A Multilevel Model of Team-level Work Engagement Emergence

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Authors note: As the present manuscript is purely theoretical, we understand that the TOP guidelines pertaining to empirical and/or revision works would not be applicable in our case.

Abstract

This article develops a multilevel theoretical model explaining how teamwork engagement (TWE), a team state grounded in compatible cognitive representations of vigor and dedication, emerges and shapes team performance and viability. Integrating Job Demands-Resources (JD-R) theory, team and multilevel emergence literature, we specify how team structural conditions (e.g., autonomy) influence members' perceptions of job demands-resources optimal balance. These perceptions activate individual work engagement and through intra and inter-personal mechanisms, fosters the emergence of TWE. We conceptualize TWE as compilational emergence arising from the functional alignment of members' differentiated engagement levels, which are unevenly distributed within teams. The model further posits TWE as a dynamic team state that moderates how structural conditions are translated into balance perceptions and contributes to team performance and viability by shaping goal setting and striving. Across eight propositions, we articulate key explanatory mechanisms, research directions, and practical implications for designing and sustaining work-engaged teams.

Keywords: Teamwork Engagement, Team Emergent States, JD-R Theory, Multilevel Theory, Team Effectiveness

A Multilevel Model of Team-level Work Engagement Emergence

Organizations tackle today their growing challenges through teams (collectives of individuals within organizational settings who perform relevant tasks and goals, fostering interdependence, social interaction, and boundary management; Kozlowski & Bell, 2012). Teams have evolved from ad hoc problem-solving groups to highly autonomous units composed of multi-skilled members responsible for achieving demanding and high-quality goals (Alcover et al., 2021). To succeed, these teams depend on members' adequate levels of work engagement, defined as a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption (Schaufeli & Bakker, 2023). Engaged team members invest effort, collaborate effectively, and embrace accountability for their outcomes (Holbeche, 2018). Accordingly, teams with engaged members tend to perform well under pressure, achieve their goals, and promote overall well-being (Bakker, 2022; Harter et al., 2002).

Job Demands-Resources (JD-R) theory originally studied work engagement at the individual level (Bakker et al., 2023; Demerouti & Bakker, 2023), as a motivational state arising from the balance between challenging job demands (work aspects requiring sustained effort, such as work pressure) and valuable job resources (work aspects that help achieve goals, manage demands, and promote personal growth). However, work engagement has also been examined as a collective phenomenon (e.g., Bakker et al., 2006; Torrente et al., 2012b), including at the team level (Costa et al. 2014a, 2014b). A curated search in the Web of Science database for "Team & Engagement" from 1998-2025 yielded 65 manuscripts (from 227 original results), revealing four primary approaches to teamwork engagement (TWE) research: (a) TWE as a predictor of individual work engagement (e.g., Bakker et al., 2006) and team productivity (Costa et al., 2016; Torrente et al., 2012a); (b) TWE as a mediator between antecedents (e.g.,

team resources) and outcomes (e.g., job satisfaction; Bakker et al., 2023; Costa et al., 2015); (c) TWE as an outcome related to individual factors (e.g., team members' extraversion, specific roles like "team boosters") and team-level inputs (e.g., empowerment, cohesion, potency, efficacy, and task interdependence; Fortuin et al., 2021, 2023; Gupta et al., 2022); and (d), TWE as a collective state emerging from compositional patterns in which all team members contribute similarly, through mechanisms like emotional contagion (Bakker et al., 2006; Van Mierlo & Bakker, 2018). Among these, Costa et al. (2014a) proposed a relevant model of TWE emergence, identifying team processes as proximal antecedents and individual, team, and work characteristics as distal ones.

Despite these advances, several gaps remain. First, literature has proposed a wide range of antecedents such as organizational and social resources, team climate and, specific team behaviors (Costa et al., 2012; Costa et al., 2014a; Fortuin et al., 2021; Gerbeth & Mulder, 2023; Torrente et al., 2012), yet it remains unclear which of these antecedents play a central versus peripheral role. Second, existing studies typically assume compositional emergence via emotional contagion (Torrente et al., 2012, 2014; Van Mierlo & Bakker, 2018), but do not provide a detailed theorization of how team-level variables (i.e., structural conditions such as team autonomy) relate with individual-level demands, resources, and work engagement during the emergence of TWE, nor the boundary conditions under which these cross-level dynamics operate. Third, while team engagement has been repeatedly linked to team performance and related outcomes (Costa, 2014; Mäkikangas et al., 2016; Torrente et al., 2012), prior models seldom specify the mechanisms through which engaged teams achieve higher effectiveness. Fourth, after its emergence, it is necessary to conceptualize when TWE itself acts as a boundary condition and normative influence that amplifies or constrains the impact of

team structural conditions on members engagement. Together, these gaps limit the accumulation of multilevel theory on TWE and, although practical implications are not the primary aim of this work, they also constrain its usefulness for organizations.

To orient readers and before delving into the logic, we briefly summarize our model (Figure 1). Since implementing team-based structures is determined primarily by organizations, our model examines three key team structural conditions central to teamwork (autonomy, workload, and task interdependence; Mathieu et al., 2019), which can shape team members' job demands and resources (Bakker et al., 2023; Mathieu et al., 2019). We acknowledge that in certain contexts, particularly in tightly procedural work systems where roles and workflows are highly specified, structural conditions may exert more immediate effects on TWE (i.e., direct path). For instance, in call-center teams or emergency response units operating under strict protocols, the direct influence of workload or task interdependence on team states may be substantial (Courtright et al., 2015; Hackman, 2002). However, our model emphasizes the indirect path (structural conditions–perceived job demands-resources optimal balance–members work engagement–TWE) as the primary pathway across most team contexts for two key reasons. First, the idea that structural conditions influence behavior through employees' perceptions is well established in motivational theories (e.g., Hackman, 2002) and in JD-R theory (Bakker et al., 2011; Li et al., 2023). Second, this specification allows for more precise intervention points since teams can take actions to rebalance their demands and resources (e.g., redistributing tasks, seeking support) and refine how they perceive them (Bakker et al., 2023).

Thus, structural conditions operate through team members' perceptions of job demands and resources optimal balance, that is, team members' perception that their

resources are sufficient to meet their demands (Demerouti & Bakker, 2023), which, in turn, foster their engagement.

-----Insert Figure 1 around here-----

Our model further explains that TWE emerges from both intrapersonal (e.g., attentional focus) and interpersonal processes (e.g., informational exchange). Conceptualized as a compilational emergent state, TWE unfolds from heterogeneous, bottom-up work engagement behaviors that differ in type, frequency, and timing, for example, some members showing energy at key moments while others displaying consistent persistence. As a result, TWE has a different structure from individual engagement, because what matters is how these diverse expressions are displayed and arranged across members. Its properties also differ, as TWE activates and sustains team performance, whereas individual engagement fuels only a person's own effort.

Once established, TWE exerts top-down effects on team members' engagement and moderates the relationship between team structural conditions and members' perceptions of job demands-resources optimal balance. Specifically, we propose that medium levels of TWE are most beneficial, because they preserve the sensitivity of team members' perceptions to structural conditions, enabling these conditions to be experienced as both challenging and resourceful. Finally, TWE contributes to team effectiveness (i.e., performance and viability) activating motivational–cognitive regulatory mechanisms, such as goal setting and striving, facilitating team processes (Locke & Latham, 2002; Mathieu et al., 2019).

