than evaluating whether these added controls affect the substantive relationships (Meehl, 1970; Spector & Brannick, 2011). Therefore, the theoretical rationale for adding control variables to a model must be provided by researchers, so these variables cannot be added or dropped without explanation.

A control variable is fundamentally a tertiary variable that mediates the interaction between independent and dependent variables, which is why it is imperative to provide an exhaustive rationale for its inclusion (Atinc et al., 2012). A variable may serve as a moderator, suppressor, or confuser (Spector & Brannick, 2011). When researchers fail to adequately justify their choice to include company performance as a control variable rather than a suppressor or moderator, it becomes very difficult to properly understand the empirical evidence linking it to the dependent variable (Breaugh, 2008). According to MacKinnon et al. (2000), the only real difference between confounding, mediating, and suppressing factors is how they are conceptualized; otherwise, all three types of variables may be evaluated using the same statistical procedures.

A separate theory for each of the controlling variables should be presented, and there must also be an explanation for how the controlling variables are expected to relate to the dependent variable. As Breaugh (2008) points out, there are cases in which even identifying a correlation between a control variable and the dependent variable is not sufficient for full understanding (e.g., when the regression weights of two identical variables also differ in sign from each other but not from the zero order-correlation between two variables). This may lead

to confusion about the meaning of terms and should be closely scrutinized with respect to the relationships between control and substantive variables.

1.3. Process of usage of the control variable

The two main approaches for control variables are ANCOVA (for statistical control) and random block design (for sampling control) (Memon et al., 2024). A randomized block design was used for control variables in a purpose-designed experiment set up by the researchers. Typically, categorical covariates are used. The control procedure is built into the design in a randomized block design.

The academics first have to select some other potential control variable that may influence the dependent variable. The researchers will also block participants with similar characteristics for this control variable. The control factor in a randomized block design is known as the blocking variable. The randomized block design aims to make groups as homogeneous with respect to the blocking variable, thereby making comparisons based on the independent variables. By way of contrast, analysis of covariance is the process of using controlled variables in all aspects of analyzing statistical data. Continuous variables are used in general. The control variables are referred to as "covariates. To obtain a clearer picture of the data, it was considered advantageous in an ANOVA analysis to include covariates, even though they are often related to/interact with the dependent variable. That is, this method is the analysis of covariance.

2. THEORIES FOR EMPLOYEE WORK ENGAGEMENT IN LIGHT OF DEMANDS AND RESOURCES

2.1. JD-R (Job Demands-Resources) model

Originally proposed by Demerouti et al. (2001), the JD-R model seeks to explain the causes of employee weariness and disengagement and the consequences these issues have for businesses. Employee health and happiness are the focus of this investigation into what makes a difference in the workplace in terms of motivation and stress. A study by Xin et al. (2025), guided by the Job Demands-Resources (JD-R) theory, demonstrated that work engagement is a motivational process that links employees' role performance to sustainable leadership. Employees' work engagement is indirectly influenced by well-being or job satisfaction and directly influenced by organizational trust exhibited toward office workers rather than production workers (Kim et al., 2025). Employee motivation and performance do not come if the job autonomy has not previously been established. Job autonomy also positively impacts innovative behavior and work engagement (Jang & Kim, 2025).

This approach appears to be a mashup of research on motivation and stress (Demerouti & Bakker, 2011). There is no reason not to reflect on the JD-R model as an ongoing project that has continued to improve since its initial appearance (Bakker & Demerouti, 2007; Bakker & Demerouti, 2014; Bakker & Demerouti, 2017; Demerouti & Bakker, 2011; Demerouti & Nachreiner, 2019). It has been extended to other meta-constructs, such as work engagement (Bakker et al., 2014). The JD-R model integrates and extends previous perspectives on how work, personality, and outcomes are interrelated (Schaufeli & Taris, 2014). It has been developed and empirically tested in numerous research studies (Bakker & Demerouti, 2014; Nahrgang et al., 2011). The theory claims job resources can foster and reinforce work engagement, but it also argues that workplace demands influence employee health (Bakker & Demerouti, 2007; Chen et al., 2020; Hagemann et al., 2023). The basic tenet of the JD-R model is that certain features of work can be classed as resources or job demands (Bakker & Demerouti, 2017; Demerouti et al., 2001; Zablah et al., 2012).

