

Segmentation or Integration? Employee Work-Family Balance Strategies in Virtual Team Work Modes

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Abstract

Virtual team work models have emerged as a developmental trend in contemporary enterprise operations, engendering boundaryless work characteristics and substantial overlap between work and family domains, thereby altering the fundamental research and practical premise that work and family are distinct and separable. Consequently, scholars have begun advocating for alignment with this boundaryless trend to promote work-family integration. However, enterprise practices grounded in this management philosophy have resulted in a series of negative outcomes. This compels us to reconsider: Under the trend of virtual team work models, should we adopt the traditional work-family segmentation approach, the current work-family integration approach, or some alternative new management paradigm? To address this critical question, the present study leverages social identity theory to compensate for the explanatory limitations of conservation of resources theory, examining how team virtuality influences employees' work-family integration behaviors and what management approaches should be employed for effective intervention to achieve harmonious development of work and family. This study constructs a novel theoretical framework for work-family balance research amidst digital intelligence transformation, advances theoretical development in this domain, and provides guidance for enterprises to promote harmonious work-family development through new management perspectives.

Full Text

Segmentation or Integration? Work-Family Balance Strategies in the Virtual Team Work Mode

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Abstract: The virtual team work mode has become a defining trend in contemporary organizational operations, producing boundaryless work characteristics where work and family domains increasingly overlap. This development fundamentally alters the research and practical premise that work and family can be clearly distinguished—a foundation upon which previous scholarship rested. In response, scholars have advocated embracing this boundaryless trend to promote work-family integration. However, managerial practices based on this integration perspective have yielded a series of negative outcomes, prompting us to reconsider: Under the trend of virtual team work modes, should we adopt the traditional work-family segmentation approach, the current work-family integration approach, or perhaps an entirely new managerial perspective? To address this critical question, this study leverages social identity theory to compensate for the explanatory limitations of conservation of resources theory, examining how team virtuality influences employees' work-family integration behaviors and identifying effective intervention strategies to achieve harmonious work-family development. This research constructs a novel theoretical framework for work-family balance studies in the era of digital intelligence transformation, advancing theoretical development in this field and providing guidance for organizations to promote harmonious work-family development through new managerial approaches.

Keywords: work-family balance, team virtuality, conservation of resources theory, social identity theory, work-family integration

Classification Code: B849: C93

1 Research Background and Problem Statement

Since the beginning of the 21st century, a new wave of technological transformation based on digital information and intelligent technologies—such as mobile internet, big data, and artificial intelligence—has propelled humanity from traditional agricultural and industrial societies into the “digital intelligence era,” rendering traditional face-to-face work modes increasingly virtual. In response to the national strategic requirement of developing the digital economy proposed at the 18th Party Congress and the national strategic task of “new infrastructure” featuring network, cloud, and computing power outlined in the State Council’s “14th Five-Year Plan for Digital Economy Development,” Chinese enterprises have actively pursued digital transformation, accelerating the virtualization of team-based work. According to statistics, 80% of companies worldwide are currently adopting virtual or hybrid work arrangements, with 64% intending to permanently maintain virtual team work modes (Meluso et al., 2020). Virtual teams represent an organizational form and work mode that leverages information and communication technologies to enable cross-regional, cross-temporal, and even cross-organizational collaboration to accomplish work tasks (Hertel et al., 2005; Minas et al., 2014). For instance, employees no longer work in

fixed physical buildings, factories, or offices but extend their work into home environments or broader settings such as coffee shops, cloud offices, and SOHO arrangements. Similarly, employees are no longer attached to a single organization but work for multiple employers on platforms like Zhubajie and Linggongwang, switching and circulating among multiple work teams. These phenomena exemplify the virtualization of team work. With the internationalization of enterprises, the proliferation of digital technologies, the emergence of platform-based organizations, and the rise of the gig economy, an increasing number of organizational teams now conduct remote, asynchronous, cross-organizational communication and collaboration through digital intelligence technologies, making organizational work modes progressively more virtual. Virtual team work modes have not only become the new normal in contemporary organizational operations but also represent a future trend in organizational management (Dennis et al., 2014; Purvanova & Kenda, 2022; Raghuram et al., 2019).

The development of virtual teams has brought fundamental transformations not only to organizational work modes but also to employees' lives, presenting new research directions for the work-family balance domain. To promote work-family balance, scholars have conducted extensive research on the relationship between work and family. Early segmentation theorists argued that work and family systems function best when operating separately (e.g., the male breadwinner/female homemaker model) (Kossek & Lambert, 2004; Olsen, 1983). Subsequently, researchers from spillover and compensation perspectives suggested that while work and family systems are distinct, they mutually influence each other—deficits in one domain are compensated by gains in the other to achieve balance (Edwards & Rothbard, 2000; Piotrkowski, 1979). More recently, scholars from an enrichment perspective have conceptualized work and family as an alliance, where resources from one domain can enhance role performance in the other, creating mutual benefits that enable both domains to function positively and achieve work-family balance (Greenhaus & Powell, 2006; Liu, 2016). These traditional theories—segmentation, spillover, compensation, and enrichment—all share a common premise: work and family are clearly bounded and distinguishable domains. Based on these perspectives, scholars have recommended that managers adopt work-family segmentation approaches to help employees establish clear boundaries, thereby achieving optimal work and life conditions and realizing work-family balance (Wei & Liu, 2013).

However, these research perspectives were developed based on traditional face-to-face work modes, whereas the virtualization of team work modes has altered the foundational premise of work-family balance research, making work and family domains increasingly indistinguishable and their overlap a future trend. For example, the widespread adoption of mobile online work platforms like DingTalk and Feishu requires employees to respond to work demands anytime and anywhere. Once online, work becomes difficult to disconnect from, blurring the lines between work and family life and extending employees' work time and space into their family domains, resulting in a high degree of overlap between the two domains (Middleton, 2008; Reyt & Wiesenfeld, 2015). This shift in

research premise suggests we may need to advance beyond traditional segmentation approaches to align with current virtualization trends.

