# Digital Workload Management in Information-Intensive Organizations: Comparing Overload Sources in Predicting Fatigue and Engagement

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## Abstract

Digital work systems are central to project-oriented work because they help employees process information, coordinate tasks, and stay connected. Yet these systems can also create workloads that are difficult to manage. Drawing on the stressor−strain−outcome framework, this study compares three sources of digital overload: information overload, system feature overload, and communication overload. Three-wave matched survey data were collected from employees in Chinese organizations, yielding a final analytic sample of 366 employees after quality screening. Work fatigue was assessed using a multidimensional measure covering physical, mental, and emotional fatigue. The results showed that information overload and communication overload were positively associated with work fatigue, whereas system feature overload was not. Work fatigue was negatively associated with work engagement and mediated the relationships between information overload, communication overload, and work engagement. Relative importance analysis further indicated that information overload and communication overload were the main overload sources associated with fatigue. These findings suggest that digital workload management in project-oriented work should focus on specific overload sources rather than treating technology overload as a single problem.


**Keywords:** digital overload; information overload; system feature overload; communication overload; work fatigue; work engagement; project management; digital project coordination; stressor-strain-outcome framework

## 1 Introduction

Digital systems now shape much of everyday work. Employees use enterprise platforms, messaging tools, workflow applications, dashboards, and collaborative software to complete routine tasks. These systems support coordination and task execution, yet they also change how workload is experienced. Employees may receive more information than they can process, work with systems that contain more functions than they need, or face communication demands that interrupt focused work (Karr-Wisniewski & Lu, 2010; Marsh et al., 2024).

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Project management provides a clear context for this issue. Project work depends on timely information sharing and cross-functional coordination, often through frequent digital updates. Digital systems make these practices faster, but they can also increase the amount of information and communication that project members must monitor. Identifying the overload source most closely related to fatigue can help project managers decide whether the problem lies mainly in information flows, communication routines, or digital tool use.

Technostress research has long shown that information and communication technologies can become sources of strain for employees. Ragu-Nathan et al. (2008) introduced the technostress creators construct and linked these stressors to organizational outcomes. Ayyagari et al. (2011) further showed that technology characteristics can contribute to work overload, role ambiguity, and related strain. A more fine-grained view was offered by Karr-Wisniewski and Lu (2010), who distinguished among information overload, communication overload, and system feature overload. Recent work has used related distinctions to examine digital workplace stress, exhaustion, and mental health (Marsh et al., 2024).

Technology overload is still often examined as an aggregate pressure. Studies commonly treat techno-overload as a broad digital job demand associated with exhaustion, performance, and work outcomes (Hao et al., 2024; Tarafdar et al., 2015). This approach is useful when the goal is to capture the general burden of digital work. It may be less useful when the aim is to understand which parts of digital overload are most closely tied to employee fatigue. Information overload points to problems of filtering and information ownership. Communication overload directs attention to meeting norms, response expectations, and interruptions. System feature overload raises a different issue: whether digital tools contain more functions than employees can reasonably use.

This study examines how three digital overload sources are related to work fatigue and work engagement. The stressor–strain–outcome framework guides the model: digital overload sources are treated as stressors, work fatigue as the strain mechanism, and work engagement as the outcome (Koeske & Koeske, 1993). The study separates technology overload into information overload, communication overload, and system feature overload, and compares their relative importance within one empirical model. It also uses a multidimensional measure of work fatigue to capture different aspects of fatigue in digital work. By linking specific overload sources to fatigue and engagement, the study offers evidence that can help project managers diagnose whether digital coordination problems arise mainly from information flows, communication routines, or tool complexity.

## 2 Theoretical Background and Hypotheses

The stressor-strain-outcome framework provides a useful logic for explaining how work demands affect employee outcomes. It distinguishes among work stressors, employees' strain responses, and subsequent work outcomes (Koeske & Koeske, 1993). Technostress research has extended this logic by treating technology-related demands as stressors that generate strain and shape work outcomes (Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2015). In digital work, technology overload can therefore be treated as a stressor, work fatigue as the strain response, and work engagement as a downstream outcome.

