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Buket Aydemir, İlksun Didem Ülbeği & Güney Çetinkaya

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The link between work-leisure conflict and cognitive pre-sleep arousal is serially mediated by emotional exhaustion and entrapment

Buket Aydemir[a], İlksun Didem Ülbeği[b] & Güney Çetinkaya[c]

[a]Department of Recreation, Istanbul Yeni Yuzyil University, Istanbul, Turkey
[b]Department of Business Administration, Cukurova University, Adana, Turkey
[c]Department of Recreation, Akdeniz University, Antalya, Turkey

Corresponding author

Güney Çetinkaya, gcetinkaya@akdeniz.edu.tr Department of Recreation, Akdeniz University, Antalya, Türkiye

ORCID

Buket Aydemir https://orcid.org/0000-0001-9567-5382

İlksun Didem Ülbeği https://orcid.org/0000-0001-6905-2720

Güney Çetinkaya https://orcid.org/0000-0002-1757-5105

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Declarations

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Conflict of interest

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Informed consent

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The link between work-leisure conflict and cognitive pre-sleep arousal is serially mediated by emotional exhaustion and entrapment

Abstract

Despite their adverse effects and increasing prevalence, sleep problems have not yet been addressed in the work-leisure conflict literature. This paper focuses on how work-leisure conflict interferes with sleep. In particular, the current study investigates the associations between work-leisure conflict and cognitive pre-sleep arousal through emotional exhaustion and entrapment. Conservation of resources theory provides the theoretical grounding for this study. Data were obtained from 346 participants using an online survey method. The findings demonstrated that work-leisure conflict is positively associated with cognitive pre-sleep arousal, and this association is mediated serially by emotional exhaustion and entrapment. These findings contribute to the literature by providing insights into cognitive sleep problems from a leisure perspective.

Keywords: work-leisure conflict, pre-sleep arousal, entrapment, emotional exhaustion, serial mediation

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Introduction

"A ruffled mind makes a restless pillow"

Charlotte Brontë

Sleep is a fundamental resource that enables employees to maintain their physical health, psychological functioning, and daily performance [1], [2]. However, many individuals have trouble transitioning from daytime demands to restorative sleep. Work-related stressors often persist beyond working hours, continuing to

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occupy individuals' thoughts during the evening and at bedtime [3], [4]. Such persistent mental activity is associated with cognitive pre-sleep arousal, a state characterized by intrusive, repetitive, or distressing thoughts that interfere with the transition to sleep [5]. When cognitive arousal remains elevated at bedtime, difficulties in falling asleep may occur, and chronic sleep disruption may be more likely. Over time, insufficient or poor-quality sleep has been linked to numerous adverse outcomes, including psychological distress, cardiovascular disease, metabolic disorders, and increased mortality risk [6].

A growing body of research suggests that sleep problems are not solely determined by physiological factors but are also shaped by experiences across daily life domains such as work and leisure [1], [2], [7]. In particular, nonwork time, especially leisure time, plays a crucial role in allowing employees to recover from work-related demands. Leisure activities can help individuals replenish depleted psychological resources by enabling psychological detachment from work, relaxation, mastery experiences, and a sense of control over one's time [8]. Through these recovery experiences, leisure facilitates the restoration of emotional and cognitive resources that have been consumed during work activities [9]. Empirical evidence consistently shows that employees who experience effective recovery during nonwork hours report better sleep quality and longer sleep duration [2], [8], [10]. Conversely, when employees fail to recover from work stressors during their leisure time, psychological

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activation may persist into the evening hours, making it difficult to mentally disengage from work and transition into sleep [11]-[13].

One important factor that may undermine the restorative function of leisure is work-leisure conflict, defined as an inter-role conflict that occurs when the demands of work interfere with individuals' ability to engage in leisure activities [14]. When work intrudes into time that would otherwise be devoted to leisure, employees may lose opportunities to recover from work-related strain. Instead of experiencing relaxation and psychological detachment, individuals may continue thinking about unfinished tasks, responsibilities, or pressures that comes from work. In this way, work-leisure conflict can disrupt the recovery process and prolong the psychological activation associated with work demands.

Despite the importance of recovery processes, the literature on work-leisure conflict has primarily focused on outcomes such as leisure satisfaction, job satisfaction, and life satisfaction [15]-[20]. Comparatively little attention has been devoted to sleep outcomes, even though sleep represents a critical domain within the broader work-nonwork system. As highlighted by research on the work-nonwork interface, work experiences can spill over into nonwork domain and ultimately influence sleep-related processes [1], [7]. Neglecting sleep within this framework limits our understanding of how conflicts between work and leisure may translate into longer-term health consequences.

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To explain how work-leisure conflict may influence sleep-related cognitive processes, the present study draws on conservation of resources (COR) theory. According to COR theory, individuals strive to acquire, maintain, and protect valuable resources such as time, energy, and emotional capacity. When these resources are threatened or lost, psychological stress occurs [21]. Importantly, COR theory proposes that resource loss is often not isolated but may trigger loss spirals, in which initial resource depletion is associated with further losses over time. Within this framework, work-leisure conflict can be conceptualized as a situation in which work demands consume time and energy that would otherwise be available for leisure and recovery. As opportunities for restoration diminish, individuals may become increasingly vulnerable to subsequent psychological strain.

