Article Title

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Abstract

This study introduces a comprehensive framework for assessing organizational mental health and wellbeing, combining micro-level analyses of communication patterns—extracted via natural language processing of messages and conversations—with macro-level evaluations of cognitive profiles and team dynamics. By integrating contextual factors such as stress levels and workload, this approach produces a Corporate Wellbeing Metric (CWM) that quantitatively reflects the mental health climate within the organization. The resulting sociometric visualization empowers leaders to detect underlying mental health challenges, guide targeted interventions, and strengthen corporate culture and productivity, advancing research in organizational wellbeing.

Keywords: Workplace Mental Health, Communication Analysis, Sociometric Analysis, Corporate Wellness Metrics, Sentiment Analysis, Natural Language Processing (NLP)

1 Introduction: The Critical Role of Mental Health in Corporate Success and Organizational Sustainability

In today's rapidly evolving corporate landscape, employee mental health has emerged as a crucial determinant of organizational success, yet it remains one of the most

challenging aspects to measure and manage effectively. The World Health Organization (WHO) estimates that depression and anxiety disorders cost the global economy 1 trillion US$ each year in lost productivity, highlighting the substantial economic impact of mental health in the workplace (WHO, 2022).

A healthy work environment, as defined by the American Psychological Association (APA), encompasses not only physical safety but also psychological safety, characterized by open communication, supportive leadership, reasonable workload management, and clear role expectations. In contrast, an unhealthy work environment often manifests through excessive stress, poor communication, unclear expectations, and lack of support mechanisms, leading to what Maslach and Leiter (2016) term as "organizational burnout."

Stansfeld and Candy's meta-analytic review (2006) significantly contributed to our understanding of the relationship between psychosocial work characteristics and mental health outcomes. Their research identified key workplace stressors, including high job demands combined with low decision latitude, effort-reward imbalance, and social support deficiency, as significant predictors of common mental disorders. This foundational work emphasizes the critical need for comprehensive measurement tools that can capture these complex dynamics.

Recent studies have further reinforced these findings. Harvey et al. (2017) demonstrated that workplace mental health interventions could yield a return on investment of 4:1, while Dimoff and Kelloway's research (2019) highlighted how leadership behaviors directly influence employee mental health outcomes. Despite these insights, organizations often struggle to implement effective mental health strategies due to the lack of quantifiable metrics and comprehensive assessment tools.

The modern workplace presents unique challenges to mental health:

Digital Transformation:

- Increased connectivity leading to work-life boundary erosion
- Information overload and digital fatigue
- Remote work isolation and communication challenges

Organizational Dynamics:

- Complex matrix structures affecting role clarity
- Cross-cultural communication demands
- Rapid change and adaptation requirements

Performance Pressures:

- CGlobal competition intensification
- Continuous productivity demands
- Career development uncertainties

This study addresses these challenges by proposing a novel framework that integrates multiple dimensions of workplace mental health assessment. By combining micro-level communication analysis with macro-level organizational dynamics, we aim to create a quantifiable metric that can guide targeted interventions and policy development.

The significance of this research lies in its potential to:

- Provide early detection of mental health challenges before they escalate
- Enable data-driven decision-making in workplace wellness initiatives
- Foster a more supportive and productive organizational culture Reduce the economic burden of mental health-related productivity losses

As organizations continue to evolve in response to global challenges, the need for sophisticated mental health assessment tools becomes increasingly critical. This research contributes to this growing need by offering a comprehensive framework that bridges the gap between theoretical understanding and practical application in workplace mental health management.

Through the development of the Corporate Wellbeing Metric (CWM), this study aims to transform how organizations approach mental health assessment and intervention, ultimately contributing to both employee wellbeing and organizational success. The following sections detail our methodology, findings, and recommendations for implementing this framework in various corporate settings.