Information overload occurs when employees receive more information than they can process effectively. Karr-Wisniewski and Lu (2010) distinguish it from communication overload and system feature overload, treating information overload as excessive informational input that exceeds processing capacity. The problem is not only volume. Information may arrive too quickly, repeat across channels, or lack clear relevance to the task at hand. Employees then need to filter, compare, and interpret information before they can decide what deserves attention. Recent research on digital overload similarly identifies information overload as a distinct source of fatigue and strain (Marsh et al., 2024).

*H1a: Information overload is positively related to work fatigue.*

System feature overload arises when digital tools offer more functions, options, or workflow steps than employees need for the task at hand (Karr-Wisniewski & Lu, 2010). Employees may have to search through menus, manage irrelevant functions, or learn tools that do not clearly support their work. This complexity can make technology use less efficient and increase the cognitive effort required to complete routine tasks (Ayyagari et al., 2011). System feature overload should therefore increase work fatigue.

*H1b: System feature overload is positively related to work fatigue.*

Communication overload is tied less to system complexity than to the pace and volume of digital interaction. It occurs when messages, meetings, notifications, and interruptions exceed employees' capacity to respond while maintaining focus (Karr-Wisniewski & Lu, 2010). Constant communication can fragment attention and create pressure to remain reachable, even when focused work requires fewer interruptions. Digital job-demands research has also linked digitization-related demands to strain and well-being outcomes (Scholze & Hecker, 2024).

*H1c: Communication overload is positively related to work fatigue.*

Work fatigue refers to work-related tiredness in physical, mental, and emotional domains. Frone and Tidwell (2015) developed the Three-Dimensional Work Fatigue Inventory to capture these domains. Fatigue should reduce engagement because tired employees have fewer resources for attention, enthusiasm, and sustained effort. Work engagement involves cognitive, emotional, and physical investment in work (Kuok & Taormina, 2017). When fatigue is high, employees may find it harder to remain involved and energetic at work.

*H2: Work fatigue is negatively related to work engagement.*

The same strain mechanism may also explain how digital overload sources relate to work engagement. Whether overload comes from excessive information, complex system features, or constant communication, employees must spend additional cognitive and emotional resources to keep up. Work fatigue captures this strain, and higher fatigue should make engagement harder to sustain. This study therefore expects work fatigue to mediate the relationships between the three overload sources and work engagement.

*H3: Work fatigue mediates the relationships between information overload, system feature overload, communication overload, and work engagement.*

*RQ1: Which digital overload source has the strongest association with work fatigue?*

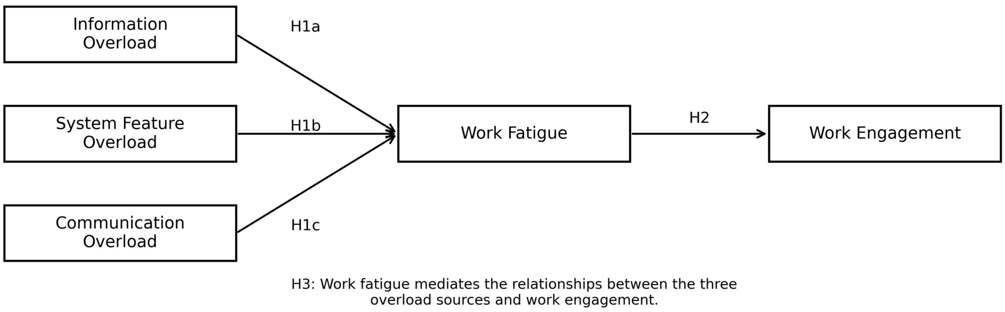


Figure 1 Conceptual model

## 3 Method

Participants and procedure. The study used three-wave matched survey data from employees in information-intensive Chinese organizations. The matched sample contained 438 cases before quality screening. After removing 72 cases with unreasonable response patterns, 366 valid cases remained for hypothesis testing. Wave 1 measured information overload, system feature overload, communication overload, and demographic controls. Wave 2 measured work fatigue. Wave 3 measured work engagement.