One consequence of sustained resource depletion is emotional exhaustion, defined as an affective state characterized by a sense of being depleted of emotional energy [22]. Emotional exhaustion reflects the cumulative effect of prolonged stress and inadequate recovery. When employees experience persistent work-leisure conflict, they may gradually lose the emotional energy needed to cope effectively with ongoing demands. This depletion represents the early stage of a resource loss process in which individuals feel increasingly fatigued and overwhelmed [23]. Over time, continued resource loss may foster a more profound psychological response, namely entrapment, which refers to the perception that one is unable

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to escape or change undesirable circumstances [24]. From the perspective of COR theory, entrapment can emerge when individuals repeatedly experience resource depletion while perceiving limited opportunities to restore or regain those resources [21], [23]. In the context of work-leisure conflict, employees may gradually feel that work consistently dominates their time and prevents them from engaging in meaningful leisure activities. As recovery opportunities become chronically restricted, individuals may perceive themselves as trapped in an ongoing cycle of demands and insufficient restoration. Such perceptions have considerable negative consequences for sleep-related cognitive processes.

Individuals who feel trapped often engage in persistent cognitive processing as they attempt to mentally cope with situations they believe are difficult to change [24], [25]. This mental preoccupation may intensify at bedtime, when external distractions diminish and unresolved concerns become more salient. Although these thought patterns may resemble rumination, entrapment is a distinct cognitive-affective construct. Rumination focuses on distressing feelings and their associated causes without an escape, whereas entrapment reflects a broader cognitive appraisal of being unable to escape ongoing stressors rather than merely repetitive thinking about specific work events [26]. Typically preceding entrapment are experiences of defeat, loss of social rank, or prolonged exposure to severe life challenges that are constrained by psychological barriers such as guilt or fear [27]. The consequences of

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entrapment are significant, showing strong correlations with depression, anxiety, post traumatic stress disorder, and suicidality in both clinical and non-clinical populations [28], [29]. It serves as a transdiagnostic construct, influencing intrusive thoughts and cognitive pre-sleep arousal [5], [30], highlighting its impact beyond mere ruminative thinking.

Taken together, we suggest a sequential process consistent with the loss spiral mechanism of COR theory. Work-leisure conflict may initiate resource loss by reducing opportunities for recovery during leisure time. This initial depletion can be related to emotional exhaustion, which in turn may foster feelings of entrapment as individuals perceive fewer possibilities for restoring balance between work and personal life. Ultimately, this escalating loss process may bring about increased cognitive activity at bedtime, resulting in cognitive pre-sleep arousal. Building on this theoretical reasoning, the present study focuses on the relationship between work-leisure conflict and cognitive pre-sleep arousal through the serial mediating roles of emotional exhaustion and entrapment. By conceptualizing these mechanisms as stages within a resource loss spiral, the study contributes to the literature by clarifying how conflicts between work and leisure extend beyond daytime experiences and shape employees' mental states during the pre-sleep period.

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Hypothesis development

Work-leisure conflict and cognitive pre-sleep arousal

The conservation of resources (COR) theory emphasizes that when individuals face the threat of diminishing or losing their key resources, they tend to maintain, foster, and protect them [21]. COR theory further posits that the higher the conditions for resource loss, the more valuable resource gains become [23]. In Hobfoll's COR framework [31], free time is regarded as one of the 74 essential resources. From a similar perspective, Kleiber, Hutchinson, and Williams [32] highlight leisure as a resource in transcending negative life events. In addition, Sonnentag [9] argues that leisure is a valuable resource for recovery after work. Therefore, maintaining and regaining leisure resources can become a priority when a person encounters the threat of losing leisure time due to work demands spilling over nonwork hours. Following these, we hypothesized work-leisure conflict, emotional exhaustion and cognitive pre-sleep arousal relationships based on COR theory, focusing on "resource loss". Accordingly, we regarded leisure as a resource that, once lost, triggers the loss of other resources.

Previous research on work-nonwork-sleep relationships reveals that resources play a crucial role in connecting these three aspects of life [7]. Relevant to this connection, work-leisure conflict may trigger cognitive pre-sleep arousal by increasing the perceived threat of resource loss. Individuals dealing with work-leisure conflict

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may feel tense and annoyed during nonwork time, which prevents them from mentally detaching from work before sleep. As stated by Pauli et al. [33], work-related affective rumination causes people to feel distressed, afraid, and both emotionally and cognitively irritated, which makes it difficult for them to fall asleep. Besides, recent research supports that individuals working during nonwork time are more likely to experience sleep problems [11]- [13]. Following these, it can be concluded that when struggling with work-leisure conflict, ruminative thoughts can intensify the psychological costs of losing leisure as a resource and stimulate cognitive arousal, interfering with the transition to sleep. Therefore, we proposed:

H1. Work-leisure conflict is positively associated with cognitive pre-sleep arousal.