Overall, our model advances theory by extending the motivational pathway of JD-R theory (Bakker et al., 2023; Bakker & Demerouti, 2024; Demerouti & Bakker, 2023) to a multilevel logic, clarifying the interrelationships between team- and individual-level work engagement. First, it introduces the concept of perceived demands-resources

optimal balance, and second, clarifies the intra- and interpersonal processes underlying TWE emergence. While extant models integrate cognitive and affective dimensions of TWE (e.g., Costa et al., 2014a), they have yet to explain how these processes interact across levels shaping TWE emergence. Further, our model advances a compilational explanation of TWE emergence that better captures variability in member contributions than compositional models assuming behavioral uniformity across levels (Kozlowski & Klein, 2000). Third, it explains how emerged TWE influences members engagement through team norms, and moderates the impact of structural conditions on members' perceptions of demands-resources optimal balance. Finally, it theorizes that TWE bolsters team regulatory processes, i.e., goal setting and goal striving, sustaining focused efforts that improve team processes and outcomes (Chen & Kanfer, 2006; Park et al., 2014).

From a research standpoint, the model articulates eight testable propositions to guide future multilevel research into the antecedents and consequences of TWE emergence. From a practical perspective, it provides actionable insight into how structural team settings and interpersonal processes shape TWE, offering organizations guidance for cultivating engaged and effective teams. Throughout the presentation of the model, multiple explanatory mechanisms are going to be described. Thus, complementary to Figure 1, Table 1 summarizes them.

-----Insert Table 1 around here-----

TWE Emergence Model

Our model of TWE emergence expands the motivational multilevel path articulated in the broader Team Job Demands and Resources (*t*JD-R) model, originally developed to describe the emergence of team burnout (Urien et al., 2021). Specifically, we build upon JD-R theory (Bakker et al., 2023; Demerouti & Bakker, 2023) and Marks et al.'s

(2001) multiphasic team effectiveness model, to capture the temporal logic implied in TWE emergence. Given the motivational nature of work engagement, our theorization is further informed by multilevel approaches to job motivation (Chen & Kanfer, 2006). Before detailing the emergence process, we first clarify the conceptualization and dimensionality of TWE.

Definition and Dimensions of TWE

Early conceptualizations framed TWE as a team's collective positive mood (Bakker et al., 2006), later refined into a shared positive work-related state comprising three dimensions: team vigor, dedication, and absorption (Torrente et al., 2012b). However, empirical evidence for this tripartite structure has been inconsistent. In particular, absorption appears to stem from energy and dedication rather than representing an independent dimension (Bakker et al., 2023; Gonzalez-Romá et al., 2006), and some studies suggest that only vigor significantly predicts TWE (Costa et al., 2016).

Whereas team vigor captures key aspects of activation and persistence, it cannot alone account for how teams remain psychologically invested in their tasks over time. Dedication provides this motivational anchor, representing a deeper cognitive-affective attachment to the team that not only energizes efforts but aligns members' contributions toward team goals (Albrecht, 2014; Costa et al., 2014b; Demerouti et al., 2010). In essence, vigor fuels collective action, whereas dedication sustains team-goal orientation.

Despite ongoing debate over dimensionality, a growing consensus situates TWE's as primarily cognitive in nature (e.g., Albrecht, 2014). Recent work on team emergent states (e.g., Rapp et al., 2021) emphasizes that shared cognitive structures surrounding effort and involvement foster positive affective experiences (DeChurch & Mesmer-Magnus, 2010). These cognitive representations (i.e., dynamic mental structures integrating knowledge, affect, and behavior expectations; Mohammed et al., 2021) both

reflect and reinforce engaged behaviors, such as proactive problem-solving and persistence. Through this process, members cognitive representations (e.g., “we persevere”) become the cognitive foundation of TWE and the bridge linking it to team team effectiveness (DeChurch & Mesmer-Magnus, 2010).

Therefore, we define TWE as an emergent team state consisting of compatible cognitive representations among team members concerning effort and persistence (vigor), and involvement and identification (dedication) toward team tasks and goals (Rapp et al., 2021). These compatible cognitive representations, while not identical across members, are sufficiently aligned to support the sense of being in an engaged team (Grand et al., 2016; Kozlowski & Klein, 2000).

Perceived Demands-Resources Optimal Balance

A central contribution of our model is the introduction of the concept perceived demands-resources optimal balance. We define this concept as team members’ subjective appraisal that the level of job demands they face is adequately matched by the resources available to them in a way that supports energy and sustained effort. This captures what Demerouti and Bakker (2023, p. 217) describe as a constellation in which job demands are manageable and resources sufficiently high. Team structural conditions generate the objective configuration of demands and resources that characterize teamwork. Yet, for work engagement to arise, team members must perceive these demands and resources as optimally combined; that is, as having adequate and valuable resources to meet both routine and challenging team requirements. This perception is inherently dynamic, evolving as members continuously recalibrate to fluctuating task demands.

The concept builds on two theoretical foundations. First, it integrates the buffering (resources mitigate the adverse effects of high demands) and boosting (high demands

paired with high resources enhance engagement) tenets of JD–R theory (Bakker & Demerouti, 2024; Demerouti & Bakker, 2023), emphasizing the motivational synergy between demands and resources. Second, it draws on multilevel emergence literature (Cronin et al., 2011; Kozlowski & Klein, 2000; Mathieu et al., 2019), which explains that team states develop as members interpret and integrate information from their team context. Without such a perception of demands-resources optimal balance, members are less likely to exhibit engaged behaviors that others can perceive, interpret, and align with; thereby impeding the emergence of compatible cognitive representations of TWE.

In sum, perceived demands-resources optimal balance activates team members' vigor and dedication. This perception functions within a favorable range: insufficient demands relative to resources lead to boredom and under-stimulation, whereas excessive demands cause overload and strain, both undermining work engagement. Thus, it is the calibration between demands and resources, not their absolute levels, that matters. Therefore, we propose (left-central part of Figure 1) that:

Proposition 1. The more team members perceive their job as characterized by an optimal balance between demands and resources, the more this perception activates their individual work engagement.

The TWE Emergence Process

TWE should be conceptualized from a multilevel standpoint, as an emergent state reflecting a dynamic team property that integrates cognitive, affective, and behavioral dimensions (Kozlowski & Klein, 2000; Marks, et al., 2001). Because emergent states originate in lower-level elements and reciprocally influence them, TWE must be theorized both, bottom-up through team members' interactions, and top-down as an emergent construct that shapes team members' cognition, affect, and behavior (Cronin et al., 2011; Kozlowski & Klein, 2000).

Accordingly, TWE emerges as team members attend to, integrate, and actively exchange information about each other's vigor and dedication, allowing these shared perceptions to trigger convergent positive affect and behavior across the team (see Figure 1, central part). Once emerged, TWE becomes a team state encompassing converging cognitive representations of vigor and dedication (effort), positive affect, and interpretive norms that shape members' identification with the team. In turn, TWE influences both team members' work engagement and team effectiveness (Costa et al., 2015; Grand et al., 2016). An overview of the mechanisms described in this section is provided in Table 1.

Bottom-Up Influence of Individual Interactions on TWE Emergence

The emergence of TWE begins when at least one team member develops cognitive representations of work engagement, and culminates when a majority of its members describe their team as work engaged. Whereas earlier models emphasized affective interpersonal mechanisms, such as emotional contagion (e.g., Bakker et al., 2006), our model further expands this view by integrating socially induced intra and interpersonal processes, including attention, information integration, positive affect, and information-affect sharing, which transform individual engagement into an emergent team state. This view aligns with a compilational emergence process (Kozlowski & Klein, 2000), in which differentiated member contributions, rather than uniformity drive TWE emergence.