Job demands are defined as the organizational, social, psychological, and physical aspects of a job that require sustained mental or physical effort (Bakker & Demerouti, 2017). These demands can be organizational, quantitative, or qualitative in nature (Schaufeli, 2017) and reduce employees' well-being. Tele and Kumar (2025) advise that managers promote flexible work arrangements, mental health programs, and individualized wellness initiatives. Conversely, workplace resources, such as organizational, developmental, social, and work-related resources, can help reduce the adverse effects of job demands and activate individuals (Demerouti et al., 2001; Bakker & Demerouti, 2017; Schaufeli, 2017). The JD-R model has been widely studied, and many facets of it have been evaluated, including several meta-analyses and reviews (Alarcon, 2011; Christian et al., 2011; Crawford et al., 2010; Lesener et al., 2019).

2.2. PD-R (Person Demands-Resources) model

Self-imposed expectations may influence the development of work engagement, despite the absence of a direct correlation between job demands and work engagement (Bakker & Demerouti, 2007; Schaufeli & Taris, 2014). Personal demand (PD) is a relatively new concept; thus, we need more studies on which factors affect it (Barbier et al., 2013; Schaufeli & Taris, 2014; Bakker & Demerouti, 2017). People set demands on themselves that make them work harder to get better results and behave better; these demands are called PD (Barbier et al., 2013, p. 751). Bakker and Demerouti (2017) assert that PD and PR must be examined concurrently, since the characteristics of PD will determine whether the process is detrimental to health or motivational. This study has regarded performance expectations as a personal demand, in accordance with the suggestions of prior researchers (e.g., Barbier et al., 2013).

Examining studies on challenge and hindrance stressors may help elucidate this assertion about performance expectations as a human requirement. Challenge stressors, such as workload, facilitate goal attainment, whereas hindrance stressors impede goal completion and personal development (Podsakoff et al., 2007). A challenging work environment is expected to provide opportunities to fulfill fundamental needs; nevertheless, workplace obstacles are likely to affect these necessities adversely (Van den Broeck et al., 2010). Moreover, harsh pressures are necessary to fulfill an individual's fundamental needs (Webster et al., 2010; Webster et al., 2011). The finding suggests that an individual may find it challenging to exceed performance requirements, thus prompting them to pursue needs-based satisfaction. Additionally, this need-based satisfaction may affect work engagement (WE).

2.3. HD-R (Home Demands-Resources) model

Ruppanner (2013) argues that HD-R contributes to JD-R as a theoretical framework. The Job Demands-Resources (JD-R) model is similar to the Home Demands-Resources (HD-R) model of work-related well-being. Domestic fatigue may be a mediating factor in the association between home demands and depression. However, home resources not only can enable active participation in domestic tasks, which involve vigor and absorption in cleaning and childcare, but they can also buffer against the adverse effects of household roles.

Good crisis management is not only the task of top- and middle managers, teams under their guidance, but also personnel at the front lines (Demerouti & Bakker, 2023). These actors are crucial, but they're not all we need. When work-related stress is brought home and carried into the workplace, it isn't easy to keep the lines between work and personal life separate. That is especially true when you find yourself working from home in an emergency. This

demonstrates how important friends and family are as people who either make things worse or assist during bad times (Gabriel & Aguinis, 2022). This was most noticeable when workers had to work from home due to the COVID-19 epidemic. But this has also occurred previously, such as after Hurricane Katrina (McCanlies et al., 2018) and the 2008 financial crisis (Burgard & Kalousova, 2015).

2.4. OD-R (Organizational Demands-Resources) model

Lesener et al. (2020) divided them into three groups (i.e., group-level, leader-level, and organizational-level resources). Resources at the organizational level were most strongly related to work engagement across all three levels. Lesener et al. (2020) state that "organizational resources are more closely related to the level of individuals than to the other two levels on which the resources are available," because it is a direct pointer toward the structure, design, and management of labor. Mazzetti et al. (2021) reviewed 94 studies in detail, extracted between 2011 and 2018. The study examined organizational resources (e.g., organizational justice), social resources (e.g., coworker support), job resources (e.g., task variety), and developmental resources (e.g., career perspective). Consistent with previous meta-analyses, work engagement was positively related to several job resources.