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Emotional exhaustion as a mediator

Based on the COR theory, emotional exhaustion is conceptualized as an affective state characterized by a sense of being depleted of emotional energy [22]. The COR theory suggests that individuals can acquire resources during leisure activities to cope with stress at work and thus improve their well-being [34]. For instance, after a demanding workday, people who are able to feel recovered through leisure can feel active, energetic, and vigorous [8]. The COR theory also demonstrates that energetic activation is affected by job demands and resources: when job demands exceed resources, emotional energy decreases; when resources exceed job demands,

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emotional energy increases [35]. To restore these resources threatened by work demands, employees invest in additional resources that help replenish them, such as exposure to fulfilling leisure experiences [8]. However, when work interferes with leisure, it becomes difficult to replenish energetic resources impeded by work demands. Empirical studies have demonstrated that individuals who experience work-leisure conflict are more likely to feel emotional exhaustion [36]-[38]. That is, limited psychological detachment or relaxation during leisure time may be linked to lower levels of psychological recovery, potentially reflecting the prolonged activation of work-related stressors, which may, in turn, be associated with emotional exhaustion [10].

Emotional exhaustion makes work demands overwhelming and unmanageable, such that employees consider these a source of stress and worry rather than challenges they can embrace [39]. The COR theory's desperation principle suggests that when resources are exhausted, individuals often adopt a defensive mode to protect themselves, which can be aggressive or irrational [23]. For instance, they can deal with intrusive, repetitive, or distressing thoughts that interfere with the transition to sleep [3]. A recent meta-analysis confirmed that exhaustion mediates the relationship between poor recovery experiences and health complaints, including sleep problems [10]. Therefore, it is likely that work interference with leisure produces emotional exhaustion, which in turn promotes cognitive arousal before sleep.

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H2. Emotional exhaustion mediates the relationship between work-leisure conflict and cognitive pre-sleep arousal.

The serial mediating role of emotional exhaustion and entrapment

When work demands spill over into the leisure sphere, competing demands between work and leisure may arise [14]. From the perspective of COR theory, such spillover threatens individuals' limited personal resources, including time, energy, and psychological capacity. When these resources are repeatedly strained, individuals may enter what COR theory describes as a loss cycle, in which initial resource depletion increases vulnerability to further losses. According to the desperation principle of COR theory, when resources are severely depleted, individuals may adopt defensive or self-protective strategies to preserve remaining resources, which can include heightened rigidity in thought and, in some cases, aggressive or irrational responses [23].

As a cognitive process, entrapment refers to the perception that one is unable to escape from adverse life circumstances [24]. Individuals who feel caught between work and nonwork domains, despite a strong desire to disengage, may struggle to do so for structural or psychological reasons [40]. Within the loss cycle framework, persistent work-leisure conflict can progressively deplete coping resources, leaving individuals with fewer perceived opportunities to restore balance between life domains. Under

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conditions of extreme resource strain, the desperation principle suggests that these individuals may enter a defensive psychological mode, which can intensify perceptions of entrapment and reduce adaptive coping.

For instance, the intrusion of work demands into leisure time has been linked to impaired psychological well-being [41]. As personal resources become progressively depleted, individuals may experience heightened emotional strain and persistent cognitive preoccupation with unresolved demands. Systematic reviews indicate that negative affective states can trigger mind wandering [42] and interfere with the transition from wakefulness to sleep [43]. When individuals feel trapped and perceive limited opportunities to escape the pressures created by work-leisure conflict, intrusive and anxious thoughts may become more prominent before sleep. In line with COR theory's loss cycle and desperation principles, the accumulation of these strains may coincide with defensive cognitive and emotional responses, which, in turn, are associated with heightened cognitive pre-sleep arousal and potential sleep disturbances. Therefore, we propose the following hypothesis:

H3. Work-leisure conflict is indirectly associated with cognitive pre-sleep arousal through a serial mediation mechanism, such that higher levels of work-leisure conflict are positively associated with emotional exhaustion, which in turn is associated with greater entrapment, and subsequently with higher levels of cognitive pre-sleep arousal.

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Methodology

Participants and procedures

We conducted an online survey between December 2024 and January 2025 using a river sampling approach, in which respondents were invited to participate through survey links distributed via websites, e-mail, and social media platforms [44]. This approach enables rapid and cost-effective access to a broad pool of participants. However, despite the high level of internet and social media usage in Türkiye [45], online recruitment through open links constitutes a form of convenience sampling rather than probability-based sampling. Therefore, the sample cannot fully represent the target population.

The recruitment process was conducted through social media groups gathering professionals. More specifically, we shared a survey link in social media groups, along with a brief explanation of the study's purpose. Participants were required to provide informed consent before accessing the survey. The Ethics Committee of Istanbul Yeni Yuzyil University approved the study (2024/12-1370), and the research followed the principles of the Declaration of Helsinki.

A total of 346 respondents (57.2% female) completed the survey. Participants' ages ranged from 18 to 65 years, with an average of 37.25 (SD = 8.96). 60.7% of the participants were married. The majority had a bachelor's degree (69.1%), followed by 23.1% with a master's degree or higher and 7.8% with a high school

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diploma. Their professional fields were distributed as follows: 36.4% in education, 35.3% in healthcare, 13.9% in tourism and hospitality, 6.1% in technology, 5.2% in finance, and 3.2% in other professional domains. The participants reported working in their current organization for an average of 6 years (SD = 5.97), ranging from 1 to 35 years. The average professional experience of them was 12 years (SD = 8.86), with a range between 1 and 45 (Table 1).