Consequently, scholars have begun exploring how to promote work-family balance in virtual team work modes. From a resource perspective, they advocate embracing the trend of increasing work-family domain overlap to actively promote work-family integration. On one hand, researchers suggest that organizations further leverage digital technologies to advance work-family integration. For instance, organizations can utilize AI, machine learning, and other digital intelligence technologies to implement cloud-based, online, and remote work modes that extend employees' work time and space into family life, achieving seamless integration between work and family domains (Brown & O' Hara, 2003; Kreiner et al., 2009). On the other hand, scholars recommend that employees develop boundaryless work-life philosophies. Some have proposed the concept of "living at work, working in life" to achieve work-family balance through seamless integration (Ma & Xu, 2011).

Many organizations have adopted work-family integration management philosophies, implementing family-friendly policies such as work-from-home, mobile work, intelligent work, and hybrid arrangements to support employees' family responsibilities and reduce absenteeism and turnover. To some extent, this integration has improved employee job satisfaction and family functioning (Edwards & Rothbard, 2000). For example, Ctrip's "3+2" hybrid work model has reportedly enhanced employee well-being and creativity. However, these integration-oriented managerial changes have also harmed employees' physical and mental health and triggered organizational performance declines, producing unintended consequences. For instance, Google encouraged employees to bring work home to promote work-family integration, but this eliminated boundaries between work and life, creating pseudo-dedication and procrastination, reducing work efficiency, and encroaching on employees' family, leisure, and entertainment time and space, thereby damaging their well-being and family relationships. This suggests that the current resource-based work-family integration perspective may have limitations.

This prompts us to reconsider: Is the traditional work-family segmentation strategy truly outdated under the trend of increasing work-family domain overlap? In other words, under the development trend of virtual team work modes, should we adopt the traditional work-family segmentation approach, the emerging work-family integration approach, or some other new management perspective? To answer this important research question, we need to re-examine these two perspectives, starting from the characteristics of virtual team work modes to deeply analyze how team virtuality affects employees' psychological and behavioral responses regarding work-family balance, and further explore how organizations can optimize the impact of virtual team work modes on work-family balance.

2.1.1 Definition and Evolution of Virtual Teams

Virtual team research emerged in the 1990s and flourished after 1995 (Martins et al., 2004). Early research, based on comparisons with face-to-face (traditional) teams, simply defined virtual teams as geographically dispersed groups collaborating together (Henry & Hartzler, 1997). With further development of information and communication technologies, an increasing number of geographically dispersed teams began using electronic and information technologies for communication and collaboration. Consequently, the definition of virtual teams evolved to emphasize the use of communication technologies in addition to geographic dispersion. For example, Townsend et al. (1998) defined virtual teams as groups that use a combination of telecommunications and information technologies to connect geographically dispersed members to accomplish tasks. Subsequently, driven by accelerated economic globalization, more organizations began breaking through temporal, spatial, and organizational boundaries to form and operate teams to integrate human resources, making cross-temporal, spatial, and organizational boundaries important components of the virtual team concept. For instance, Martins et al. (2004) defined virtual teams as teams that use technology to varying degrees to cross location, time, and organizational boundaries to accomplish interdependent tasks.

In summary, the concept of virtual teams has changed and expanded with technological advancement and evolving business environments, and no unified definition has yet been reached. Based on existing definitions, virtual teams can be understood as collaborative work groups supported by digital intelligence technologies that cross temporal, spatial, and organizational boundaries to achieve goals. Their main characteristics include: technology support (extensive use of digital intelligence information technology), boundary crossing (spanning temporal, spatial, and organizational boundaries), and group identity (a collaborative group with shared goals). These characteristics can be divided into two components: “teamness” and “virtuality.” “Teamness” represents the commonalities with traditional (or face-to-face) teams—both having shared work goals and being goal-oriented collaborative groups. “Virtuality” distinguishes virtual teams from traditional teams, encompassing typical features such as temporal-spatial dispersion, technological dependence, structural dynamism, and organizational boundary crossing.

2.1.2 Definition and Evolution of Team Virtuality

Team virtuality derives from the virtuality characteristics within the virtual team concept, describing the degree to which a team possesses features of virtual team work (Kirkman & Mathieu, 2005; Martins et al., 2004). With the advancement of new-generation information technologies such as internet, big data, cloud computing, artificial intelligence, and the Internet of Things, as well as the development of new economic forms like the digital economy, platform economy, and gig economy, most teams in today’s organizations possess these virtual team characteristics to varying degrees. Team virtuality has thus be-

come a universal feature of contemporary organizational teams (Schmidtke & Cummings, 2017; Wang & Li, 2017). In other words, current organizational work teams all possess varying degrees of virtuality, and scholars' attention has shifted toward team virtuality as a construct describing the degree of virtuality (Martins et al., 2004; Schmidtke & Cummings, 2017).

However, current scholars describe the team virtuality construct from different perspectives, failing to reach a unified definition and understanding. For example, O' Leary and Cummings (2007) view team virtuality as the degree of temporal and spatial dispersion among team members. George et al. (2022) define team virtuality as the degree to which members rely on electronic communication tools to conduct work. Shin (2004) proposes that team virtuality refers to the degree of dispersion in time, culture, space, and organization of a group communicating through electronic means, constituting a four-dimensional construct comprising technological dependence, temporal-spatial dispersion, organizational boundary crossing, and cultural differences. These different conceptualizations have resulted in a fragmented, inconsistent state regarding the definition and dimensions of team virtuality (Gibson & Gibbs, 2006; Martins et al., 2004; Schweitzer & Duxbury, 2010).

This inconsistency primarily stems from the lack of foundational theoretical explanation, leaving understanding of the team virtuality concept at a superficial level. Zheng et al. (2024) apply process virtualization theory to deduce the connotation and four structural dimensions of team virtuality, providing a unified definition and dimensional specification for this construct.

Process virtualization theory posits that a "virtual" process is one that eliminates physical interaction between people and between people and objects. When a process requires less synchronization, perception, relationship, and identification/control, its degree of virtuality is higher (Overby, 2008). Based on this theoretical deduction, Zheng et al. (2024) define team virtuality as the degree to which a team's work process exhibits temporal-spatial dispersion, technological dependence, structural dynamism, and organizational boundary crossing.