Sample profile. In the final analytic sample, 229 respondents were in gender category 1, and 137 were in gender category 2 under the original coding scheme. Respondents were 19 to 63 years old, with a mean age of 36.74 years (SD = 8.45). For education, 17 respondents were coded as category 2, 78 as category 3, 192 as category 4, and 79 as category 5. Average organizational tenure was 7.29 years (SD = 7.60).

Quality screening. Quality screening was based on response behavior and was independent of the substantive results. Screening was conducted using 47 core items from the three overload scales, the work fatigue scale, and the work engagement scale. Cases were removed if the standard deviation across these items was below .50, if all 47 items had the same response value, or if there were 30 or more consecutive identical responses. The overlap-allowed flag counts were 56 low-variation cases, 22 all-same cases, and 59 longstring cases.

Measures. Information overload, system feature overload, and communication overload were measured using items adapted from Karr-Wisniewski and Lu (2010). Information overload was measured with three items, system feature overload with four items, and communication overload with four items. Work fatigue was measured using the 18-item Three-Dimensional Work Fatigue Inventory (Frone & Tidwell, 2015), covering physical, mental, and emotional fatigue. The original fatigue response options were reverse ordered; therefore, items were reverse coded before averaging, using the transformation 6 minus the raw response. Higher scores indicate greater fatigue. Work engagement was measured using the 18-item inventory developed by Kuok and Taormina (2017), covering physical, emotional, and cognitive engagement. Gender, age, education, and industry were included as control variables.

Analytical strategy. Reliabilities, descriptive statistics, and correlations were first calculated. Confirmatory factor analysis was then conducted to assess the measurement model. The three overload constructs were represented by their original items, while work fatigue and work engagement were represented by their three-dimensional scores. Regression models tested the paths from the three overload sources to work fatigue and from work fatigue to work engagement. Indirect effects were estimated using 5,000 bootstrap samples. Relative importance analysis compared the contribution of each overload source in predicting work fatigue beyond the control variables.

## 4 Results

**Measurement quality.** The five-factor measurement model showed good fit to the data: chi-square = 167.464, df = 109, CFI = .981, TLI = .977, and RMSEA = .038. Internal consistency was acceptable to high. Cronbach's alpha was .757 for information overload, .805 for system feature overload, .724 for communication overload, .974 for work fatigue, and .961 for work engagement.

**Descriptive statistics and correlations.** Table 1 reports descriptive statistics, reliabilities, and correlations. The three overload dimensions were moderately to strongly correlated. Work fatigue was positively correlated with all three overload sources and negatively correlated with work engagement. These bivariate associations are consistent with the expected stressor-strain-outcome logic.

**Table 1 Descriptive statistics, reliabilities, and correlations**

| Variable | Mean | SD | Alpha | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|
| 1. Information overload | 3.245 | 0.771 | .757 | - | | | | |
| 2. System feature overload | 3.237 | 0.766 | .805 | .606*** | - | | | |
| 3. Communication overload | 3.346 | 0.724 | .724 | .504*** | .564*** | - | | |
| 4. Work fatigue | 2.847 | 0.971 | .974 | .181*** | .122* | .178*** | - | |
| 5. Work engagement | 4.042 | 0.519 | .961 | .094+ | .102+ | .052 | -.121* | - |

Note. N = 366. WFI scores were reverse transformed so that higher scores indicate greater work fatigue. + $p < .10$, * $p < .05$, *** $p < .001$.

**Hypothesis testing.** Table 2 reports the regression results. Information overload was positively associated with work fatigue (b = .182, SE = .083, p = .029), supporting H1a. System feature overload was not significantly associated with work fatigue (b = -.025, SE = .087, p = .777), so H1b was not supported. Communication overload was positively associated with work fatigue (b = .178, SE = .085, p = .036), supporting H1c. Work fatigue was negatively associated with work engagement (b = -.084, SE = .029, p = .004), supporting H2. The direct paths from the overload sources to work engagement were not significant after work fatigue and the control variables were included.