Intrapersonal mechanisms. Team members use attention and information integration to recognize and interpret engagement-related information from the team (Grand et al., 2016). Specifically, team members selectively attend to engagement-related information in their immediate environment. For example, when observing a colleague working with sustained focus past normal hours, members may infer high

dedication; when witnessing teammates energetically brainstorming solutions, they perceive vigor. These observations become integrated into cognitive schemas about what an engaged team looks like (Ryan et al., 2021). These behaviors make vigor- and dedication-related information highly salient (Moores et al., 2003) and embed it within members' cognitive representations (Kennedy & McComb, 2014).

Moreover, members who already identify themselves as vigorous and/or dedicated process team information in a manner that reflects their engaged state, amplifying the salience of work-engagement-related cues within the team (Grand et al., 2016). Thus, as illustrated in Figure 1 (central part):

Proposition 2a: The more team members attend to and integrate information about vigor and dedication, the more likely they are to develop compatible cognitive representations of TWE.

Because cognition and affect are intertwined (DeChurch & Mesmer-Magnus, 2010), team members' cognitive representations of work engagement can activate positive affective states such as enthusiasm and interest (Bakker, 2022; Costa et al., 2016). Team members interpretation of task information (e.g., meeting demanding deadlines), or visible behavioral displays (e.g., verbal enthusiasm) as signs of vigor and dedication, has been associated with the elicitation of positive affect (Fiske, 2018). This, in turn, reinforces attentional focus on engagement information (Forgas & George, 2001). Over time, this recurring interplay between cognition and affect facilitates convergence toward what engagement entails (Blanco & Vázquez, 2020), consolidating engagement-related cognitive representations. Thus, we propose that (Figure 1, central part):

Proposition 2b: Team members' experience of positive affect facilitates their attendance and integration of information about vigor and dedication, thereby reinforcing compatible cognitive representations of TWE.

Interpersonal mechanisms. Once engagement-related cognitions and affects arise in at least one team member, they are expressed verbally and non-verbally through statements, behaviors, tone, and facial expressions (Grand et al., 2016). These exchanges enable the sharing of information about vigor and dedication, which are key for developing compatible cognitive representations of TWE. Evidence from social neuroscience and team cognition research shows that interaction fosters the alignment of conceptual and evaluative beliefs into converging cognitive representations (Lahnakoski et al., 2014; Mohammed et al., 2021).

We agree with extant literature (Bakker, 2022; Bakker et al., 2006; Costa et al., 2014a, 2014b) on the importance of emotional contagion as a key mechanism on TWE emergence. Yet, our conceptualization expands this view by recognizing that there are other ways through which engagement information and affect circulate within teams. Team members exchange work engagement information and affect through both implicit and explicit mechanisms (Ilies et al., 2007; Turner & Reynolds, 2001). Implicit mechanisms include emotional contagion (nonverbal affect transmission), behavioral entrainment (synchronization of behaviors), social tuning (short-term alignment of ideas and behaviors), and norm absorption (gradual internalization of collective norms). For example, energetic tone or expressive engagement displays can spread through emotional contagion (Bakker, 2022) and behavioral entrainment (McGrath & Kelly, 1986). In parallel, explicit mechanisms, such as emotional comparison (monitoring and aligning one's affective state with others; Barsade et al., 2018), deliberate affective induction (efforts directed to elicit specific affective reactions in others; Barsade &

Gibson, 2007), and open communication of expectations and goals, further promote members' convergence in understanding and acting similarly (Ilies et al., 2007).

Together, these interpersonal mechanisms constitute a dual-channel convergence system: implicit mechanisms promote automatic alignment, while explicit ones support deliberate cognitive agreement. Even when individual team members' vigor or dedication fluctuates, teams may still converge on a functional, compatible representation of TWE through information-affect exchange (Barsade et al., 2018). Hence, we surmise that (see Figure 1, central part):

Proposition 2c. The more information on vigor and dedication team members' exchange via implicit and explicit mechanisms, the more likely they are to develop compatible cognitive representations of TWE.

Although TWE is a shared team-level state, it does not necessarily stem from compositional emergence, which assumes isomorphic, evenly distributed individual contributions, such that the resulting state mirrors the same structure, properties, and function across levels (Kozlowski & Klein, 2000). In this view, all team members are expected to experience and express engagement uniformly (Kozlowski & Klein, 2000). While such uniformity may occur in some teams (call-center dispatchers) or at specific times (a highly demanding deadline), this assumption often fails to capture the dynamic, context-dependent, and heterogeneous nature of team life.

Instead, we argue that TWE emergence is better understood through a compilational perspective, where heterogeneity and complementarity characterize how team members' engagement contributes to the collective state. Structural conditions shape members' distinct optimally balance perceptions of demands and resources, leading them to contribute differently to TWE emergence. Hence, some members' engagement may compensate for others', or different engagement forms, such as

energy, persistence, or dedication, may combine synergistically to sustain team functioning (González-Romá, 2011; Kozlowski & Klein, 2000). Accordingly, TWE cannot be reduced to an average of individual work engagement levels but rather reflects a dynamic configuration of complementary contributions. This heterogeneity still requires a minimal shared understanding (e.g., what it means to be an engaged team). Yet TWE emergence varies across teams and over time depending on how engagement is displayed in the team (e.g., concentrated in a few key members, evenly dispersed, or skewed with some highly engaged and others less so).

Some teams display configurations of widely shared engagement in complementary ways: one member providing energy, another showing persistence, others demonstrating dedication. Other teams rely on a few "anchors" whose sustained engagement sets the tone, while some exhibit fragmented patterns with inconsistent engagement across members. For TWE to emerge amid such variability, members' distinctive expressions of vigor and dedication must be functionally aligned, that is, they must complement one another in performing team tasks. When such alignment exists, engagement information becomes clear and consistent, enabling others to recognize and internalize what an engaged team looks like. Conversely, fragmented or unevenly distributed engagement produces ambiguous information, hindering TWE emergence.

Empirical findings support this logic: certain team members disproportionately influence their teammates' energy and affective tone (Fortuin et al., 2021, 2023), and engagement levels fluctuate across tasks and time, with some members temporarily compensating for others' disengagement (Fortuin et al., 2021). TWE can therefore emerge amid heterogeneity in the type, intensity and frequency of work-engaged behaviors, as long as the team's cognitive, affective, and behavioral information remain compatible with TWE (Salanova et al., 2011). Thus, (see Figure 1, central part):

Proposition 2d. The more team members' distinctive expressions of vigor and dedication are functionally aligned, the more likely TWE is to emerge; conversely, when these expressions are fragmented or concentrated in a small subset of members.

Top-Down Influence of TWE on Team Member Work Engagement

Multilevel theory posits that once emergent states crystallize, they exert both direct and moderating effects on lower-level processes (Cronin et al., 2011; Kozlowski & Klein, 2000). Once established, TWE shapes team members' cognition, affect, and behavior through normative mechanisms, that strengthen members' identification with the team and behavioral and affective alignment with the team state (Turner & Reynolds, 2001; Junker et al., 2022).

When present, TWE generates engagement-oriented norms that define vigor, persistence, and dedication as desirable contributions to the team, prompting members to emulate these contributions. This effect is magnified when team identification is high, leading members to engage in self-categorization processes through which they internalize engagement-relevant behaviors such as enthusiasm, and goal directed persistence (Bakker et al., 2006; Turner & Reynolds, 2001). Adherence to these norms enhances belonging, self-esteem, and the collective desirability of maintaining an engaged state (Fiske, 2018).

Empirical evidence supports these top-down effects: Bakker et al. (2006) found that TWE predicts individual work engagement beyond individual-level job demands and resources, highlighting its regulatory influence. Thus, TWE operates not merely as an outcome of individual engaged contributions, but also as a collective regulator sustaining and amplifying members' work engagement through normative alignment (Turner & Reynolds, 2001). Therefore (Figure 1, central part):

Proposition 3. TWE directly and positively influences team members' work engagement through team norms prescribing vigor and dedication.