Demerouti and Bakker (2023) argue that using resources from multiple life domains can buffer the relationship between conflicting demands, fatigue, and job engagement. The role of different resources might be magnified because of personal, family, work, and organizational obligations involved in workplace engagement. Feeling autonomous) could buffer the impacts of weariness at home and in the workplace. Moreover, the support of coworkers could be a powerful motivator for already busy professionals in their personal lives. This development makes JD-R theory more difficult, but it remains a good one for explaining and intervening with OHWB in challenging working environments where they occur.

The JD-R Model, PD-R Model, HD-R Model, and OD-R Model all focus on understanding the interaction between demands and resources across various contexts. Each model focuses on how these dynamics influence well-being, performance, and stress, but they differ in scope, focus, and applications.

Table 1: Core idea, applications, the scope of each demand, and resource

Model	Scope	Demands	Resources	Core Idea	Applications
JD-R	**Workplace**	Workload and time pressure are examples of job demands. Workload and time pressure are examples of job demands	Job resources such as feedback, autonomy, and support	Job resources improve engagement and avoid burnout by reducing the negative consequences of job expectations	Organizational environments for improving engagement, decreasing burnout, and designing jobs
PD-R	**Individual**	Individual requirements, such as cognitive load and emotional control	Individual assets such as social support, self-efficacy, and resilience	Personal resources enhance general well-being by mitigating the effects of both internal and external stress	Building resilience, managing stress, mental health, and personal growth
HD-R	**Home Environment**	Demands at home, such as care and housework	Resources at home, such as emotional ties, flexibility, and family support	Home resources improve well-being and work-life balance by mitigating the effects of domestic obligations	Workplace policies that support families and interventions for work-life balance

Model	Scope	Demands	Resources	Core Idea	Applications
OD-R	**Organizational**	Organizational requirements such as legislation, competition, and financial strains	Infrastructure, culture, and leadership are examples of organizational resources	By reducing the burden of demands, organizational resources promote long-term viability and success	Enhancing organizational resilience, organizational development, and strategic management

Source: Developed by the authors based on established demand-resource models

3. CONTROL VARIABLE

3.1. Control Variables for Job Domain

Personality and Individual Differences (Bal & Kooij, 2011; Bansal et al., 2020; Ghorbannejad & Esakhani, 2016; Liu et al., 2023; Prieto-Díez et al., 2022):

1. Personality traits (such as neuroticism and conscientiousness): Conscientious workers are a resource since they are often well-organised, accountable, and skilled at handling the demands of their jobs. Conversely, neuroticism can heighten the sense of expectations at work, rendering people more vulnerable to stress and burnout.

2. Work-Related Attitudes (e.g., Work Centrality, Job Satisfaction): Employees who view work as central to their identity (high work centrality) may experience greater demands because of the high emotional investment in their jobs. However, if they are satisfied with their job, they may perceive fewer demands and find resources such as meaning and fulfilment in their work. Job satisfaction acts as a resource that promotes well-being and motivation.

3.2. Control Variables for Personal Domain

Personal Characteristics (Al-Hamdan & Bani Issa, 2022; Bielak et al., 2012; Burić et al., 2022; Chen et al., 2020; George et al., 2022; Shao et al., 2022):

1. Personality Traits (e.g., Conscientiousness, Emotional Stability): Personality traits shape how individuals respond to demands. For example, conscientious individuals may better manage time and responsibilities (a resource), while emotional stability helps individuals handle stress effectively. On the other hand, low emotional stability can increase demands by increasing emotional strain.

2. Emotional Intelligence: People who possess high emotional intelligence are more adept at identifying and controlling their own feelings as well as comprehending those of others. This skill improves coping strategies and interpersonal connections during difficult times.

3. Cognitive Ability: The ability to solve problems, reason, and comprehend complicated information is referred to as cognitive ability. Higher cognitive ability is a resource for managing demanding tasks, making individuals more efficient and better able to adapt to challenges.

4. Self-Efficacy: A crucial psychological tool is self-efficacy, which is the conviction that one can succeed in particular circumstances. People who have high self-efficacy typically face obstacles head-on with courage and fortitude. Low self-efficacy, however, can increase demands, as individuals may feel overwhelmed by obstacles.

5. Physical Health: Physical health is an essential resource for handling both physical and mental demands. Poor health can become a significant demand, limiting energy, focus, and overall productivity.

Situational Variables (Björk-Fant et al., 2023; Jolly et al., 2021):

1. Social Support from Family, Friends, or Coworkers: Social support is a critical resource that provides emotional, practical, and informational help during times of need. Strong social networks can buffer against stress and help individuals cope with demands. A lack of social support might make someone feel more stressed and alone, placing additional demands on them.