Specifically, temporal-spatial dispersion refers to the degree to which team members work in different locations and at different times (Hoch & Dulebohn, 2017; O' Leary & Cummings, 2007; Prasad et al., 2017). Technological dependence refers to the degree to which team members rely on technological tools for work and communication (George et al., 2022; Suh et al., 2011). Structural dynamism refers to the degree to which team members adjust and change according to work needs (Gibbs et al., 2008; Gibson & Gibbs, 2006; Shi & Weber, 2018). Organizational boundary crossing refers to the degree to which team members cross different organizations or departments in their work (Schweitzer & Duxbury, 2010). Higher team virtuality means greater temporal-spatial dispersion among members, less synchronous interaction, greater dependence on technological tools for team work and communication (resulting in fewer sensory experiences), more frequent changes in team composition leading to less stable relationships, and multiple, dynamic identities due to simultaneous belonging to

different organizations or departments, making member behavior more difficult to constrain by a single organization (Cummings, 2004; Majchrzak et al., 2007).

These four dimensions collectively depict a crucial feature of team virtuality: boundary breaking. Temporal-spatial dispersion breaks through traditional fixed work time (e.g., 9-to-5) and space (e.g., company office) boundaries. Technological dependence breaks the traditional physical resource boundary of direct contact between people and work objects. Structural dynamism breaks the traditional human resource boundary of fixed personnel composition. Organizational boundary crossing breaks the traditional organizational resource boundary of fixed organizational units. The greater the degree of breakthrough in these four boundaries, the higher the team's virtuality (Zheng et al., 2024).

2.1.3 The Relationship Among Virtual Team Work Mode, Virtual Teams, and Team Virtualization

According to process virtualization theory, “virtual” refers to the absence of direct physical interaction between people and between people and objects; “virtualization” refers to the process of eliminating such physical interaction; and “virtuality” refers to the degree of physical interaction elimination in a process—that is, the degree of virtualization. If physical interaction between people and between people and objects is low in an activity, that activity's virtuality is relatively high (Overby, 2008). Correspondingly, virtual teams are defined as teams that use technology to varying degrees to cross location, time, and organizational relationship boundaries to accomplish interdependent tasks (Martins et al., 2004). Team virtualization refers to the process by which a team acquires virtuality characteristics and becomes virtual. Through the process of “virtualization,” teams eliminate direct physical interaction to become “virtual” teams—a specific type among various team forms. However, scholars generally agree that teams in today's organizations all possess some features from the “virtual” definition; purely virtual teams do not exist, only varying degrees of “virtualization”—that is, different levels of “virtuality” (Schmidtke & Cummings, 2017). The virtual team work mode describes the work approach of teams during the virtualization process, with its degree of virtualization measured by team virtuality.

Since real-world teams all possess some degree of virtuality, the virtual team work mode is more suitable for describing the prevalent team work approach in contemporary enterprises. In summary, the relationship among virtual team work mode, virtual teams, and team virtualization is: virtual teams represent the final virtual state achieved after a work team undergoes the team virtualization process. However, since purely virtual teams currently do not exist and all teams possess some degree of virtuality, we use the virtual team work mode to describe contemporary teams' virtualized work approaches, while using team virtuality to reflect the degree of virtualization of this work mode.

2.2.1 Definition and Evolution of Work-Family Balance

Work-family balance describes a relationship at the work-family interface, focusing on whether individuals can balance work and family relationships. Currently, scholars describe the concept from three perspectives without reaching a unified definition. From a role fulfillment perspective, Clark (2000) views work-family balance as individuals being relatively satisfied in both work and family domains while experiencing minimal role conflict. Similarly, Greenhaus et al. (2003) define work-family balance as individuals' ability to equally participate in work and family roles and experience balanced satisfaction. From a domain demands perspective, Duxbury (2003) defines work-family balance as an equilibrium state where demands from work and family domains are equal. From a responsibility achievement perspective, Grzywacz and Carlson (2007) view work-family balance as the fulfillment of role expectations—when work-family balance is achieved, responsibilities in both work and family roles are effectively and efficiently fulfilled.

These definitions collectively show that work-family balance describes a state where employees reduce conflict between work and family domains while achieving development in both (Hirschi et al., 2019). Therefore, if employees' performance in both work and family domains is enhanced, better work-family balance is achieved; conversely, if performance in either domain is hindered, work-family balance is lower (Hirschi et al., 2019). Based on this principle, this study selects representative outcomes from both domains (e.g., work performance and job satisfaction for work; quality of life and life satisfaction for family) to examine changes in employees' work and family outcomes under virtual team work modes, thereby reflecting their work-family balance level.

2.2.2 Evolution of Work-Family Balance Research Approaches

(1) Work-Family Segmentation Approach

The work-family segmentation approach treats work and family domains as separate, achieving balance through functional spillover, compensation, and enrichment between domains. This approach primarily builds on segmentation, compensation, and spillover theories. Early segmentation research argued that work and family should be treated separately, with men and women assuming different responsibilities in different domains—women handling emotional expression at home and men handling instrumental work in the workplace—each performing their own duties to properly manage work and family and achieve balance (Kossek & Lambert, 2004; Olsen, 1983). Compensation-based research posits that work and family are independent domains where individuals seek greater satisfaction from family to compensate for deficiencies at work, or vice versa, thereby achieving work-family balance (Lambert, 1990; Piotrkowski, 1979). Spillover theory suggests that employees' successful experiences in one domain (work or family) spill over to improve their experiences in the other

domain, promoting work-family balance (Grzywacz et al., 2002; Ruppanner & Pixley, 2012). Similarly, enrichment theory indicates that experiences from one role (work or family) enhance performance in the other role, promoting balanced development (Greenhaus & Powell, 2006; Grzywacz et al., 2007).

The logic underlying segmentation, spillover, compensation, and enrichment theories is based on the work-family segmentation approach. These theoretical perspectives assume that work and family domains are independent and distinguishable, and that resources can be allocated between them through spillover, compensation, and enrichment to meet resource distribution demands, thereby achieving work-family balance.

(2) Work-Family Integration Approach

With the advent of the digital intelligence era, more organizations and employees have adopted virtual team work modes, gradually breaking down and blurring boundaries between work and family and creating a boundaryless development trend (Milliken & Dunn-Jensen, 2005). It has become difficult to treat work and family as independent, separable domains (Powell et al., 2019). Accordingly, scholars have proposed work-family integration perspectives to promote work-family balance. The work-family integration approach treats work and family activities as a whole, viewing them as a single system and seeking balance through organic coordination. This integration approach emerged in response to the reality of work and family domain fusion in virtual team work modes, primarily including work-family integration perspectives and work-family integration viewpoints.