Team Structural Conditions, Perceived Demands-Resources Optimal Balance, and Teamwork Engagement

From a multilevel perspective, teams influence individual engagement primarily through structural conditions (relatively stable characteristics of the task, team, and context; Mathieu et al., 2019). These conditions define team demands (i.e., tasks, objectives, constraints) and provide resources (e.g., information, tools, social support) necessary for effective performance. Accordingly, our model positions team structural conditions as top-down antecedents (Cronin et al., 2011) that shape team members' perceptions of demands-resources optimal balance. We focus on three conditions widely recognized as fundamental to team design (e.g., Hackman, 2002; Mathieu et al., 2019): 1) team autonomy or the extent of control and decision-making latitude members have over their tasks (Langfred, 2005), 2) team workload or the volume of tasks performed within quality standards over a period (Funke et al., 2012), and 3) team task interdependence or the extent to which members' tasks depend on each other (Morgeson et al., 2021).

Although emergent states such as team cohesion (i.e., members' unity toward common goals; Rapp et al., 2021) are often emphasized in team effectiveness research (Costa et al., 2014a; Morgeson et al., 2021), we prioritize structural conditions because they are more stable (Cronin et al., 2011), exert foundational influence on team dynamics (Kozlowski & Klein, 2000), and shape emergent states (Mathieu et al., 2019). Furthermore, the way these structural conditions interact to predict outcomes remains insufficiently understood (Rapp et al., 2021).

The propositions in this section are organized into two clusters: Propositions 4, 5, and 6 (Figure 1 left section) address how each structural condition influence members' perceptions of demands-resources optimal balance. Propositions 7a, 7b, and 7c (Figure 1, left/central section) extend this logic by theorizing that emerged TWE moderates the relationship between structural conditions and members' perceptions of demands-resources optimal balance, consistent with multilevel accounts of top-down effects (Cronin et al., 2011; Kozlowski & Klein, 2000), and evidence that team climates (e.g., security) moderate team-individual links (Geue, 2018). An overview of the mechanisms described in this section is provided in Table 1 (page 8).

The Role of Team Structural Conditions on Perceived Demands-Resources Optimal Balance

Team Autonomy

The greater a team's latitude in managing its tasks and environment, the higher its autonomy. Long regarded as a cornerstone of effective teamwork design (Hackman, 2002), team autonomy remains critical as teams increasingly face complex, cognitively and emotionally demanding work (Palumbo, 2021). It enables members to distribute tasks, regulate performance standards, train their peers, and manage rewards and recognition (Bakker, 2022). By enhancing decision-making control, team autonomy functions as a key resource, allowing members to adjust task conditions and access additional resources, such as planning flexibility and self-direction (Rico et al., 2020; Tims et al., 2013). Hence, team autonomy strengthens members' sense of ownership and responsibility, fostering perceived demands-resources optimal balance (Ryan et al., 2021).

However, autonomy's benefits are nonlinear. When autonomy becomes excessive, particularly in highly dynamic contexts that require continuous adaptation and

flexibility, such as healthcare environments or cross-boundary collaborations, it can generate ambiguity, overload members with decisions and strain cognitive resources (Alcover et al., 2021; Geerts et al., 2021). Conversely, too little autonomy limits member's ability to utilize their skills or exercise discretion, producing frustration or disengagement (Hackman, 2002). Hence, moderate levels of team autonomy yield the most favorable perceived balance of challenge and support, consistent with curvilinear findings linking moderate team autonomy to higher well-being at work (Bakker et al., 2023; Kubicek et al., 2017). Thus (see Figure 1, left part):

> *Proposition 4. Team autonomy exhibits an inverted U-shaped relationship with members' perceived demands-resources optimal balance: moderate autonomy yields optimal balance, whereas low or too high autonomy leads to suboptimal balance.*

Team Workload

Effectively, workload management requires estimating team capacity (e.g., member availability, coordination time, and contingencies), clarifying task scope and priorities, and distributing tasks among members fairly (Hollan et al., 2000; Morgeson et al., 2021). When these conditions are met, team members perceive workload as challenging yet attainable, supported by adequate resources. Thus, these moderate (i.e., medium) amounts of team workload promote perceived demands-resources optimal balance among team members, which enhances their individual work engagement.

In contrast, excessive workload (e.g., unrealistic expectations, inadequate processes) overwhelms team resources, constraining coordination, communication, and quality improvement (Urban et al., 1996; Christensen et al., 2021). This can hinder team members' ability to address errors or issues caused by other members or management decisions (Mazur et al., 2014; Porter et al., 2010). These pressures heighten time strain,

unmanageable expectations, and reduce flexibility, creating perceptions of demands-resources suboptimal balance. Similarly, insufficient workload can be detrimental for teams: when demands fall short of available resources, team members experience boredom and under-stimulation, curbing motivation and opportunities for skill development (Bakker et al.,2023; Demerouti & Bakker, 2023), and reducing knowledge exchange plummeting cooperation (Reijseger et al., 2013). Accordingly, we surmise that (Figure 1, left part).

Proposition 5. Team workload exhibits an inverted U-shape relationship with members' perceived demands-resources optimal balance: moderate workload yields optimal balance, whereas low or high workload leads to suboptimal balance.

Team Task Interdependence

Teamwork inherently involves a certain level of task interdependence, which is contingent upon the amount of information, knowledge, skills, physical assistance and/or equipment required for effective task completion (van der Vegt & van de Vliert, 2005). Moderate task interdependence promotes collaboration, coordination and mutual support among team members; key social resources that facilitate the management of workload demands (Bakker, 2022; Cropanzano & Mitchell, 2005). When team task interdependence allows for distributed expertise, and a shared sense of accountability, that is, a moderate level, team members perceive optimal balance between demands and resources.

By contrast, high team task interdependence can introduce friction. Excessive reliance on others fosters role ambiguity, interpersonal tension, and social strain; particularly when seeking help threatens one's status (Nadler, 2015; Somech et al., 2009). These relational demands can outweigh available resources, yielding suboptimal demands-resources perceptions that will undermine work engagement. Conversely, low

team task interdependence isolates members, curtailing information flow, knowledge exchange, support, and coordination among team members (Hackman, 2002). This can result in team members perceiving higher personal demands, feeling solely responsible for outcomes with fewer available shared resources. Such misalignment with individual and team efforts drifting apart, increase conflicts and task inefficiencies, resulting in a perception of increased demands without the corresponding resources. Thus, we propose that (Figure 1, left part):

Proposition 6. Team task interdependence exhibits an inverted U-shape relationship with members' perceived demands-resources optimal balance: moderate team task interdependence yields optimal balance, whereas low or high task interdependence leads to suboptimal balance.

The Moderating Effect of TWE

Consistent with multilevel theorizing (Cronin et al., 2011; Kozlowski & Klein, 2000) and evidence that affective team climates moderate individual outcomes (Kim et al., 2016; Pearsall & Ellis, 2011), we propose that TWE moderates the strength of the curvilinear relationship between team structural conditions and members' perceptions of demands-resources optimal balance. As established in Propositions 4–6, team structural conditions exhibit inverted-U relationships with perceived demands-resources balance: moderate levels yield optimal perceptions, whereas low or high levels lead to suboptimal balance. We argue that TWE influences the sensitivity of these perceptions to structural conditions, that is, the degree to which team members' perceptions of demands-resources optimal balance adjust to variations in team structural conditions. Thus, sensitivity influences how strongly that curvilinear relationship occurs at various levels of TWE (see Figure 2).