2. Life Events (e.g., Major Life Changes, Trauma): Significant life events such as marriage, relocation, job loss, or trauma can introduce significant demands into a person's life. These events often require adaptation and coping strategies, which can sometimes reduce access to resources. Conversely, positive life events (e.g., achieving a personal goal) can act as resources by boosting emotional well-being and confidence.

3. Work-Life Balance: Effective work-life balance is a resource that helps individuals manage personal and professional responsibilities. A balanced life reduces stress and increases well-being. Work-life balance is the balance between long-term employee and organizational interests (Monje-Amor, 2024). Conversely, poor work-life balance can create significant demands, leading to burnout, stress, and reduced life satisfaction.

3.3. Control Variables for Home Domain

Social and Environmental Factors (Afrahi et al., 2022; Gaxiola Romero et al., 2022; Gu & Xue, 2022; Lyu & Fan, 2022; Ojo et al., 2021; Parida et al., 2023; Wood et al., 2023):

1. Social Support from Family Members or Community: Emotional, informational, or practical help from family members or the community can act as a key resource in managing household demands. It reduces stress and promotes well-being.

2. Family Cohesion and Conflict: Family cohesion (closeness and unity) is a resource that fosters emotional support and a positive home environment. Conversely, family conflict can be a demand that leads to stress and reduces psychological resources.

3. Home-Life Satisfaction: Satisfaction with one's home environment, relationships, and overall living situation is a psychological resource that can enhance well-being and buffer against stress.

4. Life Events (e.g., Illness or Bereavement): Major life events like illness or bereavement can create significant demands, disrupting the emotional and social equilibrium of a household and potentially reducing the available resources for coping.

3.4. Control Variables for Organizational Domain

Leadership and Management Factors (Engida et al., 2022; Ghavifekr & Adewale, 2019; Hossan, 2021b, 2021a; Hossan et al., 2021; Ngotngamwong, 2014):

1. Leadership Style (e.g., Transformational vs. Transactional): Transformational leadership tends to offer resources in the form of inspiration and developmental opportunities but may also set high expectations (demands). Transactional leadership focuses on structure and rewards but may limit personal growth resources.

2. Leadership Change Frequency: Frequent leadership changes can be a demand, causing instability and disrupting established workflows, but they might also introduce new perspectives and opportunities (resources).

Workplace Structure and Practices

1. Teamwork and Collaboration Level: A high level of teamwork can act as a resource by providing peer support, shared knowledge, and collective problem-solving. However, poor collaboration can increase demands, leading to conflict or inefficiency.

2. HR Policies and Flexibility (e.g., Telework, Flexible Hours): Flexible policies offer resources like work-life balance, autonomy, and reduced stress. Rigid policies can increase demands, making it difficult for employees to manage personal and professional obligations.

3. Organizational Change Initiatives: Change initiatives often come with demands (e.g., adapting to new systems or processes), but successful change can lead to greater organizational resources, such as improved technology or streamlined operations.

4. Diversity and Inclusion Policies: Effective diversity and inclusion policies are resources that foster a sense of belonging, equity, and innovation. Lack of such policies or poor implementation can increase demands by creating conflict or exclusion.

3.5. General Control Variables Across Models

Demographic Variables of the respondents:

Age, Gender, Educational level, Marital status, Number of dependents (family responsibilities), Tenure (years of experience), Employment Status (Full-time vs. Part-time), Job Position (Managerial vs. Non-Managerial), Household income (Bernerth et al., 2018; Yao et al., 2022).

Organizational Demographics:

Organization size (e.g., small, medium, large), Type of industry or sector, Organizational culture and climate, and Geographic location (urban vs. rural) (Bernerth & Aguinis, 2016).

Temporal factors:

Needs-supply (retrospect, current, and anticipated) fit, Demands-abilities (current and anticipated) fit (Hernandez & Guarana, 2018).