2 Quantifying Organizational Health: From Traditional Metrics to Digital Communication Analysis

The measurement of organizational health has traditionally relied on a set of established metrics that, while valuable, may no longer capture the full complexity of modern workplace dynamics. Historical approaches to quantifying workplace health have centered around three primary categories: turnover metrics, attendance patterns, and performance indicators.

Turnover metrics have long served as a fundamental measure of organizational health, with voluntary turnover rates and department-specific attrition providing insights into employee satisfaction and organizational stability. The cost of replacement and key talent retention rates further illuminate the financial implications of workforce instability. However, as Hom et al. (2017) note, these metrics often serve as lagging indicators, revealing issues only after they've become significant problems.

Attendance patterns, including absenteeism rates and sick leave frequency, have traditionally provided another lens through which to view organizational health. Research by Johns (2010) demonstrates that these patterns can indicate underlying organizational health issues, yet they often fail to reveal root causes. The analysis of

leave duration trends and specific absence patterns (such as Monday/Friday absences) adds depth to this understanding but still provides an incomplete picture.

Performance indicators, including productivity metrics, goal achievement rates, and customer satisfaction measures, form the third pillar of traditional organizational health assessment. While these measures offer quantifiable data points, Kaplan Norton (2004) argue that they often fail to capture the human element of organizational health and the nuanced dynamics of workplace relationships.

The limitations of these traditional approaches have become increasingly apparent in our modern work environment. Their reactive nature means issues are often identified only after manifestation, limiting predictive capability and delaying intervention opportunities. Furthermore, these metrics provide only surface-level understanding, missing underlying causes and team dynamics. Perhaps most critically, they fail to reflect modern work patterns, particularly in the context of remote and hybrid work arrangements.

The digital communication revolution has transformed how we work and interact, necessitating a fundamental shift in how we measure organizational health. Modern workplace communications provide rich data sources that were previously unavailable. Digital interaction patterns, including email frequency, message sentiment, and response times, offer unprecedented insight into organizational dynamics. The analysis of collaboration platform usage, virtual meeting participation, and document collaboration patterns provides a more comprehensive view of how work actually gets done in modern organizations.

3 Problematic: The Complex Dynamics of Professional Communication

In professional environments, the traditional tripartite classification of sentiments (positive, negative, neutral) proves inadequate for capturing the nuanced dynamics of workplace communications. This oversimplification fails to account for the complex interplay of professional relationships, hierarchical structures, and organizational culture that characterize corporate communications.

Corporate communication requires a more sophisticated sentiment taxonomy that reflects workplace realities. Research by Thompson and Van der Merwe (2020) suggests that professional communications often exhibit complex emotional undercurrents that don't fit neatly into basic sentiment categories. For instance, a message might be professionally assertive while maintaining emotional neutrality, or demonstrate constructive criticism while expressing concern.

Moreover, the problem extends beyond mere sentiment classification. Individual communications in professional settings serve as windows into broader cognitive and behavioral patterns, yet current analytical frameworks lack the sophistication to map these individual communication patterns into meaningful cognitive profiles. The

challenge here is twofold: first, in developing a classification system that accurately reflects the nuances of professional communication, and second, in creating a methodology that can reliably translate these classifications into meaningful insights about individual cognitive approaches to professional interaction.

The complexity compounds when considering the hierarchical nature of organizational structures. Individual cognitive patterns, derived from communication analysis, must somehow be aggregated and interpreted at team and organizational levels without losing the nuanced insights that make them valuable. This scaling problem presents a significant methodological challenge: how can individual-level insights be meaningfully projected onto higher organizational levels while maintaining their practical utility and theoretical validity?

Another critical aspect of the problem lies in the temporal dimension of professional communications. Unlike static analysis, workplace interactions evolve over time, influenced by changing roles, organizational dynamics, and external pressures. Current analytical frameworks struggle to capture these temporal patterns and their implications for individual and organizational health. This temporal challenge is particularly relevant in modern workplace settings, where rapid changes in organizational structure and working conditions can significantly impact communication patterns and mental health.