Although engagement is generally desirable (Holbeche, 2018), its effects on perceptual calibration vary by intensity. Medium levels of TWE support accurate cognitive appraisal of demands as manageable challenges via positive affect (Gross, 2008) and facilitate behavioral mobilization to leverage resources through activation. Critically, at medium TWE, perceptions remain appropriately sensitive to variations in structural conditions because team members accurately detect when autonomy, workload, or task interdependence deviate from optimal levels and adjust their demands-resources perceptions accordingly. This sensitivity produces a pronounced inverted-U relationship between structural conditions and perceived balance (Figure 2).

-----Insert Figure 2 around here----

At high TWE, however, optimism bias and heuristic processing (Gasper & Clore, 2002; Schwarz & Bless, 1991) lead team members to maintain positive perceptions of demands-resources balance regardless of actual structural conditions. Rather than reducing perceived balance per se, high TWE attenuates the sensitivity of these perceptions to structural conditions, effectively flattening the inverted-U relationship. Team members under high TWE may perceive adequate balance even when structural conditions are suboptimal (e.g., excessive workload or low autonomy), because their elevated positive affect and activation create a generalized sense of capability that persists independent of context. This decoupling reduces teams' adaptive capacity, as perceptions no longer track structural reality (Bakker et al., 2011). Conversely, very low TWE dampens activation and positive affect, inflating perceived demands and shrinking perceived resources (Gençöz, 2002; Sonnentag, 2018). Under low TWE, team members tend toward pessimistic perceptions that are similarly insensitive to structural conditions; even when conditions improve, perceptions remain negative. This again flattens the inverted-U relationship, though at a lower baseline than high TWE.

Figure 2 illustrates this pattern. At medium TWE, the inverted-U relationship between structural conditions and perceived demands-resources balance is most pronounced: perceptions are highest at moderate structural conditions and decline appropriately when conditions are too low or too high. At both low and high TWE, the curve flattens, perceptions become less responsive to structural variations, though for different reasons and at different baseline levels.

Before detailing how this principle operates across the three structural conditions, we illustrate this logic with a concrete example. Consider a team operating at 80% of its workload capacity. At this medium level, workload is perceived as stimulating yet manageable, fostering demands-resources optimal balance. If workload increases, the balance shifts toward strain; if it decreases, stimulation wanes, producing perceptions of suboptimal balance (Proposition 5). TWE shapes how sensitive teams are to these variations: under low TWE, even moderate workload feels excessive and perceptions remain pessimistic; under medium TWE, perceptions accurately track workload variations, feeling optimally challenging at moderate levels; under high TWE, teams may underestimate strain or overestimate available resources, maintaining positive perceptions even as workload becomes excessive.

Team Autonomy

Team autonomy provides discretion and control, but its influence on perceived demands-resources optimal balance depends on how team members interpret and respond to this structural condition. At medium levels of TWE, teams display heightened sensitivity to autonomy: members accurately register autonomy as a resource that enables responsibility, initiative, and control, while remaining attentive to contextual constraints. Under these conditions, variations in autonomy are translated into proportionate adjustments in perceived resources relative to demands,

strengthening the alignment between structural conditions and perceptions of optimal balance.

When TWE is excessive, however, team members may overestimate their adaptive capacity to handle complex tasks, reducing the likelihood that variations in autonomy trigger appropriate recalibration of effort or support-seeking (Smith et al., 2011). Similarly, when TWE is low, teams show reduced sensitivity in the opposite direction: autonomy may be interpreted as excessive responsibility, amplifying perceived demands and diminishing responsiveness to its resource-enabling potential (Gençöz, 2002; Sonnentag, 2018). In both cases, autonomy no longer translates reliably into perceptions of demands-resources optimal balance. Hence, we propose (see Figure 1, central part):

Proposition 7a. TWE moderates the curvilinear relationship between team autonomy and members' perceived demands-resources optimal balance, such that this relationship is strongest (most pronounced) at medium levels of TWE and attenuated at low or high levels of TWE.

Team Workload

While autonomy influences TWE through perceptions of control and empowerment, workload operates through the calibration of challenge and capacity. At medium TWE, team members are more sensitive to workload demands and better able to discriminate between manageable and excessive demands. Moderate positive affect supports balanced information processing enabling teams to accurately detect changes in workload and consider whether available resources are sufficient (Gasper & Clore, 2002). Simultaneously, moderate activation mobilizes energy for adaptive responses, such as task reallocation or pacing adjustments (Tims et al., 2013). As a result,

fluctuations in workload are translated into calibrated perceptions of demands–resources optimal balance.

In contrast, high TWE can lessen sensitivity to workload increment by fostering optimism bias and reduced deliberation (De Neve & Oswald, 2012; Gasper & Clore, 2002), leading team members to underestimate demands or overestimate resources. When unforeseen workload pressures arise (e.g., missed deadlines due to cascading delays), this diminished sensitivity can result in delayed or maladaptive responses, disrupting perceptions of balance (Urban et al., 1996). When TWE is low, the capacity to interpret workload information accurately is reduced, causing that even adequately calibrated team workloads may be interpreted as excessive. As a result, disengagement or uneven compensatory effort may emerge, disrupting the translation of workload into a balanced perception of demands and resources. Thus, high and low TWE reduce perceptual sensitivity of demands-resources optimal balance, either blinding teams to constrains or reducing responsiveness to workload demands. Accordingly, we propose (Figure 1, central part):

> *Proposition 7b. TWE moderates the curvilinear relationship between team workload and members' perceived demands-resources optimal balance, such that this relationship is strongest (most pronounced) at medium levels of TWE and attenuated at low or high levels of TWE.*

Team Task Interdependence

Whereas autonomy and workload shape individual perceptions of capacity, task interdependence additionally introduces social-relational demands into the equation. At medium TWE, team members display greater sensitivity to task interdependence, such that interaction requirements are accurately interpreted as opportunities for information sharing and mutual support (Bakker & Xanthopoulou, 2009). In this way, variations in

task interdependence are translated proportionately into resources, reinforcing perceptions of demands–resources optimal balance.

However, when TWE is excessive, sensitivity to the costs associated with task interdependence may be reduced. High activation can amplify interaction intensity (e.g., interruptions, over-consultation), while reducing sensitivity to how these interactions deplete resources such as time and energy (Somech et al., 2009). As a result, task interdependence no longer translates reliably into perceptions of optimal balance. Likewise, low TWE reduces sensitivity to variations in task interdependence. Even well-calibrated levels of task interdependence may be experienced as inefficient or effortful, leading to reduced collaboration, individual task prioritization, or support withholding. These responses heighten perceived demands and deplete resources, thereby eroding perceptions of demands–resources optimal balance.

Proposition 7c. TWE moderates the curvilinear relationship between team task interdependence and members' perceived demands-resources optimal balance, such that this relationship is strongest (most pronounced) at medium levels of TWE and attenuated at low or high levels of TWE.

TWE and Team Effectiveness.

Team effectiveness is a multifaceted construct encompassing three interrelated outcomes: a) team performance, referring to the quality, quantity, and value of outputs; b) the impact of team functioning on its members, including job satisfaction, personal growth, and well-being; and c) the team’s ability to maintain and improve performance over time, ensuring its long-term viability (Hackman, 2002; Mathieu et al., 2019). Our model focuses on the first and third outcomes, reflecting our emphasis on results that are inherently collective and capture team functioning.

Since its inception, the JD-R theory has conceptualized work engagement as a motivational state that enhances both individual and team performance by activating the energy and dedication needed to mobilize resources in response to demands (Bakker et al., 2023; Bakker et al., 2006; Costa et al., 2016). In this regard, empirical research consistently supports the link between TWE and indicators of team effectiveness. Studies have shown that TWE predicts team performance, whether measured through efficiency, quality, or adaptive outcomes (García-Buades et al., 2016; Costa et al., 2016; Mäkikangas et al., 2016; Salanova et al., 2011), as well as lower turnover and accident rates (Harter et al., 2002).