Measures

Following DeVellis's guidelines [46], we selected four scales to measure the construct: Work-Leisure Conflict Scale, Entrapment Scale, Shirom-Melamed Burnout Measurement, and Pre-sleep Arousal Scale. We selected the scales primarily based on their suitability to the theoretical framework and their accurate representation of the variables. We also considered the validity and reliability of the scales and their adaptation to the Turkish culture. We further evaluated the scales for being short and concise to ensure that they were practical as well as applicable.

Work-leisure conflict was measured using the Turkish version of the Work-Leisure Conflict Scale [47], [48]. The unidimensional scale has five items (e.g., "I am not able to participate in leisure activities because of my job") measured on a five-point Likert scale ranging from 1 *(strongly disagree)* to 5 *(strongly agree)*.

Emotional exhaustion was measured using the Turkish version of

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the Shirom-Melamed Burnout Measurement [49], [50]. Emotional exhaustion subscale of the measurement has four items (e.g., “I feel fed up”) measured on a five-point Likert scale ranging from 1 *(strongly disagree)* to 5 *(strongly agree)*.

Entrapment was measured using the Turkish version of the Entrapment Scale [51], [52]. The scale has four items (e.g., “I feel I’m in a deep hole I can’t get out of”) measured on a five-point Likert scale ranging from 1 *(not at all like me)* to 5 *(extremely like me)*.

Cognitive pre-sleep arousal was measured using the Turkish version of the Pre-sleep Arousal Scale [5], [53]. Cognitive pre-sleep arousal subscale has eight items measured on a five-point Likert scale ranging from 1 *(not at all)* to 5 *(extremely)*. In the measurement instructions, participants were asked to describe the intensity of each symptom (e.g., “worry about problems other than sleep”) they generally experience while trying to fall asleep.

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Control variables. We controlled for the effects of gender, age, marital status, and tenure, considering their potential impact on work, nonwork, and sleep relationships [7].

Measurement model assessment

Before testing the measurement model, we implemented procedures to meet the assumptions for subsequent statistical analyses. First, to avoid missing values in our dataset, we designed a survey in Google Docs that required respondents to answer all questions before

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completing the survey. By applying mandatory response settings, we ensured that no survey could be submitted with missing data. This approach eliminated the need for post-survey follow-ups or data imputation techniques. It also minimized potential bias from missing data. Second, we checked for possible univariate and multivariate outliers. No observations exceeded the critical threshold for univariate outliers ($z > 3.29$) or multivariate outliers (Mahalanobis distance < 0.001) [54]. Third, we tested the assumptions for a normal distribution. Skewness and kurtosis values for all variables were within ±2, meeting the assumptions for normality [55]. Last, we applied Guadagnoli and Velicer's factor saturation-based absolute sample size determination criteria [56]. For the stability of factor models the researchers recommend that a) a sample size of 50 is adequate with .80 factor loadings, b) a sample size should be greater than or equal to 150 with .60 factor loadings, and c) a sample size should be at least 300 with .40 factor loadings. Since our measurement model had factor loadings between .68 and .96 (see Table 2) with a sample size of 346, the adequate sample size assumption was also met.

Convergent and discriminant validity. We applied the rules of thumb proposed by Hair et al. [57] to measure convergent and discriminant validity. Standardized loading estimates were above the minimum threshold of .50, all constructs exceeded the recommended threshold of .50 for average variance extracted (AVE), and composite reliability (CR) ranged from .91 to .95 (Table 2), providing evidence

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for convergent validity. The discriminant validity was supported by Fornell-Larcker and the heterotrait-monotrait (HTMT) criteria. The square root estimates of AVE were greater than inter-construct correlations, and the HTMT ratio of correlations was below .90 (Table 3).

Model fit. We assessed model fit using the criteria proposed by Kline [58] and Hair et al. [57]. Kline suggests CFI and TLI values ≥ .90 for acceptable fit [58]; RMSEA and SRMR values ≤ .08 for good fit, while values ≥ .10 indicate poor fit. Hair et al. [57] recommend χ^2/df values below 5 for acceptable fit. The analysis yielded fit indices: χ^2/df = 3.472, CFI = .94, TLI = .93, RMSEA = .085, and SRMR = .088. The χ^2/df ratio indicates acceptable fit, with CFI and TLI above the .90 threshold. RMSEA and SRMR were slightly above .08 but below the .10 threshold, indicating an acceptable overall fit.

Common method bias. We followed Podsakoff et al.'s recommendations to reduce the likelihood of common method bias [59]. First, we informed the participant that the study aimed to collect the data for research purposes only and that their responses would remain anonymous. Second, we designed a concise questionnaire to minimize participant fatigue, which could lead to inattentive responses. Third, we ensured the questionnaire items were clearly worded and straightforward to avoid confusion or misinterpretation. Last, we carefully reviewed all questionnaire items to eliminate double-barrelled questions and grammatical

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redundancies.