4. DISCUSSION

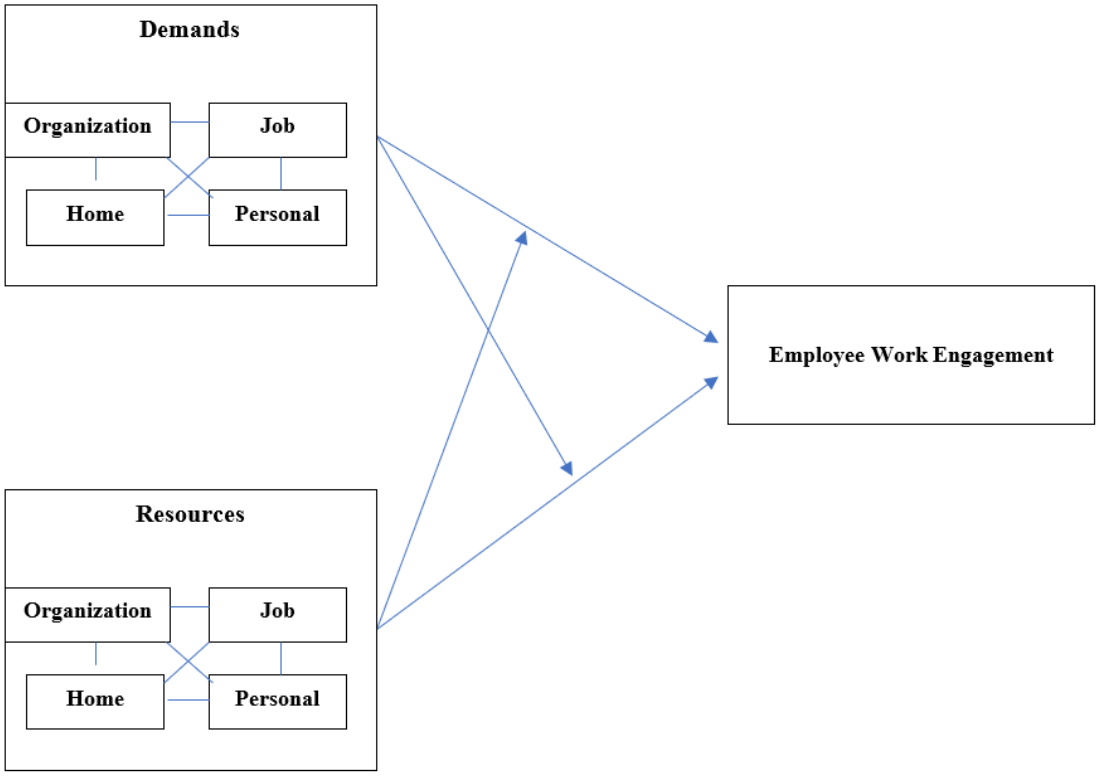
According to the Job Demands-Resources (JD-R) model, work engagement is possible when job demands are high yet manageable and when there are sufficient resources in the workplace. These working environments are likely to sustain employee motivation and well-being, helping them perform their duties efficiently. When employees lack the necessary resources to do their jobs well during a crisis, or when their job expectations are unrealistic, they are likely to feel more exhausted and less motivated. Mazzetti and his team (2025) found that job demands significantly affect employee well-being, especially in challenging work conditions.

Employees may struggle to make constructive contributions due to low energy or health issues, or they may not be engaged enough to have a positive impact on key organizational performance measures, such as quality of service and productivity. Nevertheless, since the crisis is literally affecting them, it’s crucial to establish or maintain an optimal balance of

work elements like job demands and resources. In the context of a crisis, knowing how resources are currently being allocated is vital for making successful reallocation decisions, especially when resources are finite (Mishra, 1996). Busing's (1999) work demonstrated that the insecurity of a job had absolutely no effect on satisfaction with the job if one enjoyed a great deal of power and social support during times when an economy was in decline. Wu et al. (2025) found that human-technology collaboration positively impacted work engagement, but only if the basic needs of quality of work life were met.

Proposition 1: **Employees facing manageable job demands and possessing high job resources (and employees with high job demands and low job resources) are more adept at adapting to circumstances and sustaining an appropriate degree of work engagement, due to the consistency of Control Variables within the job domain.**

Figure 1. Proposed model for sustainable employee work engagement



Source Adapted from the extended JD-R theory proposed by Demerouti and Bakker (2023)

JD-R theory was originally focused only on job demands and resources (except for Demerouti et al.). (2004), who extended its use to the home environment. The majority of stress theories, such as the work strain theory (Karasek & Theorell, 1990), take a one-job-at-a-time approach. Members of staff may take on multiple roles, showing a lack of understanding that the experience of stress is complex (Barnett et al., 2012).