Further, Costa et al. (2014a), drawing on the multiphasic model of team effectiveness (Marks et al., 2001), theorized the link between TWE and team effectiveness conceptualizing TWE as a high-energy, positive state that principally supports team action processes (i.e., execution and performance).

Our model complements Costa et al.'s (2014a) work, by specifying the regulatory mechanisms through which TWE contributes to team effectiveness. As referred in Table 1, we propose that the cognitive-motivational nature of TWE energizes and sustains team efforts through two regulatory mechanisms: goal setting (e.g., direction) and goal striving (e.g., perseverance and adjustment). These mechanisms channel vigor and dedication into the motivational drive that transforms transition, action, and interpersonal processes into team performance and long-term viability.

Consistent with multiphasic models of team effectiveness (Marks et al., 2001; Mathieu et al., 2020), our model posits that TWE supports team goal setting by articulating members around challenging yet attainable objectives. TWE fosters the vigor and dedication needed to achieve these goals (Bakker, 2022; Costa et al., 2016), enhancing the cognitive and emotional readiness necessary for assessing resources,

prioritizing tasks, and anticipating potential obstacles; activities central to team transition processes (Marks et al., 2001). Teams experiencing TWE are also more likely to engage in collaborative goal formulation, harmonizing individual and collective aims (Bakker, 2022; Larson et al., 2020).

Through goal striving, TWE facilitates the translation of plans into coordinated and sustained action (Costa et al., 2014a; Marks et al., 2001). These action processes encompass monitoring progress, reallocating resources, coordinating activities, and adjusting strategies in real time. TWE heightens team members' willingness to stay engaged, reinforces identification with team goals, and sustains attentional focus under time pressure or uncertainty (Larson et al., 2020). By energizing coordination and problem-solving, TWE prevents individual tasks from undermining collective monitoring or support functions (Van der Hoek et al., 2018).

Teams experiencing TWE are also more likely to show functional interpersonal processes to handle disagreements constructively, maintaining task focus while avoiding unproductive relational friction (Mathieu et al., 2020). By facilitating interpersonal processes, TWE conserves valuable resources (e.g., attentional or temporal) that can be re-invested into both goal-setting and goal-striving efforts. According to the above mentioned, we proposed that (Figure 1, right part):

Proposition 8a: TWE positively influences team effectiveness (team performance and long-term viability) by providing energy and persistence required for goal setting.

Proposition 8b: TWE positively influences team effectiveness (team performance and long-term viability) by fostering involvement and identification that sustain goal striving.

For researchers seeking to test these propositions, we recommend prioritizing proximal performance indicators that directly reflect team regulatory processes: supervisor ratings of goal attainment, peer assessments of coordination quality, objective metrics of output quality or efficiency, and customer/client satisfaction scores. For viability, focus on measures of team reflexivity, backup behaviors, and members' intentions to continue working together (Hackman, 2002; Mathieu et al., 2019). More distal outcomes, such as unit financial performance, turnover rates, or absenteeism, involve complex causal chains beyond our model's scope and should be interpreted cautiously.

Discussion

This multilevel emergence model of TWE extends the motivational pathway of JD-R theory (Bakker et al., 2023; Demerouti & Bakker, 2023) to the team level. Drawing from research on team motivation (Chen & Kanfer, 2006) and team effectiveness (Mathieu et al., 2019), the model adopts a dynamic, multilevel approach to explaining how work engagement emerges and operates within teams (Grand et al., 2016; Kozlowski & Klein, 2000). Whereas earlier frameworks have addressed TWE (Costa et al., 2014a; Torrente et al., 2012b), the present model is distinctive in grounding TWE within JD-R theory and in explicating the cognitive and affective mechanisms that underlie its emergence.

After defining TWE as an emergent team state consisting of members' compatible representations of vigor and dedication, we introduce the new concept of perceptions of demands-resources optimal balance. This perception acts as the proximal antecedent of members engagement, shaped by team structural conditions (autonomy, workload, and task interdependence). For TWE to emerge, members' states interact through cognitive and affective exchanges, giving rise to compatible representations of team vigor and

dedication. By emphasizing the differentiated contributions of members to the emergent team state, the model adopts a compilational rather than compositional logic (Kozlowski & Klein, 2000). Ultimately, both team vigor and dedication are proposed to activate and sustain team regulatory mechanisms, such as goal setting and goal striving, facilitating the enactment of team transition, action, and interpersonal processes drive team effectiveness (i.e., team performance and viability). The eight empirically testable propositions articulated in the model offer a foundation for advancing theory, informing research, and guiding practice. We elaborate on these contributions below.

Theoretical Contributions

The model advances theorizing on TWE and team effectiveness in several important ways. First, consistent with JD-R theory (Bakker et al., 2023; Demerouti & Bakker, 2023), it underscores the role of team structural conditions (team work design) in the development and emergence of TWE. By introducing perceived demands-resources optimal balance, it clarifies how team structural conditions such as autonomy, workload, and task interdependence influences members' engagement. This new perceptual concept reflects members' appraisals of whether team-provided resources are sufficient to meet its demands, capturing both the buffering and boosting hypotheses as recently postulated in JD-R theory (Bakker et al., 2023; Demerouti & Bakker, 2023). When these perceptions align optimally, TWE is promoted; when they misalign, such as high demands/low resources or vice versa, strain or boredom is more likely. Thus, by connecting team design features to members' perceptions, the model clarifies how and when TWE emerges.

Second, the model advances the cognitive foundations of engagement by integrating team cognitive representations with affective–motivational dynamics. Rather than treating TWE as a purely affect-laden emergent state, our model emphasizes the

role of compatible mental representations of vigor and dedication in enabling members to interpret team structural conditions in meaningful and motivationally coherent ways. These representations also provide the basis for goal setting and goal striving, through which energy, persistence, involvement, and identification are directed toward the enactment of transition, action, and interpersonal processes. This rationale aligns with contemporary conceptualizations of team emergent states as cognitive-motivational hybrids (Rapp et al., 2021) and supports the recognition of interplay between team cognition and motivation (DeChurch & Mesmer-Magnus, 2010).

Third, by adopting a compilational emergence logic (Kozlowski & Klein, 2000) the model acknowledges heterogeneity in engagement contributions. Prior models have typically assumed that individual engagement aggregates linearly into a shared team-level state (e.g., Costa et al., 2014a, 2014b; Torrente et al., 2012a). In contrast, our model recognizes that team members vary in intensity, timing, and frequency of engaged-related behaviors, and that these heterogeneous inputs interact dynamically (Cronin et al., 2011) to yield TWE. Compilational emergence emphasizes that either or both the number or nature of the elemental content of emergence are different (i.e., discontinuity, Kozlowski & Klein, 2000). This logic clarifies how medium TWE may arise from varied individual states, some highly engaged “boosters” (Bransby et al. 2024; Fortuin et al., 2023), and others at lower levels, rather than uniform engagement across members. Accordingly, the model positions TWE as a dynamic state, which can strengthen or weaken over time depending on shifts in member states and contributions.

Fourth, the model introduces a novel perspective by theorizing curvilinear and indirect effects of TWE through a sensitivity-based mechanism. While engagement is often depicted as uniformly beneficial, excessive TWE may reduce teams’ sensitivity to structural constraints, distorting members’ perceptions of capacity and progress and

leading to overinvestment, resource depletion, or misalignment with task requirements (Somech et al., 2008; Urban et al., 1996). Such unintended consequences of high TWE have received limited attention in prior theorizing (e.g., Costa et al., 2015; Torrente et al., 2012a). Addressing this gap, our model proposes that emergent TWE moderates how team structural conditions are translated into members' perceptions of demands–resources optimal balance, yielding adaptive or maladaptive effects depending on its intensity.