**Table 2 Regression results for hypothesis testing**

| Outcome | Predictor | b | SE | p | Decision |
|---|---|---|---|---|---|
| Work fatigue | Information overload | .182 | .083 | .029 | Supported |
| | System feature overload | -.025 | .087 | .777 | Not supported |
| | Communication overload | .178 | .085 | .036 | Supported |
| | Model R2 | .094 | | | |
| Work engagement | Information overload | .058 | .046 | .211 | Direct path n.s. |
| | System feature overload | .050 | .048 | .294 | Direct path n.s. |
| | Communication overload | -.004 | .047 | .938 | Direct path n.s. |
| | Work fatigue | -.084 | .029 | .004 | Supported |
| | Model R2 | .038 | | | |

Note. Gender, age, education, and industry were included as controls.

**Mediation and relative importance.** Table 3 reports the bootstrap indirect effects. The indirect effect of information overload on work engagement through work fatigue was negative and significant, estimate = -.015, 95% CI [-.035, -.001]. The indirect effect of communication overload was also negative and significant, estimate = -.015, 95% CI [-.037, -.001]. The indirect effect of system feature overload was not significant, estimate = .002, 95% CI [-.014, .020]. H3 was therefore partially supported. Relative importance analysis for RQ1 indicated that information overload accounted for 44.5% of the focal explained variance in work fatigue, communication overload accounted for 41.6%, and system feature overload accounted for 13.9%. Information overload was the largest contributor, followed closely by communication overload.

**Table 3 Bootstrap indirect effects and relative importance**

| Path or comparison | Estimate | Boot SE | 95% CI | Result |
|---|---|---|---|---|
| Information overload -> work fatigue -> work engagement | -.015 | .009 | [-.035, -.001] | Supported |
| System feature overload -> work fatigue -> work engagement | .002 | .008 | [-.014, .020] | Not supported |
| Communication overload -> work fatigue -> work engagement | -.015 | .009 | [-.037, -.001] | Supported |
| Relative importance: IO | 0.023 R2 | | 44.5% of focal R2 | |
| Relative importance: CO | 0.021 R2 | | 41.6% of focal R2 | |
| Relative importance: SO | 0.007 R2 | | 13.9% of focal R2 | |

Note. Bootstrap confidence intervals are based on 5,000 resamples. Relative importance values refer to focal explained variance in work fatigue beyond controls.

## 5 Discussion

This study tested a source-specific account of technology overload. The findings support the central stressor-strain-outcome logic, while also showing why the source of overload matters. Information overload and communication overload were associated with greater work fatigue, and work fatigue was associated with lower work engagement. System feature overload did not show the same fatigue path in the final model. This pattern is consistent with technostress research showing that technology-related demands can create strain and shape work outcomes (Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2015). It also extends work that distinguishes information overload, communication overload, and system feature overload as related but separable sources of digital strain (Karr-Wisniewski & Lu, 2010; Marsh et al., 2024).

The result for information overload is consistent with the idea that employees pay an energy cost when they must sort, evaluate, and integrate excessive information. Information systems can increase access to useful data, but access alone does not make information easy to use. When information is excessive, repetitive, or poorly filtered, employees may experience information processing as an additional layer of work.

The result of communication overload is also notable. Digital communication can support coordination, but it can also fragment attention. Messages, meetings, and notifications may create a sense that work remains open to interruption. In the present data, this communication burden was linked to work fatigue, and fatigue in turn was associated with lower work engagement. This finding suggests that digital workload management should pay close attention not only to information quantity but also to communication norms and interruption patterns.

System feature overload was not a significant predictor of work fatigue once the other overload sources and controls were included. One interpretation is that employees may learn to avoid unnecessary functions, whereas incoming information and communication demands are harder to ignore. Another possibility is contextual: in this sample, the volume of information and communication may have been more visible than the complexity of system features. Prior research suggests that technology characteristics and system complexity can contribute to strain, but their effects may depend on how central these features are to employees' tasks and whether users can bypass or adapt to them (Ayyagari et al., 2011; Karr-Wisniewski & Lu, 2010).