To assess the potential influence of common method bias, we employed both Harman's single factor test and a confirmatory factor analytic (CFA) approach. First, we conducted Harman's single factor test by loading all measurement items into an unrotated exploratory factor analysis. The results indicated that the first factor accounted for 46% of the total variance, which is below the threshold of 50%. This suggests that a single factor does not dominate the variance and provides preliminary evidence that common method bias is unlikely to be a serious concern in the present study. Also, we conducted a CFA to further examine the presence of common method bias by specifying a single factor measurement model in which all items were constrained to load onto one latent construct. The results demonstrated a poor model fit (x^2/df = 16.444, CFI = 0.63, TLI = 0.58, RMSEA = 0.212, SRMR = 0.134), indicating that the single factor model does not adequately represent the data. This finding provides additional support that common method variance is unlikely to account for the observed relationships among the study variables.

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Results

We used PROCESS (version 4.1) Model 6 with 5000 bootstrap samples and 95% confidence intervals to test the potential mediating roles of emotional exhaustion and entrapment in the relationship between work-leisure conflict and cognitive pre-sleep arousal. As shown in Figure 1, the total effect of work-leisure conflict on

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cognitive pre-sleep arousal was significant (B = 0.38, 95% CI = [0.28, 0.47], t = 7.52, p < 0.001), indicating that higher levels of work-leisure conflict are associated with greater cognitive pre-sleep arousal. Therefore, H1 was supported.

The mediating role of emotional exhaustion in the relationship between work-leisure conflict and cognitive pre-sleep arousal was tested using a bootstrapped mediation analysis. Consistent with H2, work-leisure conflict was positively associated with emotional exhaustion (B = 0.62, 95% CI = [0.52, 0.73], t = 11.66, p < 0.001) (Table 4). Emotional exhaustion, in turn, was significantly related to cognitive pre-sleep arousal (B = 0.24, 95% CI = [0.13, 0.35], t = 4.21, p < 0.001). Results further indicated a significant indirect pathway through emotional exhaustion (B = 0.15, 95% CI = [0.08, 0.23]) (Table 5). Thus, H2 was supported as well.

The proposed serial mediation model was tested by entering emotional exhaustion and entrapment sequentially. Work-leisure conflict was significantly related to emotional exhaustion (B = 0.62, 95% CI [0.52, 0.73], t = 11.66, p < .001), and emotional exhaustion was strongly related to entrapment (B = 0.76, 95% CI [0.68, 0.84], t = 18.41, p < .001). Entrapment, in turn, was positively associated with cognitive pre-sleep arousal (B = 0.35, 95% CI [0.24, 0.45], t = 6.56, p < .001).

The total indirect effect of work-leisure conflict on cognitive pre-sleep arousal was significant (B = .34, SE = .04, 95% CI [.26, .42]). Further, the serial indirect effect (WLC → EE → ENT → COG)

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was significant (B = .17, 95% CI [.11, .23]). When entrapment and emotional exhaustion were included as mediators, the direct effect of work-leisure conflict on cognitive pre-sleep arousal became nonsignificant (B = 0.04, 95% CI = [-0.05, 0.13], t = 0.87, p = 0.39). Taken together, these findings support H3, demonstrating that work-leisure conflict influences cognitive pre-sleep arousal sequentially through emotional exhaustion and subsequent entrapment.

Discussion

The findings of this study provide empirical support for the proposed hypotheses and contribute to the understanding of how work-leisure conflict influences cognitive processes prior to sleep. Consistent with the conservation of resources (COR) theory, the results demonstrate that work-leisure conflict is positively associated with cognitive pre-sleep arousal and that this relationship unfolds through a sequential psychological process involving emotional exhaustion and entrapment. In line with COR theory, stressors that threaten or deplete personal resources tend to provoke sustained cognitive engagement, which can interfere with psychological detachment and ultimately manifest in heightened cognitive activity before sleep.

From a resource-based perspective, leisure represents a critical domain for restoring depleted personal resources. When work demands intrude into this domain, individuals may perceive a threat to their opportunities for recovery. Even when leisure time is not completely eliminated, the anticipation or perception that leisure

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opportunities are constrained may still activate stress responses. For instance, long working hours or constant connectivity through e-mails and digital communication during nonwork hours may coincide with individuals perceiving that their leisure time is at risk. Such perceived threats to recovery opportunities may prompt persistent cognitive preoccupation with the imbalance between work and leisure. These concerns may become particularly salient at bedtime, when environmental stimuli decrease and individuals have fewer distractions from their own thoughts. While daytime activities and social interactions may temporarily divert attention from these concerns, the quietness of the night can make unresolved thoughts and worries more prominent, thereby increasing cognitive pre-sleep arousal. These findings are consistent with recent research demonstrating that employees who engage in work-related activities after regular working hours are more likely to experience sleep-related difficulties [11]-[13]. Extending this line of research, the present study highlights the psychological mechanisms through which work-leisure conflict may translate into sleep-related cognitive activation.