The work-family integration perspective treats both work and family as production sites, forming a work-family integrated production model. Through the integration of work and family sites, both domains' functions are positively activated and mutually reinforced, achieving synergistic, balanced development (Polk, 2008; Liu & Zhao, 2016). Work-family integration, by contrast, is an activity that seeks reasonable work-family balance and symbiotic coordination to fulfill both work and family responsibilities (Grady & McCarthy, 2008). When employees make work-family activity decisions, if they can consider family when making work decisions or consider work when making family decisions, they are more likely to avoid work-family conflict and achieve work-family balance. Unlike work-family integration, work-family integration does not merely merge work and family life in the same time or space but actively seeks balance through dynamic coordination between work and family (Grady & McCarthy, 2008).

(3) Measuring Work-Family Segmentation and Integration: Work-Family Integration Tendency

Integrating segmentation and integration research approaches reveals that the core theoretical discussion in work-family balance research centers on the segmentation and integration of work and family domains. When resources from work and family are used separately, this reflects the work-family segmentation approach; when resources are integrated and used simultaneously, this reflects

the work-family integration approach. We can determine whether employees prefer work-family segmentation or integration through two resource allocation methods: work-to-family integration (using family domain resources to participate in work activities) and family-to-work integration (using work domain resources to participate in family activities) (Grady & McCarthy, 2008; Parasuraman & Greenhaus, 1997). If employees show high tendencies toward both integration methods, this indicates they desire work-family fusion with resource sharing across domains, making the work-family integration approach more applicable (Edwards & Rothbard, 2000; Parasuraman & Greenhaus, 1997). If employees prefer one integration method over the other, this indicates they desire work-family segmentation to allocate resources to different domains, making the work-family segmentation approach more applicable (Edwards & Rothbard, 2000; Parasuraman & Greenhaus, 1997). Therefore, this study examines employees' work-family integration tendencies under virtual team work modes to determine whether they prefer work-family integration or segmentation strategies.

2.3 Current Research Gaps

The above analysis of virtual team work modes and work-family balance reveals that virtual team work modes blur work-family boundaries, altering the research premise of traditional work-family balance and pointing to new research directions: How can we promote work-family balance in virtual team work modes? However, research on how virtual team work modes affect employee work-family balance is still in its infancy, with the following prominent gaps:

On one hand, research on virtual team work modes' impact on work-family balance remains limited to the technology use dimension, neglecting investigations into the influence mechanisms of other important dimensions of team virtuality such as temporal-spatial dispersion, structural dynamism, and organizational boundary crossing. This hinders holistic understanding and systematic development of research on virtual team work modes' impact on work-family balance. Currently, scholars have primarily focused on the technology use dimension of team virtuality, conducting studies on how mobile technology use at work affects employee work-family balance, yet reaching inconsistent conclusions. Some research suggests that mobile technology use at work blurs work-family boundaries, interferes with family responsibility fulfillment, damages family relationships, and increases work-family conflict (Butts et al., 2015; Delanoeije et al., 2019; Kotecha et al., 2014). Other studies find that mobile technology use enables employees to complete work tasks more flexibly and conveniently, with positive spillover and compensation effects to the family domain that help employees better manage family life and promote work-family balance (Johnson et al., 2020; Richardson & Thompson, 2012; Ma et al., 2016).

On the other hand, research on mobile technology' s impact on work-family balance primarily builds on conservation of resources theory, yet this theoretical logic appears inadequate when viewed against the development characteristics

of virtual team work modes. Regarding work-family balance issues in mobile technology use, scholars have used conservation of resources theory to explain how employees allocate resources between work and family domains according to domain environmental needs to promote work-family balance—specifically, investing resources in resource-scarce domains and transferring resources from resource-abundant domains to ensure resources meet respective domain demands, enhancing output and performance in both domains (ten Brummelhuis & Bakker, 2012). Although conservation of resources theory has advanced our understanding of work-family balance relationships, it has limitations. First, the basic explanatory logic of current research applying this theory assumes that different domains have different resources and needs, with these domains being divided based on physical boundaries. However, as virtual team work modes develop, physical boundaries between work and family domains gradually overlap and become inseparable, seemingly violating the explanatory premise of conservation of resources theory and potentially reducing its explanatory power. Second, conservation of resources theory only considers environmental demands for resources and resource allocation according to domain needs, neglecting human judgment regarding resource needs and failing to explain employees' motivation for resource allocation—specifically, why employees are willing to transfer resources from one domain to another. This indicates we need to further advance theoretical development in work-family balance research under virtualization trends; otherwise, we cannot clarify the internal reasons why team virtuality affects employee work-family balance, preventing managers from implementing effective interventions to promote sustainable, harmonious development for employees and organizations.

To answer this study's research question and address the theoretical development limitations of current resource-based work-family balance research, this study introduces social identity theory to explain the mechanisms through which team virtuality affects employee work-family balance. Previous resource-based research suggests that mobile technology enables employees to move and allocate resources between work and family domains according to domain needs to promote work-family balance. However, capability does not imply willingness. Conservation of resources theory only considers environmental resource demands while neglecting human judgment of resource attributes, creating an important logical gap in mechanism analysis—namely, lacking explanation of how resources move between work and family, in which direction, and why they move in that direction. Therefore, beyond conservation of resources theory, we urgently need more appropriate theories to expand the theoretical premise limitations of conservation of resources theory, forming a more explanatory theoretical research framework.

Social identity theory can effectively explain how and why resources move between work and family domains. Social identity theory posits that individuals act according to identity, devoting effort and resources to groups or domains they identify with (Burke, 1991). According to this logic, resources flow toward domains that individuals identify with—domain identity provides the direction

for resource flow. This can explain why resources flow from one domain to another, compensating for the logical gaps and deficiencies in previous resource-based theories and helping integrate current research perspectives into a more explanatory overall theoretical framework. Therefore, social identity theory can help address current research gaps and serve as the theoretical foundation for this study.

Thus, this study integrates previous “conservation of resources theory” from a “social identity theory” perspective to re-examine how virtual team work modes affect employee work-family balance. Starting from the “work-family integration” characteristic presented in virtual team work modes, we explore the mechanisms through which team virtuality influences employee work-family integration behaviors and subsequently affects work and family outcomes. The overall research framework is shown in Figure 1 [Figure 1: see original paper].