Fifth**,** a distinctive strength of the model lies in the explicit specification of multiple mechanisms across its key relationships (Table 1). The emergence of TWE is explained through both intra-personal and interpersonal mechanisms, further differentiated into implicit and explicit. Once TWE is established, the model also specifies distinct mechanisms through which TWE influences individual work engagement, regulates the relationship between team structural conditions and perceived job demands-resources optimal balance, and shapes team performance and team viability. By articulating mechanisms at each of these stages, the model offers a process-based account of how TWE forms and how it subsequently operates within teams.

Together, these contributions position TWE not only as an outcome of well-designed team environments, but as a dynamic emergent state that both shapes and is shaped by cognitive, affective, and structural forces across levels.

Implications for Research

To advance research on TWE, our model offers a set of empirically testable propositions that, excepting the first and final propositions (P1, P8a and P8b), call for research designs capturing multilevel and temporal complexity (Cronin et al., 2011; Kozlowski & Klein, 2000). Hence, research seeking to test this model will benefit from longitudinal, multilevel designs that analyze evolving dynamic relationships between

individuals and teams (Grand et al., 2016; Mohammed et al., 2021). Random coefficient modeling (RCM; Arora, 2010) is particularly suitable for testing propositions P2-P7, allowing repeated measures to capture how team structural conditions (e.g., autonomy) shape individual perceptions of demands-resources optimal balance (P4–P6), which in turn, relate to individual work engagement and TWE emergence (P2d). RCM accommodates variation in individual trajectories, detects curvilinear moderation effects (as posited in propositions P7a-P7c), and integrates heterogeneous contributions from team members to TWE, reflecting a compilational logic of emergence. RCM captures different ways in which individual engagement patterns shape TWE such as indicators of how dispersed engagement is within the team (how much members differ in their engagement), differences in members' influence (some members have stronger impact), or thresholds (proportion of members who perceive job demands-resources as optimal or suboptimal).

However, studying TWE emergence micro-mechanisms (Table 1), such as attention, information integration, and interpersonal transmission (P2a–P2c), require finer-grained approaches. Computational modeling (i.e., formal, algorithmic representations of theoretical mechanisms; Grand et al., 2016) and agent-based simulation (i.e., micro-level interactions generating meso or macro-level outcomes; Grand et al., 2016) provide valuable complements to longitudinal methods, functioning as "virtual laboratories" where the mechanisms proposed in our model can be formalized into interaction rules among agents. For instance, to examine the attention and information integration mechanism described in P2a, simulation models could encode specific behavioral rules such as: "The probability of attending to TWE-relevant information increases with the frequency and clarity of signals from peers about workload manageability". These rules can be grounded in observable indicators such as

reactions to emotionally charged events (e.g., successful task completion) or signals related to team priority and capacity. Through such simulations, researchers can test under what structural or communicative conditions engagement spreads, dissipates, or fragments; offering mechanistic clarity on the bottom-up emergence of TWE.

Overall, a combined methodological strategy integrating longitudinal RCM analyses with simulation-based approaches, would provide a robust framework for testing this model's theoretical assumptions; tracing TWE's developmental trajectory, and identifying configurations that facilitate or inhibit its emergence.

Implications for Practice

Although primarily theoretical, the proposed model of TWE offers actionable guidance for managing and sustaining team engagement. Adopting a compilational perspective helps practitioners design interventions that recognize individual variability in engagement and foster complementary contributions. Identifying and supporting key "boosters" or informal leaders (Fortuin et al., 2023) can help spark and maintain energy within the team. At the same time, encouraging diverse yet complementary engagement roles (e.g., some members taking initiative while others sustain effort at different stages of task execution), helps keep team-level engagement alive and stable over time.

Well-designed structural conditions remain essential. Designing teams with moderate levels of autonomy and task interdependence, while keeping workload to manageable levels (e.g., 80% of team capacity), support TWE by reinforcing members' perceptions of control, mutual responsibility, fostering reciprocity, and enabling high-quality interactions without fatiguing or overwhelming them (Ryan et al., 2021; Turner & Reynolds, 2001). Aiming for medium TWE levels further reamplifies these benefits as they foster team members' energy and motivation needed to proactively restore demands and resources optimal perceptions in the face of challenges (Bakker, 2022;

Tims et al., 2013). When a team is struggling to meet deadlines, medium engagement often prompts members to initiate practical problem-solving conversations about time use, resources allocation, and task prioritization, helping realign demands and resources and strengthen collective efficacy. In contrast, very high engagement may narrow attention toward task execution rather than reflection, reducing the likelihood that the team steps back to recalibrate its workflow when needed.

Finally, managers and team members should treat TWE not merely as an outcome, but as a key enabler of goal setting and goal striving as regulatory mechanisms driving team effectiveness. This may involve seeking regular feedback, conducting after-event reviews, structured planning conversations or open dialogues about structural issues (Alcover et al., 2021; van der Vegt et al., 2010). Teams can also use the TWE model as a developmental tool, discussing how different levels of structural conditions shape work engagement states and exploring strategies for keeping TWE at medium level (Bakker et al., 2023). If restoring optimal demands and resources perceptions proves challenging, recovery strategies become essential. These may include transitioning to less cognitively demanding tasks, encouraging rest periods, or temporarily reducing certain interpersonal interactions to prevent affective or cognitive overload. Over time, such practices reinforce TWE's role as a mechanism of continuous improvement. They transform challenges into developmental opportunities, creating more resilient, adaptive and effective teams that meet current demands while proactively growing stronger.

Limitations and Future Developments

Despite the advances in our model, there are several limitations that must be acknowledged, offering fruitful directions for future research. Although the model includes conceptually salient variables, its explanatory power could be enriched by incorporating additional team-level elements. For example, other team structural

conditions, such as task complexity (Hærem et al., 2015), or task meaningfulness (impact on clients or other teams), may play a critical role in shaping TWE. Beyond identifying additional structural variables, it is important to acknowledge that their relevance is likely to be context-dependent. Consistent with JD–R theory, the antecedents of TWE are therefore expected to vary across organizational contexts, sectors, and hierarchical levels (Bakker et al., 2023). Additionally, our model underscores the indirect and emergent nature of TWE, which unfolds through perceptions of demands-resources optimal balance shaped by structural conditions, influencing members work engagement. However, in teams operating in tightly regulated contexts or under strict protocols, such as air traffic controllers, or call-center dispatchers, structural conditions can exert a more immediate influence on TWE. In such team contexts, structural conditions may exert a dominant influence on TWE, thereby weakening the impact of individual members perceived job demands and resources on their engagement and reducing the relevance of this indirect pathway for TWE emergence. Examining these situations would provide valuable insights into the model's boundary conditions.

Further, heterogeneity in individual work engagement, warrants future attention in the model given its potential to either facilitate TWE, through complementary contributions, or hinder it through subgrouping or conflict (Antino et al., 2019). Additionally, the incorporation of concurrent team emergent states, such as team potency or team empowerment (Costa et al., 2014a) could facilitate the clarification of dynamic and reciprocal relationships among these team states. Furthermore, investigating top-down effects of TWE on individual performance, or how team effectiveness may reinforce TWE (Costa et al., 2014a), may reveal additional important relationships within the model. The model is also open to exploring the interaction

between team and organizational structural conditions, such as HR policies or the organization's financial situation (Demerouti & Bakker, 2023), in shaping team's work conditions, therefore their demands-resources perception. These cross-level interactions are likely consequential for TWE.