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More specifically, the results indicate that emotional exhaustion mediates the relationship between work-leisure conflict and cognitive pre-sleep arousal. Emotional exhaustion represents a core manifestation of resource depletion and reflects the gradual erosion of individuals' emotional and psychological energy. According to COR theory [23], initial resource loss increases

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individuals' vulnerability to further losses, initiating what has been described as a loss cycle. In the context of the present study, work-leisure conflict may initially drain key resources such as time, energy, and psychological resilience, leaving individuals with reduced capacity to recover from work-related demands. As emotional exhaustion increases, individuals may find it more difficult to regulate emotions, disengage from work-related concerns, and cope with ongoing stressors. Consequently, this depletion of coping resources may intensify cognitive activity before sleep, contributing to higher levels of cognitive pre-sleep arousal.

The findings further demonstrate that this process extends beyond emotional exhaustion through a serial mediation mechanism involving entrapment. The serial mediation findings suggest that work-leisure conflict may be associated with a psychological loss cycle in which resource depletion is reflected first in emotional exhaustion, which is in turn linked to intensified feelings of entrapment, and subsequently associated with elevated cognitive pre-sleep arousal. Entrapment reflects the perception of being unable to escape from adverse or demanding circumstances. When individuals experience persistent work-leisure conflict alongside ongoing resource depletion, they may begin to perceive fewer opportunities to restore balance between work and nonwork domains. This perceived lack of alternatives may foster a sense of being trapped between competing demands, particularly when

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individuals feel unable to reduce work obligations or protect their leisure time.

Coinciding with the desperation principle of COR theory [23], emotional exhaustion may signal a state in which individuals' remaining resources are significantly constrained. Under such conditions, individuals may shift toward a defensive, self-protective orientation aimed at conserving residual resources. This defensive mode may be accompanied by narrowed and more rigid cognitive processing, which can limit individuals' perceived capacity to generate alternative courses of action or disengage from stressors. Such cognitive constriction aligns with the emergence of entrapment, characterized by a perceived inability to escape ongoing demands. This state may be accompanied by growing cognitive preoccupation with one's perceived inability to change the situation. Consistent with recent systematic reviews suggesting that negative emotional states trigger mind wandering and interfere with the transition from wakefulness to sleep [42], [43], feelings of entrapment may sustain intrusive and repetitive thoughts before sleep. These persistent cognitive processes may, in turn, be linked to difficulties in achieving the mental disengagement necessary for sleep initiation.

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Theoretical implications

This study contributes to the literature by investigating the relationship between work-leisure conflict and cognitive pre-sleep

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arousal and the serial mediating roles of emotional exhaustion and entrapment. Building on the COR theory, our findings suggest that work-leisure conflict acts as a resource-depleting stressor, impeding individuals' psychological resources necessary for an effective recovery at bedtime. This study extends the applications of the COR theory by indicating how the loss of resources related to work-leisure conflict spill over beyond the workday and disrupt key recovery periods such as sleep. In addition, by identifying emotional exhaustion and entrapment as serial mediators, this study contributes to understanding the psychological pathways through which work-leisure conflict promotes cognitive pre-sleep arousal. Our findings suggest that work-leisure conflict heightens individuals' sense of emotional exhaustion and entrapment serially, thus intensifying intrusive and repetitive thoughts before sleep. By integrating emotional exhaustion and entrapment into a serial mediation framework, the study provides further support for the COR theory's loss cycle perspective and highlights the incremental psychological processes through which work-related stressors may impair employees' ability to mentally disengage before sleep.

Practical implications

This study provides several practical insights for organizations to address the adverse effects of work-leisure conflict on employees' well-being, particularly their sleep health. The findings highlight the critical need for organizations to proactively address work-leisure

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conflict as a significant stressor that negatively impacts employees beyond the workplace. By disrupting recovery processes such as sleep through cognitive pre-sleep arousal, work-leisure conflict may be related to long-term health and productivity losses.

Drawing on COR theory, this study indicates that work-leisure conflict functions as a primary resource drain that is associated with a state of cognitive pre-sleep arousal, which prevents night-time resource replenishment. To mitigate this, organizations should implement resource protection protocols aimed at preserving employees' psychological and energetic resources during non-work time. In such contexts, organizations may adopt more flexible and adaptive strategies, including structured on-call rotations, protected off-duty periods following intensive shifts, and the redistribution of after-hours responsibilities across teams. Additionally, limiting non-essential communications, prioritizing urgent information, and providing compensatory recovery opportunities (e.g., scheduled rest periods or reduced workload following high-demand shifts) may help reduce unnecessary resource depletion. These context-sensitive practices can still serve the core purpose of conserving employees' internal resources and facilitating psychological detachment, thereby supporting sleep quality without compromising operational demands.

In addition, addressing the emotional exhaustion and feelings of entrapment that arise from work-leisure conflict requires targeted resource investment to replace depleted psychological capital. To eliminate the perception of being trapped by rigid work demands,

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organizations should implement job crafting initiatives. This approach empowers employees to proactively alter the task, relational, or cognitive boundaries of their roles to better align with their personal resource needs. Such autonomy acts as a “resource caravan,” providing employees with the agency needed to buffer against the exhaustion caused by high workloads. Furthermore, managers should be trained to recognize early indicators of resource depletion, such as decreased engagement or cognitive withdrawal, and respond with structured recovery intervals or temporary workload adjustments to prevent minor resource losses from turning into burnout.