Figure 1 description: Psychological availability, Team virtuality (temporal-spatial dispersion, technological dependence, structural dynamism, organizational boundary crossing), Family identity salience, Family identity, etc., Study 1: Exploring mechanisms, Study 2: Exploring transformation methods, Work-to-family integration (using family resources for work activities), Family-to-work integration (using work resources for family activities), Job satisfaction, Life satisfaction.

3.1 Study 1: The Dual-Level Mechanisms of Team Virtuality on Employee Work-Family Integration Behaviors and Work/Family Outcomes

To answer what work-family balance strategy should be adopted under the trend of virtual team work modes, Study 1 begins with the “work-family integration” characteristic of virtual team work modes, selecting the core construct “work-family integration” to explore how team virtuality influences employee work-family integration behaviors (including work-to-family integration and family-to-work integration). This reveals what work-family integration tendencies team virtuality produces in employees, thereby answering the research question: Under the trend of virtual team work modes, should we adopt the traditional work-family segmentation approach, the current work-family integration approach, or some other new management perspective?

By examining dual-level resource and identity mechanisms, we find that as team work becomes more virtual, employees do not necessarily tend to integrate work and family but instead show stronger preference for family-to-work integration. This means that under the virtual team work mode trend, employees still hope to distinguish between work and family, preferring to allocate resources to the family domain. Therefore, these findings demonstrate that the traditional work-family segmentation concept is not outdated under virtual team work mode trends, but managers must understand that employees prefer allocating resources to the family domain to achieve the life ideal of “working

for a better life.” The research model for this section is shown in Figure 2 [Figure 2: see original paper].

Figure 2 description: Virtual team work mode, Conservation of resources theory perspective (work-family integration +,+), Social identity theory perspective (work-family segmentation +,-), Work-family balance (+,+), Work-family imbalance (+,-), Psychological availability, Work-to-family integration (using family resources for work activities), Team virtuality (temporal-spatial dispersion, technological dependence, structural dynamism, organizational boundary crossing), Family identity salience, Family identity, etc., Job satisfaction, Life satisfaction, Family-to-work integration (using work resources for family activities).

3.1.1 The Mechanism of Team Virtuality on Employee Work-Family Integration and Work/Family Outcomes Based on Conservation of Resources Theory

(1) Team Virtuality and Resource Control/Utilization

Team virtuality helps employees break through various resource boundary constraints, increasing their resource control and utilization (e.g., sense of control, psychological availability, and vigor). Team virtuality refers to the degree to which a team possesses temporal-spatial dispersion, technological dependence, structural dynamism, and organizational boundary crossing (Zheng et al., 2024), reflecting the degree of breakthrough in temporal-spatial, physical, human, and organizational resource boundaries. Higher team virtuality means more resource boundaries are broken. Conservation of resources theory states that resources emerge in specific environments and become scarce due to environmental constraints. When people can break through environmental constraints, they can obtain more resources (Hobfoll et al., 2018). Team virtuality breaks through temporal-spatial, organizational, and human resource boundary constraints, giving employees higher control over resources, manifested in greater sense of control, psychological availability, and vigor. Specifically, team virtuality breaks through temporal-spatial, physical, human, and organizational resource boundary constraints, increasing employees’ resource acquisition. For example, research shows that team virtuality helps employees obtain more knowledge, information, social networks, and flexibility resources (Ahuja & Carley, 1999; Griffith & Neale, 2001; Leenders et al., 2003). Sense of control refers to individuals’ perception of their ability to influence and control their environment (Folkman et al., 1986). Employees with high sense of control feel more capable of controlling their environment and obtaining more resources. Therefore, as team virtuality increases, employees’ sense of control also strengthens. Meanwhile, team virtuality enables employees to break through resource boundary constraints to obtain more resources, thereby enhancing psychological availability—the perception of having abundant available resources to engage in relevant role activities (Binyamin & Carmeli, 2010). Additionally, team virtuality removes resource boundary restrictions, increasing employees’ disposable resources and thereby stimulating and releasing vigor—the feeling of having more physical, emotional,

and cognitive energy resources (Carmeli et al., 2009). In summary, team virtuality breaks through temporal-spatial, physical, human, and organizational resource boundaries, granting employees more autonomy and control over various resources such as time, information, flexibility, and social capital, thereby enhancing sense of control, psychological availability, and vigor. Based on this, we propose:

Hypothesis 1-1: Increased team virtuality enhances employees' resource control and utilization (e.g., sense of control, psychological availability, and vigor).

(2) Resource Control/Utilization and Work-Family Integration

Increased employee resource control and utilization (e.g., sense of control, psychological availability, and vigor) enhances their tendency and ability for resource integration, promoting work-family integration. Sense of control refers to beliefs about one's ability to directly or indirectly influence the environment (Thomas & Ganster, 1995). Psychological availability refers to individuals' perception of having accessible resources needed to enter a role (Binyamin & Carmeli, 2010). Vigor refers to individuals' feeling of physical, emotional, and cognitive energy resources (Carmeli et al., 2009). Sense of control, psychological availability, and vigor all reflect the degree to which employees possess and control abundant resources. When employees have higher levels of these resources, they possess more resources overall. Conservation of resources theory states that individuals strive to obtain and maintain resources to better engage in various activities. Individuals with more resources have stronger investment tendencies and are more likely to activate positive behaviors (Kahn, 1990). Therefore, employees with high sense of control, psychological availability, and vigor perceive themselves as having abundant resources and greater capacity for positive behaviors, enabling them to integrate resources across work and family domains. Based on this, we propose:

Hypothesis 1-2: Enhanced employee resource control and utilization (e.g., sense of control, psychological availability, and vigor) promotes work-family integration behaviors (i.e., increases both work-to-family integration and family-to-work integration).

(3) Work-Family Integration and Work/Family Outcomes

Conservation of resources theory states that changes in resources individuals receive significantly affect their subsequent feelings and attitudes (Halbesleben et al., 2014). Resource acquisition helps individuals efficiently cope with situational demands, while resource loss creates stressful experiences and feelings (Hobfoll, 2002; ten Brummelhuis & Bakker, 2012). Following this logic, work-family integration reflects employees' resource adjustment and investment across work and family domains, affecting resource changes in both domains. Work-to-family integration refers to using family domain resources to participate in work activities, reflecting the investment of family resources into the work domain. This increases work domain resources, helping employees better cope with work environments and tasks, enhancing work outcomes such as job performance and

satisfaction; simultaneously, it decreases family domain resources, reducing employees' ability to cope with family environments and roles, decreasing family outcomes such as quality of life and life satisfaction. Conversely, family-to-work integration refers to using work domain resources to participate in family activities, reflecting the investment of work resources into the family domain. This increases family domain resources, helping employees effectively cope with family environments and roles, enhancing family outcomes such as quality of life and life satisfaction; simultaneously, it decreases work domain resources, reducing employees' ability to cope with work environments and tasks, decreasing work outcomes such as job performance and job satisfaction.