4 Theoretical Framework: A Multi-dimensional Approach to Professional Communication Analysis

4.1 Setting the Foundation: Enhanced Sentiment Classification

Moving beyond traditional sentiment analysis, we propose a refined ten-class system specifically designed for professional communications. These classes are derived from extensive analysis of workplace interaction patterns and organizational behavior research:

1. Professional: Demonstrates competence, expertise, and adherence to workplace standards
2. Assertive: Shows direct, confident communication and decision-making abilities
3. Constructive: Contributes positively to team dynamics and project outcomes
4. Enthusiastic: Displays high energy and positive engagement in work activities
5. Critical: Exhibits analytical thinking and evaluative judgment
6. Passive-Aggressive: Shows indirect resistance or opposition to demands/requests
7. Defensive: Demonstrates protective reactions to perceived challenges or criticism
8. Neutral: Maintains an unbiased, moderate stance in workplace interactions
9. Frustrated: Exhibits signs of dissatisfaction or impediment in work progress
10. Supportive: Provides assistance and encouragement to team members

4.2 Miniature Corporate Environment Design

To test and validate our framework, we constructed a hypothetical corporate setting consisting of 20 employees across six teams: Core Leadership, Project Alpha, Project Beta, Project Gamma, Operations Support, and Technical Support. Each employee is assigned a primary cognitive profile based on their communication patterns across the ten sentiment classes.

4.3 Sociometric Analysis Framework

Sociometric analysis, pioneered by Jacob Moreno in the 1930s, represents a quantitative method for measuring social relationships. This methodology examines interpersonal relations through mathematical and experimental techniques, providing insights into group dynamics and social structures.

The framework begins with sociogram visualization, serving as a graphical representation of social links where individuals appear as nodes and relationships as edges. Modern adaptations utilize advanced network visualization tools such as NodeXL, Gephi, or R's igraph package for complex organizational analysis.

The fundamental metrics encompass several key measurements. Sociometric status measures an individual's relative position within the group, while the mutual choice index quantifies reciprocity in relationships. The cohesion index evaluates group solidarity, and the isolation index identifies marginalized individuals. Network density provides an assessment of overall connectedness within the system.

This analysis examines two fundamental theories - Granovetter's Strength of Ties and Moreno's Classical Sociometry - while proposing a modern quantitative framework for relationship assessment.

4.3.1 A Critical Analysis of Classical Theories and Modern Quantitative Approaches

Granovetter's theory: introduced in 1973, distinguishes between strong and weak ties in social networks. In corporate settings, strong ties represent close colleagues with frequent interactions, characterized by deep trust, shared understanding, and high emotional investment, typically within similar departmental or functional areas. Conversely, weak ties manifest as cross-departmental connections with occasional professional interactions, serving to bridge different organizational silos and provide access to diverse information and resources.

The corporate application of Granovetter's theory suggests that while strong ties foster team cohesion, weak ties are often more valuable for innovation and career advancement. This paradox is particularly relevant in matrix organizations where cross-functional collaboration is essential. However, the theory's binary classification (strong/weak) oversimplifies complex workplace relationships and fails to account for modern digital interactions and remote work dynamics.

Moreno's sociometry: introduced in 2009, examines social structures through relationship patterns and preferences. In corporate settings, this manifests through key elements such as the social atom (individual employee's relationship network), sociometric status (employee's influence within the organization), and tele (mutual attraction or repulsion between colleagues).

The corporate application helps identify informal leaders, communication bottlenecks, and team dynamics, proving valuable for team formation, project assignment, conflict resolution, and leadership development. Despite its groundbreaking nature, the theory lacks quantitative precision and doesn't account for modern organizational complexity.