The findings offer several theoretical implications. They first support the value of separating digital overload sources. A single technology overload score would have hidden the difference between information and communication overload on one side and system feature overload on the other. The findings also connect technostress research with work fatigue as a strain mechanism. The Three-Dimensional Work Fatigue Inventory captures physical, mental, and emotional fatigue, which fits the possibility that digital work can drain employees across domains (Frone & Tidwell, 2015). Finally, the results show that work engagement may be affected indirectly. The direct overload-engagement paths were not significant, but work fatigue carried the effects of information overload and communication overload.

The comparison between information overload and communication overload is especially relevant for project-oriented digital work. Project teams often depend on rapid information exchange, status updates, document circulation, and cross-functional coordination. These practices are valuable, but they also increase the number of information objects and communication requests that employees must monitor. The present findings suggest that fatigue may arise less from the existence of digital systems themselves and more from the way information and communication are organized around work tasks.

**The findings also have practical implications.** Digital workload management should begin with diagnosis. If employees are fatigued because they receive too much information, managers should reduce duplicated reporting, clarify information ownership, and improve filtering rules. If communication overload is the main concern, organizations should examine meeting routines, notification practices, response-time expectations, and channel discipline. If system feature overload is salient in another context, the response should focus on interface simplification, feature governance, task-based training, and better alignment between software functions and actual work.

From a project-management perspective, these findings suggest that digital workload should be treated as a coordination design issue, not only as an individual coping problem. In many project settings, employees work across multiple platforms, receive frequent status updates, and manage overlapping communication channels. These arrangements are often introduced to improve transparency and responsiveness, but they may also increase the amount of information that project members must process. Overload diagnosis can therefore become part of routine project governance.

Review meetings, for example, may examine whether dashboards, reports, and message channels still serve decision needs or have become sources of unnecessary monitoring work.

The findings also point to several concrete practices. Project dashboards should distinguish information that requires action from information that is only for awareness. Communication channels should have clear purposes, so task decisions, routine updates, urgent issues, and archival documents do not compete in the same stream. Teams may also benefit from agreed response windows and meeting rules, especially in multi-project environments where employees move across several digital workspaces. These practices do not remove digital tools from project work. They make the tools less likely to become additional sources of fatigue.

Table 4 summarizes these implications by overload source. The table is intended as a diagnostic guide rather than a universal prescription: managers should first identify the dominant overload source and then choose the intervention that matches it.

**Table 4 Project-management implications by overload source**

| Overload source | Typical project-work symptom | Evidence in this study | Suggested management response |
|---|---|---|---|
| Information overload | Excess reports, files, dashboards, or updates | Significant path; largest contribution | Reduce duplicate reporting; separate action-required from awareness-only information |
| Communication overload | Frequent messages, meetings, and notifications | Significant indirect effect | Set channel purposes, response windows, and meeting rules |
| System feature overload | Functions or workflows exceed task needs | No significant fatigue path | Simplify defaults; use task-based training and tool reviews |

This study has several limitations. It used self-report survey data, so response style and common method concerns cannot be fully ruled out, although the variables were collected across waves, and low-quality response patterns were removed (Podsakoff et al., 2003). The sample came from Chinese organizations, which may limit generalizability to other cultural or occupational settings. Future studies could combine surveys with digital trace data, such as message volume, meeting load, dashboard use, or application switching. Later work could also examine boundary conditions, including job autonomy, digital literacy, team norms, and after-hours connectivity.

## 6 Conclusion

Digital workload management requires more than a general warning about technostress. In this study, information overload and communication overload increased work fatigue, and fatigue reduced work engagement. System feature overload did not show a significant fatigue path in the final model. The findings suggest that effective intervention begins with diagnosis: organizations need to identify the kind of digital load employees are carrying before deciding how to respond. For project managers, this means treating information flow, communication rhythm, and tool complexity as separate design choices in digital project coordination. Too much information, too much communication, and too many system features are related problems, but they are not the same problem.

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