Despite their theoretically grounding, several propositions remain empirically under-explored, particularly Propositions P7a, P7b, and P7c positing that TWE moderates curvilinearly the relationship between team structural and team members' variables. Whereas extant research has not found long-term detrimental effects of work engagement on individual well-being or performance (Shimazu et al., 2018), such findings cannot be directly generalized to TWE. Indeed, studies on team-supportive climates have shown that they may inadvertently foster counterproductive work behaviors (Pearsall & Ellis, 2011), reinforcing the importance of testing these dynamics in the context of TWE.

Finally, to study the relationship between TWE and team effectiveness, it is first necessary to select specific indicators of effectiveness based on the type of task performed by the team (e.g., innovation, quality, goal achievement, etc.). Furthermore, it is important to note that this relationship warrants further investigation, as it may not follow a linear pattern. Specifically, both very low and very high levels of TWE could undermine team effectiveness by disrupting core team regulation, reflecting a curvilinear dynamic. This extension aligns with the JD-R theory, particularly its buffer and boost hypotheses, suggesting that the value of engagement depends on contextual alignment between team demands, available resources, and team goals.

Conclusion

Teams are the foundation of modern organizations, and their sustained engagement is vital to ensuring their effectiveness. The present model elucidates how TWE emerges

from the interplay between structural conditions and members' perception of demands and resources optimal balance, and how it activates core regulatory mechanisms, goal setting and striving, that drive team performance and long-term viability. We hope the propositions presented here will spark further inquiry into the mechanisms and conditions that sustain teamwork engagement, contributing to the development of a sustainable effectiveness and well-being of team members, teams, and organizations.

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Figure 1

Multilevel Model of Teamwork Engagement Emergence

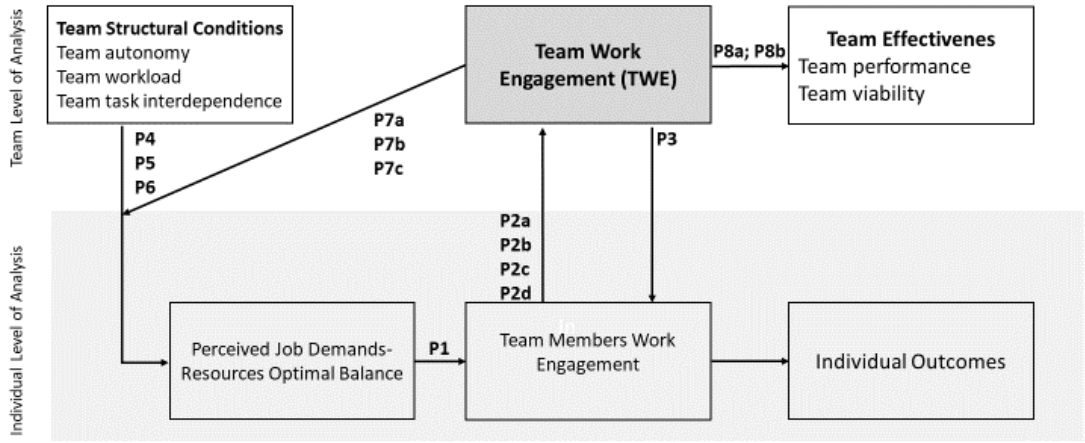
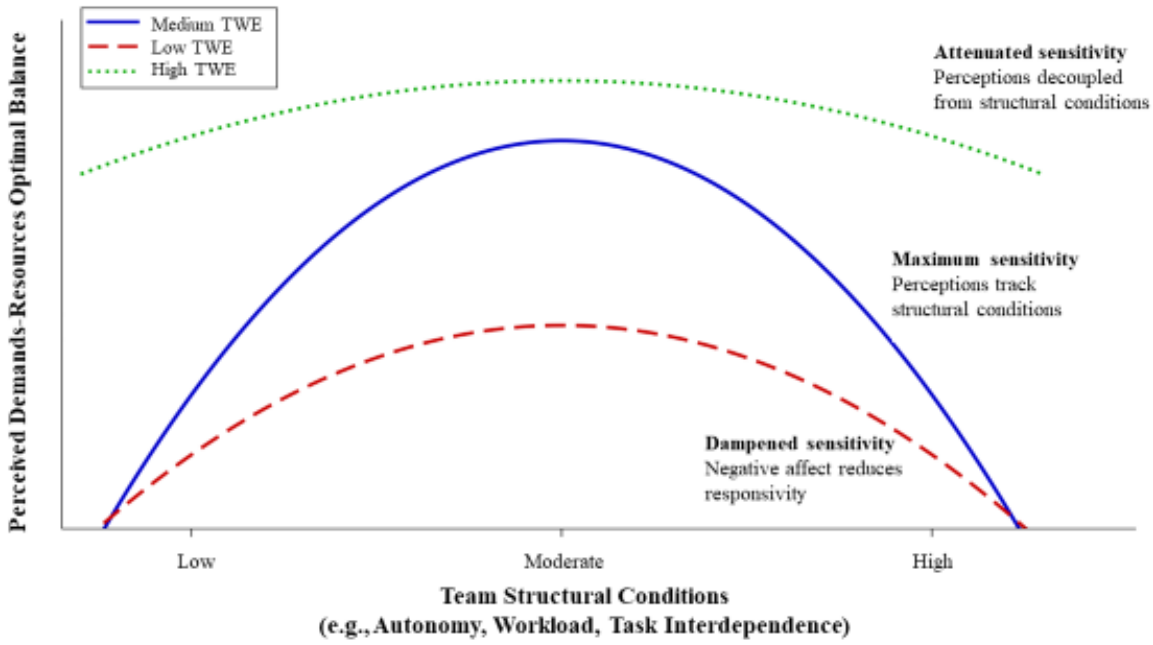


Figure 2

Curvilinear Moderation of TWE on the Relationship Between Team Structural Conditions and Perceived Demands-Resources Optimal Balance



Note. The figure illustrates how TWE moderates the strength of the curvilinear relationship between team structural conditions (i.e., autonomy, workload, task interdependence) and perceived demands-resources optimal balance. At medium TWE (solid line), the inverted-U relationship is most pronounced, reflecting maximum sensitivity of perceptions to structural conditions. At high TWE (dotted line), optimism and reduced deliberation attenuate sensitivity, flattening the curve at a higher baseline. At low TWE (dashed line), negative affect and reduced activation similarly flatten the curve, but at a lower baseline.

Table 1.

Explanatory Mechanisms in the TWE Model

Paths	Explanatory Mechanisms
Team structural conditions→ Perceived demands-resources optimal balance	-Moderate team autonomy fosters demands-resources optimal perceptions of by strengthening members sense of ownership and responsibility to deal with team tasks. -Moderate team workload fosters demands-resources optimal perceptions of by signaling that tasks are meaningful and effortful yet attainable within members' available resources. -Moderate team task interdependence fosters demands-resources optimal perceptions of by allowing for distributed expertise and a shared sense of accountability among members.
Perceived demands-resources optimal balance →Members work engagement	-Job demands-resources optimal balance perceptions increase vigor and persistence and reinforce involvement and dedication.
Members work engagement→TWE	-Intrapersonal: attention, information integration and positive affect. -Interpersonal: work engagement information and affect exchange: . Implicitly: emotional contagion, behavioral entrainment, social tuning and norm absorption. . Explicitly: emotional comparison, deliberate affective induction, and expectations and goals open communication. -Team members vigor and dedication functional alignment.
TWE→Members work engagement	-Members adoption of work engagement-oriented norms facilitated by team identification.
TWE moderates Team structural conditions→Perceived demands-resources optimal balance	-Medium TWE optimizes sensitivity to team structural conditions, strengthening the translation of demands and resources into perceptions of optimal balance.
TWE→Team Effectiveness	-Goal setting. -Goal striving.