Lastly, for industries characterized by high work demands, organizations must facilitate proactive resource replenishment in the work environment. Our findings suggest that leisure and recovery should not be viewed as time away from work but as essential reinvestments in human capital. Organizations can foster resource-rich environments by providing diverse, voluntary recovery opportunities, ranging from low-activation quiet zones to high-activation social groups, that allow employees to choose the recovery method that best fits their specific depletion state. By reframing organizational culture to focus on employees’ resource sustainability, organizations can break the fatigue cycle and foster a more engaged, resilient, and productive workforce with healthier sleep habits.

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Limitations and future research

Despite its contributions, this study has several limitations that should be acknowledged. First, although sleep-related outcomes are influenced by a wide range of physiological, behavioral, and environmental factors, the present study controlled only for basic demographic variables (gender, age, marital status, and tenure). Important confounding variables, such as work hours, caffeine and alcohol consumption, history of sleep disorders, and personality traits, were not included in the analyses. Given that these factors are known to shape pre-sleep arousal, their omission may have introduced uncontrolled variance and potentially inflated or attenuated the observed associations. Therefore, the findings should be interpreted with caution. Future research is encouraged to include a broader set of physiological, behavioral, and dispositional controls to more precisely isolate the unique contribution of work-leisure conflict and related psychological mechanisms.

Second, the sample may be subject to self-selection, coverage bias, and sectoral concentration. A substantial proportion of participants were drawn from the education and healthcare sectors, resulting in a sample that is heavily concentrated in service professions characterized by high emotional labor, intense workloads, and blurred work–nonwork boundaries. This relative homogeneity may have amplified the observed relationships, as employees in these sectors are more likely to experience persistent resource depletion and limited recovery opportunities. From the

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perspective of COR theory, such high-demand work environments may intensify resource loss cycles, thereby strengthening the link between work–leisure conflict and emotional exhaustion. Consequently, the findings may not fully generalize to occupational contexts with lower emotional demands or more clearly defined boundaries. Future research should employ more diverse and balanced sampling strategies, such as probability or stratified sampling across industries, to examine whether these relationships vary under different job demands and resource conditions.

Last, this study primarily focused on the adverse psychological pathway linking work-leisure conflict to cognitive pre-sleep arousal. Future studies could extend this framework by examining protective or buffering factors, such as supportive leadership styles, workplace recreational initiatives, or individual recovery strategies, that may mitigate these associations and provide actionable implications for employee well-being.

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Ethics statement

The study approved by the Ethics Committee of Istanbul Yeni Yuzyil University (2024/12-1370).

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List of Figures

Figure 1. Serial mediation model

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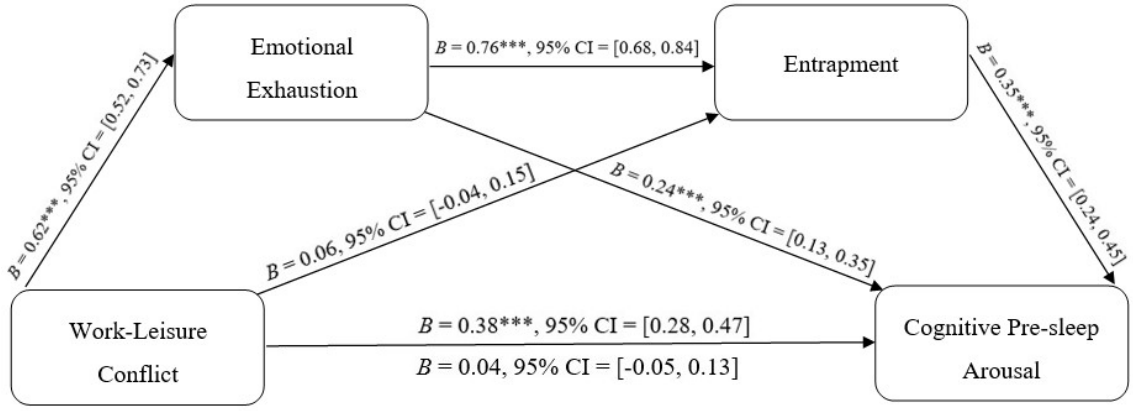


Figure 1. Serial mediation model.

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Table 1. Demographic characteristics of the participants (n=346).

	n	*%*
Gender		
Female	198	57.2
Male	148	42.8
Marital status		
Married	210	60.7
Single	136	39.3
Education		
Master's degree or higher	80	23.1
Bachelor's degree	239	69.1
High school diploma	27	7.8
Professional field		
Education	126	36.4
Finance	18	5.2
Tourism and hospitality	48	13.9
Healthcare	122	35.3
Technology	21	6.1
Other	11	3.2
	Min - max	*X ± SD*
Age	18 - 65	37.25 ± 8.96
Tenure	1 - 45	11.95 ± 8.86

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Table 2. Measurement model.