Therefore, work-to-family integration enhances work outcomes while decreasing family outcomes, whereas family-to-work integration enhances family outcomes while decreasing work outcomes. Based on this, we propose:

Hypothesis 1-3: Work-to-family integration enhances employee work outcomes (job performance, job satisfaction) while decreasing family outcomes (quality of life, life satisfaction).

Hypothesis 1-4: Family-to-work integration enhances employee family outcomes (quality of life, life satisfaction) while decreasing work outcomes (job performance, job satisfaction).

3.1.2 The Mechanism of Team Virtuality on Employee Work-Family Segmentation and Work/Family Outcomes Based on Social Identity Theory

(1) Team Virtuality and Social Identity

Team virtuality hinders employees' team identity cognition, reduces insider status perception within the team, and creates ambiguity and loss of social identity, thereby turning employees toward familiar, stable, accessible real family groups to actively construct family identity and enhance family identity and family identity salience. Team virtuality comprises temporal-spatial dispersion, technological dependence, structural dynamism, and organizational boundary crossing (Zheng et al., 2024), which break traditional fixed environmental boundaries to create a discrete, non-face-to-face, dynamic, changing virtual environment. Temporal-spatial dispersion breaks fixed time and space boundaries, creating a discrete environment where employees are separated. Technological dependence breaks fixed physical boundaries, creating a non-face-to-face environment. Structural dynamism breaks fixed personnel boundaries, creating an environment with dynamic member relationships. Organizational boundary crossing breaks fixed organizational boundaries, creating an environment where members belong to different organizations with diverse, changing identities. Social identity theory states that people form a group identity in their self-concept through communication and interaction with other group members, linking self-cognition, values, and emotions with the group and using this as the basis for their group behavior (Stets & Burke, 2000, 2014). The discrete, non-face-to-

face, dynamic, changing virtual environment created by team virtuality limits emotional connections and communication among members, hindering team identity cognition and making employees feel like outsiders—that is, reducing insider status perception (Stamper & Masterson, 2002). Meanwhile, in this virtual environment, employees' identities are multiple, dynamic, and changing, causing ambiguity and loss of social identity.

To compensate for social identity loss at work and maintain a positive self-concept, employees turn to familiar, stable, accessible real families to obtain family identity. Social identity theory holds that people strive to achieve and maintain positive social identity; if social identity is missing or unsatisfactory, people will join groups that provide positive differentiation and more favorable conditions to obtain satisfactory social identity and form a positive self-concept (Stets & Burke, 2000, 2014). Therefore, as team virtuality increases, employees have more opportunities to work and live with family members in homes, coffee shops, and other life settings, increasing communication and intimacy with family members, strengthening family identity cognition and emotion, and enhancing family identity—the degree to which employees recognize and accept family identity (Dumas & Stanko, 2017). On the other hand, employees have less contact and perception of other team members but more contact with family members' attitudes and emotions, which increases the perceived importance of family members relative to other members and enhances family identity salience in virtual team work modes (Randel, 2002). Based on this analysis, we propose:

Hypothesis 1-5: Increased team virtuality reduces employees' insider status perception while enhancing family identity and family identity salience.

(2) Social Identity and Work-Family Segmentation

Employees' family identity and family identity salience lead them to invest more effort and resources in family, promoting family-to-work integration while reducing family resource outflow and loss, thereby decreasing work-to-family integration. Family identity refers to the degree to which individuals recognize and accept family identity (Dumas & Stanko, 2017). Family identity salience refers to the likelihood that personal family identity is activated in social situations (Randel, 2002). Both reflect the degree to which employees recognize and value family identity. Social identity theory posits that identifying with a group leads to behavior consistent with that group; individuals tend to select and execute activities consistent with their social identity and support organizations that uphold their social identity (Ashforth & Mael, 1989). Therefore, employees with high family identity and family identity salience will execute behaviors consistent with family identity, preferring to devote extra energy to family, using available work resources to invest in family activities, and enhancing family-to-work integration. Simultaneously, employees with high family identity and family identity salience will protect family interests, reduce family resource loss, and prevent family resources from flowing to the work domain, decreasing work-to-family integration. Thus, employees with high family identity and family identity salience concentrate resources more in the family domain

than the work domain, promoting family-to-work integration while reducing work-to-family integration. Based on this, we propose:

Hypothesis 1-6: Enhanced employee family identity and family identity salience increase family-to-work integration while decreasing work-to-family integration.

(3) Work-Family Segmentation and Work/Family Outcomes

Social identity theory holds that people think of themselves according to group membership; group identity helps individuals maintain positive attitudes and behaviors toward the group and motivates them to exert effort to achieve group goals for self-enhancement (Rapp & Mathieu, 2019; Stets & Burke, 2000). Following this logic, work-family segmentation is a positive behavior for maintaining the family group or work team group, affecting self-enhancement outcomes of employees' family identity and work identity. Family-to-work integration refers to using work domain resources to participate in family activities, which increases family resource investment—a positive behavior for maintaining family identity that helps achieve family goals, maintains employees' family identity, enhances family identity self-enhancement outcomes such as quality of life and life satisfaction, while simultaneously damaging work resources—a behavior that undermines work identity, hinders work goal achievement, damages work team identity, and reduces work identity self-enhancement outcomes such as job performance and job satisfaction. Work-to-family integration is a work resource investment behavior that maintains work identity, enhancing work identity self-enhancement outcomes (job performance, job satisfaction) while damaging family identity through family resource loss, undermining family identity self-enhancement outcomes (quality of life, life satisfaction). Therefore, family-to-work integration enhances family outcomes while damaging work outcomes, whereas work-to-family integration enhances work outcomes while damaging family outcomes. Based on this, we propose:

Hypothesis 1-7: Family-to-work integration enhances employee family outcomes (quality of life, life satisfaction) while decreasing work outcomes (job performance, job satisfaction).