Kreiner (2012, page 417) writes that organizational processes take place within broader ecological contexts where subsequent interactions are replete with serendipity and the unexpected. Turner and Lingard (2016) claim that one's aspirations are related to each other and cannot be seen separately. Research practices indicate that people who have many job

demands miss work more than those with few. Van Woerkom et al. (2016) state that a range of varied work demands amplified reported absentee levels across the organisation. The authors used the conservation of resources hypothesis (COR; Hobfoll et al., 2018) to help explain this effect. They proposed that markets would deplete resources in one domain of work due to high demands and, because the same resource may be needed to meet other needs, a loss cycle would ensue. Given that role theories posit the effects of workplace expectations are contingent on the level of more salient family role demands (Hollenbeck et al., 1989; Hughes & Galinsky, 1994; Pleck, 1977), limited research has examined the work-nonwork interface.

As time and energy are finite, the complex relationship of work (job and organizational) and nonwork (family and personal) role characteristics may better explain how individuals handle stress (see Figure 1). Moreover, most people cannot attend to only one role at a time. Employees have to deal with multiple work and non-work demands simultaneously, and the need to simultaneously cope with great external demands will probably impact how they react to job demands. Pleck's (1977) work-family role type schema suggests that people's job demands are structured at the family level rather than the individual level. Barnett et al. (2012) propose, however, that alternative resources from other roles can be used when the requirements of a specific role threaten to reduce a particular resource. This tactic could lead to a reduction in material across all segments, regardless of space. Individuals transfer resources from their personal and/or family life to meet job demands, attempting to avoid depleting these same resources.

Hughes and Galinsky (1994) found that job-related variables, such as job pressure, long work hours, and job insecurity were moderators of the effect of family role stressors; a child under thirteen years of age in the home, household inequality of labor division between partners and dual-earner status on their home outcomes in terms of mood states, tension/relaxation levels and mutual support. High structural requirements at work don't leave workers enough slack to tolerate their spouse's failure to help with housework, causing problems in the marriage. This reasoning might also apply when people have high self-imposed standards, like perfectionism, and their work demands are more exacting, or when employers exert greater pressure on their employees.

Proposition 2: **Given that the Control Variables from job, personal, work, and home domains remain constant, organizational, job, home, and personal demands interact in a manner wherein the impact of any single demand (e.g., job demands) on work engagement is intensified when other demands (e.g., home demands) are elevated**.

The interaction of resources across multiple life domains could explain their motivational effects. In contrast, the interplay of demands across multiple life domains should provide insight into how these demands have negative consequences for outcomes. The COR (Hobfoll, 1989; Hobfoll et al., 2018) posits that individuals seek to obtain, protect, and preserve personal characteristics, conditions, and goods that enable them to cope with work challenges. If people don't meet the high demands of their job, they may be stressed or tired because they're running low on resources. According to this view, people are likely to use a variety of 'instruments' to protect their biological and mental health, adding to what Hobfoll (2002) has described as their "stress resistance armamentarium" (p. 312). Resources (i.e., time, physical and mental energy) are finite (Ten Brummelhuis & Bakker, 2012). If these resources are used to address one potential job demand, then people might have less left for other demands (Van Woerkom et al., 2016).

According to Ross and Mirowsky (2010), receiving resources from other domains could have at least two distinct implications for the degree to which these resources satisfy needs. The

initial scenario illustrates what Ross and Mirowsky refer to as “reinforcement of advantage” or “resource multiplication,” wherein “advantaged groups gain most from the resources they have, so that their resources multiply to reinforce their advantage” (p. 2–3). The second example demonstrates the hypothesis of substitution of resources, which assumes that the buffering effect of job resources is more pronounced for those with no other resources, in this case personal resources. Ross & Mirowsky, 2010) and observe that "either has a weaker effect when the other is present" and “the effect of possessing any given resource is larger for those who have fewer alternative resources” (p. 7). To maintain balance between requests, resources can be swapped.