Construct	Mean	*SD*	Skewness	Kurtosis	Loading[a]	*α*	*CR*	*AVE*
Work-leisure conflict	3.29	1.04	-0.24	-0.76		0.92	0.92	0.71
I do not have enough time for leisure activities because of my job.	3.33	1.18	-0.32	-0.76	0.93			
I do not have enough time to participate in leisure activities with my family/friends because of my job.	3.20	1.13	-0.17	-0.73	0.91			
I do not have energy to participate in leisure activities because of my job.	3.50	1.20	-0.47	-0.98	0.79			
I am not able to participate in leisure activities because of my job.	3.23	1.19	-0.19	-1.05	0.88			
I have never been in a suitable frame of mind to participate in leisure activities because of my job.	3.19	1.27	-0.15	-0.99	0.68			
Entrapment	2.81	1.22	0.19	-0.99		0.90	0.91	0.72
I often have the feeling that I would just like to run away.	2.98	1.44	0.11	-1.35	0.72			
I feel powerless to change things.	2.93	1.34	0.42	-1.18	0.81			
I feel trapped inside myself.	2.81	1.37	0.23	-1.17	0.93			
I feel I'm in a deep hole I can't get out of.	2.53	1.38	0.47	-1.01	0.91			
Emotional exhaustion	3.25	1.21	-0.23	-1.02		0.95	0.95	0.82
I feel fed up.	3.32	1.24	-0.31	-0.95	0.90			
My batteries are dead.	3.22	1.32	-0.22	-1.14	0.93			
I feel burned out.	3.04	1.35	-0.07	-1.21	0.90			
I feel mentally fatigued.	3.41	1.28	-0.38	-0.98	0.90			
Cognitive pre-sleep arousal[b]	3.42	1.03	-0.21	-0.81		0.92	0.91	0.65
Review or ponder events of the day.	3.46	1.12	-0.33	-0.78	0.72			
Depressing or anxious thoughts.	3.17	1.02	-0.08	-1.03	0.74			
Worry about problems other than sleep.	3.33	1.16	-0.18	-0.96	0.70			
Being mentally alert, active.	3.54	1.17	-0.43	-0.60	0.71			
Can’t shut off your thoughts.	3.47	1.27	-0.34	-1.05	0.95			

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Thoughts keep running through your head.	3.53	1.25	-0.41	-0.93	0.96

[a] All factor loadings significant at $p < 0.001$ level; [b] Items with factor loadings below .50 (COG1 and COG8) were removed.

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Table 3. Discriminant validity.

Construct	WLC	ENT	EE	COG
Work-leisure conflict	**.84**	.48	.57	.40
Entrapment	.41	**.85**	.83	.71
Emotional exhaustion	.51	.80	**.91**	.67
Cognitive pre-sleep arousal	.32	.62	.61	**.80**

Note. WLC: Work-leisure conflict; ENT: Entrapment; EE: Emotional exhaustion; COG: Cognitive pre-sleep arousal. Square root of average variance extraction are shown on the diagonal in bold; HTMT above the diagonal; Fornell-Larcker criterion below the diagonal.

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Table 4. Test of serial mediation.

Construct	Emotional exhaustion					Entrapment					Cognitive pre-sleep arousal				
	B	*SE*	*t*	*LLCI*	*ULCI*	*B*	*SE*	*t*	*LLCI*	*ULCI*	*B*	*SE*	*t*	*LLCI*	*ULCI*
Work-leisure conflict	0.62***	0.05	11.66	0.52	0.73	0.06	0.05	1.24	-0.04	0.15	0.04	0.05	0.87	-0.05	0.13
Emotional exhaustion						0.76	0.04	18.41	0.68	0.84	0.24***	0.06	4.21	0.13	0.35
Entrapment											0.35***	0.05	6.56	0.24	0.45
Gender	-0.05	0.11	-0.47	-0.27	0.17	0.14	0.09	1.62	-0.03	0.31	0.01	0.08	0.10	-0.16	0.17
Age	-0.01	0.01	-0.80	-0.04	0.02	0.02	0.01	1.55	-0.01	0.04	-0.01	0.01	-1.13	-0.03	0.01
Marital status	0.12	0.12	1.03	-0.11	0.36	0.11	0.09	1.19	-0.07	0.29	-0.02	0.10	-0.20	-0.19	0.16
Tenure	0.01	0.01	0.11	-0.03	0.03	-0.01	0.01	-1.12	-0.03	0.01	0.01	0.01	0.01	-0.02	0.02
F			29.09					86.12					43.18		
R^2			.30					.60					.47		

Note. SE: standard error; *LLCI*: lower limit confidence interval; *ULCI*: upper limit confidence interval.

***p < 0.001.

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Table 5. Total, direct, and indirect effects

	B	*SE*	*LLCI*	*ULCI*
Total effect				
Work-leisure conflict	.38	.05	0.28	0.47
Direct effect				
Work-leisure conflict	.04	.05	-0.05	0.13
Indirect effects				
Total	.34	.04	0.26	0.42
WLC → EE → COG	.15	.04	0.08	0.23
WLC → ENT → COG	.02	.02	-0.01	0.05
WLC → EE → ENT → COG	.17	.03	0.11	0.23

Note. WLC: Work-leisure conflict; ENT: Entrapment; EE: Emotional exhaustion; COG: Cognitive pre-sleep arousal; *B*: unstandardized regression coefficient; *B*: unstandardized regression coefficient; *SE*: standard error; *LLCI*: lower limit confidence interval; *ULCI*: upper limit confidence interval.

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