Hypothesis 1-8: Work-to-family integration enhances employee work outcomes (job performance, job satisfaction) while decreasing family outcomes (quality of life, life satisfaction).

3.1.3 The Relationship Between Family Outcomes and Work Outcomes

The above analysis indicates that employees in virtual team work modes prefer allocating resources to the family domain. However, this does not necessarily mean such resource allocation preferences will damage work outcomes. Enhanced family outcomes can also contribute to improved work outcomes, thereby achieving work-family balance. Conservation of resources theory posits that re-

sources across domains are limited and interdependent, flowing across domains according to environmental demands. Resources from one domain can flow to another, simultaneously enhancing development in one or both domains (Hobfoll, 2001; Westman et al., 2004). Therefore, when individuals obtain sufficient resources in one domain (e.g., high quality of life and life satisfaction in the family domain), these resources can positively spill over to the work domain, helping employees better cope with work environments and problems, creating a resource gain spiral that enhances work outcomes such as job performance and job satisfaction (Mauno et al., 2007).

From a social identity theory perspective, individuals tend to enhance their group identity superiority through various means (Stets & Burke, 2000, 2014). Employees' family identity superiority can be demonstrated through higher family quality of life, which requires more resources to maintain or enhance. In organizations, superior work performance often means higher income, status, and social standing. Therefore, when employees have higher family quality of life, they will be more motivated to further improve their work performance to maintain and enhance their family identity superiority. Based on this, we propose:

Hypothesis 1-9: Enhanced family outcomes (quality of life, life satisfaction) promote employee work outcomes (job performance, job satisfaction).

3.2 Study 2: Connecting and Transforming the Two Mechanisms—The Moderating Role of Family Identity

Study 1 explored dual-level mechanisms based on conservation of resources theory and social identity theory, examining how team virtuality affects work-family integration/segmentation through resource control/utilization processes and group identity processes, ultimately influencing employee work and family outcomes. Some studies based on the mainstream conservation of resources theory perspective suggest that team virtuality may promote work-family integration to achieve work-family balance. However, from this study's social identity theory perspective, team virtuality makes employees more inclined toward family identity, allocating more resources to the family domain and forming work-family segmentation to achieve work-family balance, indicating that a work-family segmentation approach rather than integration approach should be adopted under virtual team work modes. Are these conclusions from resource and identity perspectives necessarily contradictory? Or does this collision between different research approaches suggest some connection or transformation mechanism between these two work-family balance approaches? Furthermore, if this study's approach is reasonable, under what identity conditions is the resource-based work-family integration approach more likely to hold? To address this question, Study 2 builds on the resource perspective logic and uses social identity theory to further explore how social identity moderates the effect of resource control/utilization on employee work-family integration behaviors.

This study reveals that employees' family domain identity (e.g., higher family identity and family identity salience) makes them more inclined to allocate resources to the family domain rather than the work domain. Therefore, when employees have some resource control, this enhances family-to-work integration while reducing work-to-family integration, ultimately creating different impacts on work and family outcomes. Examining these moderating effects not only further answers which strategy is more suitable for work-family balance under virtual team work mode trends but also helps resolve the seemingly contradictory research logic between resource and identity perspectives, pointing to new directions for integrating these two research logics and facilitating the construction of an overall theoretical framework for work-family balance research under virtual team work mode trends. The research model for this section is shown in Figure 3 [Figure 3: see original paper].

Figure 3 description: Family identity salience, Family identity, etc., Psychological availability, Work-to-family integration (using family resources for work activities), Family-to-work integration (using work resources for family activities).

According to conservation of resources theory logic, employees' resource control can promote family-to-work integration because employees have stronger manipulation capabilities over resources. However, this does not mean employees will use these resources for the family domain. From a social identity theory perspective, employees' family domain identity helps guide resource investment toward the family domain. Specifically, group identity helps individuals maintain positive attitudes and behaviors toward the group and motivates them to exert effort and invest in the identified group (Rapp & Mathieu, 2019; Stets & Burke, 2000). Following this logic, family identity reflects the degree to which individuals identify with the family group or domain; higher family identity means employees are more likely to invest resources in the family domain. When employees have high family identity, they more clearly recognize family's mission and value to them, treat family resource development and value creation as their responsibility, have stronger determination and will for family resource creation, and transform this into more family resource investment behaviors, investing resources obtained from the virtual team environment more into the family domain, thereby strengthening family-to-work integration effects. Therefore, the higher employees' family domain identity, the stronger the positive effect of resource control/utilization (e.g., sense of control, psychological availability, vigor) on family-to-work integration. Thus, we propose:

Hypothesis 2-1: Employees' family domain identity (e.g., family identity, family identity salience) positively moderates the positive effect of resource control/utilization (e.g., sense of control, psychological availability, vigor) on family-to-work integration—when family domain identity is higher, the promoting effect of resource control/utilization on family-to-work integration is stronger.

However, when employees use controlled resources for work-to-family integration, family identity hinders resource movement and use toward the work do-

main, weakening the promoting effect of resource control/utilization (e.g., sense of control, psychological availability, vigor) on work-to-family integration. Family identity reflects employees' identification with the family group or domain. When employees have higher family identity, they are more likely to invest resources in the family domain and, to protect family interests, reduce family resource outflow and loss to the work domain, thereby weakening work-to-family integration effects. Based on this, we propose:

Hypothesis 2-2: Employees' family domain identity (e.g., family identity, family identity salience) negatively moderates the positive effect of resource control/utilization (e.g., sense of control, psychological availability, vigor) on work-to-family integration—when family domain identity is higher, the promoting effect of resource control/utilization on work-to-family integration is weaker.

4 Theoretical Contributions and Innovations

This study integrates previous conservation of resources theory from a social identity theory perspective to re-examine how virtual team work modes affect employee work-family balance. This not only provides a new theoretical perspective for this research domain, expanding the research logic of current conservation of resources theory perspectives on work-family balance and promoting theoretical development under virtualization trends, but also offers new managerial perspectives and recommendations for practice.