Simultaneously possessing multiple resources, such as increased job autonomy and higher education, reduces the dependence of outcomes on any single resource. According to the reinforcement hypothesis, family support enhanced the positive impact of work-family enrichment and family-work enrichment on well-being (Kalliath et al., 2019). The influence of organisational health climate on work engagement was more pronounced when leaders exhibited a pronounced health mindset towards employees (Shin & Hur, 2021a, 2021b). Koltai and Schieman (2015) found that, consistent with the substitution hypothesis, the influence of autonomy or challenging work diminished for individuals with a higher level of personal resource of socioeconomic status (SES). Theoretical approaches and empirical evidence indicate that examining the interplay of various resources in predicting motivational outcomes, especially for individuals in need during crises, is crucial (Ross & Mirowsky, 2010). Given the ambiguity surrounding the substitutability of resources in influencing motivational outcomes, it is essential for future research to identify which specific resources can serve as substitutes. This introduces the subsequent proposition in JD-R theory.

Proposition 3: **Given that the Control Variables from job, personal, work, and home domains remain constant, organizational, job, home, and personal resources interact in a manner where the impact of any single resource (e.g., job resources) on work engagement is intensified when other resources (e.g., home resources) are abundant (i.e., resource reinforcement), or is diminished in the presence of alternative resources (i.e., resource substitution).**

Demands and resources from various life domains likely interact in complex manners, potentially altering the nature and/or impact of other demands or resources (Bakker et al., 2019; Du et al., 2018; Turner & Lingard, 2016). According to ecological systems theory, individuals operate within several interconnected environments or systems that influence them (Bronfenbrenner, 1989). Cross-domain processes include resource drain, resource gain, and positive or negative spillover (Edwards & Rothbard, 2000; Ten Brummelhuis & Bakker, 2012).

Voydanoff (2005) posited that individuals evaluate the adequacy of work and family resources to fulfil the demands of both domains, ensuring effective participation in each. Individuals weigh whether their family resources are sufficient to meet job demands and whether their work resources are adequate to meet their families' needs. As a result, to achieve balance, coherence, and integration between professional and family lifestyles, they use boundary-spanning mechanisms (see Fig. 1). When the demands of one job threaten to deplete a particular resource, resources from other occupations can be accessed (Barnett et al., 2012). When work caregivers have a heavy workload, they may use organizational resources (e.g., vacation time) or family resources (e.g., time with family members) to avoid returning home feeling more fatigued (Barnett et al., 2012).

This viewpoint aligns with a fundamental tenet of COR (Conservation of Resources) theory, which posits that individuals possessing greater resources experience reduced negative

impacts during resource depletion, as they are able to substitute these resources effectively. This phenomenon may arise as resources in one domain can enhance employees' ability to achieve goals in another domain through increased personal resources or energies (Ten Brummelhuis & Bakker, 2012). Resources from one domain can generate new resources in another domain, thereby enhancing participation in the latter or increasing the competence and capacities of individuals to perform in different domains (Voydanoff, 2005). Furthermore, resources within a single domain can facilitate an individual's ability to handle various demands across multiple domains. For instance, practical support from a partner allows individuals to engage in extended work hours and overtime (Turner & Lingard, 2016).

The evidence concerning the buffering effects of cross-domain resources is inconsistent. Luk and Shaffer (2005) found that home support, a form of home resource, reduced the impact of work role expectations on work-life conflict, while organizational family-friendly policies, an organizational resource, attenuated the relationship between commitment to work time and work-life conflict. Li et al. (2025) theorized that levels of employees' organizational commitment are directly connected with job control as well as social connectedness. Butler et al. (2009) could not confirm the buffering effect of spousal support on the relation between daily job demands and work-family conflict. However, Luk and Shaffer (2005) found that supervisor support and family-friendly policies may strengthen rather than reduce the effect of family role expectations on family-work conflict. This result was interpreted as an attempt to reciprocate to the domain that provided the resource. According to Festinger's (1957) cognitive dissonance theory, receiving help from another sector of society may not actually reduce stress but could generate a subconscious need to pay it forward. Despite being in a supportive organization or working under supportive leadership, employees may feel more compelled to excel beyond the expected level to meet their employers' and superiors' expectations. We therefore suggest two classes of moderating effects in our further hypotheses, thus extending JD-R theory. We offer the buffering hypothesis, which suggests that cross-domain and within-domain buffering processes – by which resources at work buffer job demands against health outcomes. Job-related resources, in particular, may mitigate the effect of household tasks on health outcomes.

The literature review also reveals that resources may weaken in a way that worsens health degradation if persons focus on the domain that provided them, rather than directly investing their attention in the second domain rather than the first. Further research may clarify whether this is an effect of domain-specific resources, such as support from specific domains (e.g., family support), or in response to demands imposed by diagnosed domains.