First, based on the overlapping trend of work-family domains, this study examines the mechanisms through which team virtuality affects employee work-family integration and work/family outcomes, helping resolve work-family balance issues in boundaryless contexts and expanding new research directions for the work-family balance domain. Previous work-family balance research based on traditional face-to-face work modes adopted segmentation approaches, exploring resource allocation and coordination between domains through spillover, compensation, and enrichment to achieve work-family balance (ten Brummelhuis & Bakker, 2012). However, current digital development and the popularity of virtual team work modes have blurred work-family boundaries, making them indistinguishable and presenting a boundaryless state where traditional work-family balance research premises seem mismatched with practical developments. This study, based on work-family domain overlap and using the new perspective of “work-family integration,” introduces social identity theory on the foundation of conservation of resources theory to explore how team virtuality influences employee work-family integration behaviors and how work-family integration differently affects work and family outcomes. The findings indicate that employees in boundaryless contexts still hope to distinguish their self-identities between work and family, meaning traditional work-family segmentation-based research approaches are not outdated. However, this segmentation concept is not simply physical boundary segmentation but rather promotes employee self-identity distinction between work and family under domain overlap. This clarifies new research directions for better promoting work-family balance under virtual team

work mode trends, expanding the field from traditional bounded work-family research to boundaryless work-family research, thereby advancing new theoretical development in work-family balance research.

Second, this study introduces the new perspective of social identity theory to examine how team virtuality affects employee work-family integration and work/family outcomes, resolving the problem of unclear motivation for work/family resource allocation in previous resource-based research and providing a new theoretical foundation for work-family balance studies. Previous work-family balance research primarily examined resource allocation and adjustment between work and family domains from a resource-based perspective. Conservation of resources theory is the mainstream theory explaining work-family balance, positing that resources can be allocated and adjusted between work and family domains through spillover, compensation, and enrichment to meet functional needs and enhance output and performance in both domains, thereby achieving work-family balance (ten Brummelhuis & Bakker, 2012). However, the conservation of resources theory perspective only considers resource allocation methods while neglecting resource allocation motivation, failing to explain why resource allocation occurs from family to work or from work to family. This limits deeper understanding of work-family resource allocation and hinders further development of work-family balance research. This study uses social identity theory to explore how team virtuality affects employee work-family integration and work/family outcomes, uncovering the social identity mechanisms for achieving work-family balance under virtual team work modes. Using domain identity as the entry point, it indicates that resource allocation motivation is to transfer resources toward the domain (work or family) that individuals identify with. This compensates for important theoretical logic missing in previous resource-based research, explaining previously unclear work-family relationships and providing a new theoretical foundation for work-family balance research.

Finally, this study integrates the theoretical logics of conservation of resources theory and social identity theory, constructing a dual-path model of how team virtuality affects employee work-family integration and work/family outcomes, and connecting and integrating the two theoretical logics through the moderating role of family identity in the resource path. This provides a new integrated theoretical framework for work-family balance research. Previous work-family balance research based on conservation of resources theory focused on exploring resource allocation methods for achieving work-family balance, such as resource spillover, compensation, and enrichment (Grzywacz et al., 2007; Lambert, 1990; Ruppanner & Pixley, 2012), while neglecting and missing discussion of resource allocation motivation. This prevented good understanding of why employees are willing to allocate resources across domains. This study, building on conservation of resources theory, uses social identity theory to further explore resource allocation motivation, examining different mechanisms through which team virtuality affects employee work-family integration and work/family outcomes. Based on the common theoretical logic of resource allocation and utiliza-

tion, it integrates resource and identity perspectives by analyzing the moderating role of family identity in the resource path, forming a more explanatory theoretical framework for work-family balance research. This integrated framework can analyze not only the resource allocation process between work and family domains under virtual team work modes but also the motivation behind resource allocation in both domains, thereby enriching and improving understanding of work-family balance mechanisms and advancing theoretical development in this field. Additionally, this study constructs a theoretical framework of team virtuality's effects on work-family balance based on social identity theory, providing a foundation for future expansion research. For example, individual characteristics such as mindfulness, psychological detachment, and self-leadership reflect employees' thoughts about distinguishing different domains. Researchers can use this theoretical framework to further explore how these individual characteristics moderate the effects of work-family integration on work and family outcomes, helping further enrich and develop work-family balance research.

From a practical perspective, this study examines how team virtuality affects employee work and family outcomes through work-family integration behaviors based on the boundaryless development trend of work-family domains. This helps organizations rethink management approaches under virtual team work modes and provides guidance and support for harmonious, sustainable development of employees, organizations, and society. From an organizational standpoint, previous research limited to examining digital intelligence technology's impact on employees' work domain has guided managers to promote work-family resource integration to enhance work performance, treating employees' family life as private matters without intervention. However, this study shows that team virtuality makes employees more identify with family domain needs—that is, it strengthens employees' philosophy of “working for life.” This helps managers realize that employees in virtual team work modes actually prefer allocating resources to the family domain, causing work-family integration management to backfire. Organizations need to extend management responsibilities from the work domain to the family domain and adopt measures to promote employees' family life quality to enhance talent attraction, enable employees to invest in work with better life states to improve organizational performance, and achieve “win-win” harmonious development for employees and organizations. On the other hand, this study's examination of how team virtuality affects employee work and family outcomes through work-family integration helps resolve employee work-family balance issues under current digital intelligence and virtualization trends. This responds to the strategic goals of “accelerating digital society construction” and “enhancing people's well-being” proposed in the national “2035 Vision Outline,” echoing President Xi Jinping's statement that “the people's aspiration for a better life is our goal,” helping employees achieve work-family balance, enhance life happiness, and contribute to building a harmonious socialist society.

Furthermore, this study's examination of how team virtuality affects work-family integration and work/family outcomes from the new perspective of social iden-

tivity helps managers rethink work-family balance management approaches under current work-family integration trends, enabling better managerial interventions and improved management effectiveness. If we view work-family balance issues under virtualization trends purely from resource theory logic, team virtuality gives organizations stronger capabilities to promote work-family resource integration to meet work domain needs, suggesting managers should further promote employee work-family integration development. However, resource-based research only considers environmental (work or family domain) resource needs while neglecting human motivation in resource allocation, which may be an important reason why some current organizational practices trigger negative social effects. This study's social identity perspective indicates that team virtuality increases employees' family identity, making them more willing to allocate resources to the family domain and creating resource differentiation between work and family domains. Therefore, when facing the reality of highly overlapping work-family domains, managers cannot blindly use this trend to forcibly integrate work into family but should provide corresponding protective measures to help employees establish work-family boundaries in self-identity within the boundaryless virtual environment to better promote work-family balance and enhance management effectiveness.

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Note: Figure translations are in progress. See original paper for figures.

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