Proposition 4: **Given that the Control Variables from job, personal, work, and home domains remain constant, resources from any domain (i.e., organization, job, home, or personal) can either amplify or mitigate the impact of demands from the same or different domains on work engagement.**

According to the JD-R theory (Breevaart & Bakker, 2018; Tadic et al., 2015), hard work may enhance the functioning of job resources. This suggests that people are more likely to behave according to resource motives when they face adversity. This concept is consistent with Hobfoll (2002), who argued that resources are most beneficial when needed the most (e.g., when work demands are high due to a crisis). Resource gain is clearly evident against a backdrop of resource loss. Consistent with the more specific boosting hypothesis embedded in JD-R theory, work demands enhance learning and intrinsic motivation (Schneider et al., 2017) or the use of job resources (van den Broeck et al., 2011), thus indirectly illustrating how job resources potentially have (positive) effects on outcomes.

Several studies have examined the moderating effect of job demands on the relationship between resources and work engagement (e.g., Bakker et al., 2007; Breevaart & Bakker, 2018; Hakanen et al., 2005; Tadic et al., 2015; van den Broeck et al., 2011). Comparable boosting effects have been observed between resources and demands across various domains. Hughes and Galinsky (1994) found that the presence of a child under 13 years of age moderated the relationship between job flexibility and marital quality. The relationship between job flexibility, considered a job resource, and marital support was found to be positive exclusively among employees with children under the age of 13, identified as a home demand. The relationship between job flexibility and marital support was not significant for employees with children over the age of 13. Consequently, as illustrated in Figure 1, the JD-R theory is expanded and suggested.

Proposition 5: Given that the Control Variables from job, personal, organization, and home domains remain constant, demands from any domain (i.e., organization, job, home, personal) can amplify the affirmative effect of job resources on work engagement.

5. FROM THEORY TO EVIDENCE AND PRACTICE: FUTURE DIRECTIONS FOR EMPIRICAL VALIDATION

Future studies may employ both quantitative and qualitative approaches to test the interaction effects of demands, resources, and control variables across job, personal, organization, and home domains.

First, Proposition 1 may be examined using moderated regression, structural equation modeling (SEM), or latent interaction modeling to assess how jointly manageable job demands and high job resources predict work engagement, while accounting for control variables. Experience sampling or diary studies could also capture short-term fluctuations in demands, resources, and engagement.

Second, Propositions 2 and 3, which highlight cross-domain interactions among demands and resources, may be tested through multilevel modeling (MLM), recognizing that individuals operate within nested contexts (e.g., employees within teams, families, or departments). Researchers may also use person-centered techniques, such as latent profile analysis, to identify demand–resource configurations across domains.

Third, Propositions 4 and 5 highlight how demands and resources across different domains interact to influence work engagement. Future research could use cross-lagged panel designs to examine these dynamic, reciprocal relationships over time, showing how resources may buffer or amplify demands and how demands may enhance the effect of resources across life domains.

Finally, future studies could apply the model in diverse organizational settings, such as manufacturing, services, education, or healthcare, to determine whether the interactions among demands, resources, and control variables operate similarly across industries and cultural contexts. Comparative studies may reveal boundary conditions or contextual differences that shape work engagement.

CONCLUSION AND RECOMMENDATION FOR CONTROL VARIABLES IN FUTURE STUDIES

The need for control variables is best described by an abundance of information. This requires describing how the study and control variables are connected, especially when there is a cause-and-effect relationship or just an association. Authors should also define the

relationship among these elements. We also recommend that when it makes sense, significant effect relationships found in meta-analyses should be adjusted for control variables. In the absence of meta-analytic information, authors need to specify the types of associations and findings reported in previous research (e.g., correlations or results from longitudinal studies).

In the absence of such previous empirical research to support the inclusion of control variables, researchers should move beyond purely logical reasoning when investigating a posited relationship and instead rely on theoretical frameworks to demonstrate why a particular control variable is needed. There's a good reason a problem occurs when mixing control variables with suppressor or moderator variables are problematic. Where theoretical models or earlier empirical evidence suggest a stable direction of relationships, it is expected by researchers that the form that control and dependent-variable relations will take. This encourages authors to think through control variables more carefully and increases the likelihood that they will provide a strong justification for their inclusion. Authors must provide a demonstration of the results of the association between the independent and dependent variables in both the text of the paper and in tables.

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