4.3.2 Proposed Quantitative Framework

The proposed Relationship Health Score (RHS) addresses these limitations through a multi-dimensional analysis:

$$\text{RHS} = 0.35 \cdot \text{CPC} + 0.20 \cdot \text{HD} + 0.25 \cdot \text{TCI} + 0.20 \cdot \text{HIS} \tag{1}$$

Where:

$$\begin{aligned} \text{CPC} &= \text{Cognitive Profile Compatibility} \\ \text{HD} &= \text{Hierarchical Distance} \\ \text{TCI} &= \text{Team Cohesion \& Interdependence} \\ \text{HIS} &= \text{Historical Interaction Success} \end{aligned}$$

Advantages

- **Quantifiable metrics:** Provides a measurable assessment of relationship health.
- **Weighted importance:** Reflects the relative significance of each component.
- **Multi-dimensional analysis:** Incorporates diverse factors affecting relationship dynamics.
- **Actionable insights:** Enables targeted interventions and strategic team-building initiatives.

Sample calculation:

For example, consider the relationship between **Ahmad Al-Rashid (AR)** and **Michael Anderson (MA)**, calculated as follows:

Cognitive Profile Breakdown

- **AR:** Assertive (60%), Professional (25%), Critical (15%)
- **MA:** Constructive (50%), Professional (30%), Enthusiastic (20%)

Rationale for key relationships:

Strong Positive Complementary (+4/+5):

Constructive Supportive (+5): Optimal workplace interaction
Professional Constructive (+4): Effective problem-solving combination
Enthusiastic Supportive (+4): Creates positive work environment
Professional Professional (+4): Consistent communication style

Strong Negative Conflicts (-4/-5):

Passive-Aggressive Constructive (-5): Fundamentally opposing approaches
Passive-Aggressive Assertive (-4): Creates communication barriers
Frustrated Enthusiastic (-4): Clashing energy levels
Passive-Aggressive Supportive (-4): Undermines positive interactions

Neutral Relations (0/±1):

Neutral Assertive (0): Neither helps nor hinders
Neutral Defensive (0): Minimal interaction impact
Critical Professional (-1): Slight tension but manageable

Style Compatibility Calculation

The compatibility score between the two profiles is computed based on the weighted alignment of their cognitive styles:

$$\begin{aligned}
\text{Assertive vs Constructive} &: +3 \times (0.60 \times 0.50) = +0.90 \\
\text{Assertive vs Professional} &: +2 \times (0.60 \times 0.30) = +0.36 \\
\text{Assertive vs Enthusiastic} &: +1 \times (0.60 \times 0.20) = +0.12 \\
\text{Professional vs Constructive} &: +4 \times (0.25 \times 0.50) = +0.50 \\
\text{Professional vs Professional} &: +4 \times (0.25 \times 0.30) = +0.30 \\
\text{Professional vs Enthusiastic} &: +2 \times (0.25 \times 0.20) = +0.10 \\
\text{Critical vs Constructive} &: -2 \times (0.15 \times 0.50) = -0.15 \\
\text{Critical vs Professional} &: -1 \times (0.15 \times 0.30) = -0.045 \\
\text{Critical vs Enthusiastic} &: -3 \times (0.15 \times 0.20) = -0.09
\end{aligned}$$

Total Compatibility Score = +1.945 (normalized to a 0-100 scale) = 78 points.

When weighted by the CPC's 35% significance in the RHS framework, the score contributes **27.3 points** to the final RHS.

4.3.3 Integrating Sociometric Metrics into RHS

The RHS framework also incorporates sociometric principles through additional dimensions:

- **Hierarchical Distance (HD):** Evaluates positional alignment within the organizational hierarchy. For AR and MA, sharing the same leadership level results in **100 points**, contributing **20 weighted points**.
- **Team Cohesion & Interdependence (TCI):** Measures collaborative potential based on communication frequency and shared responsibilities. With high scores across these metrics, AR and MA achieve an average of **90 points**, contributing **22.5 weighted points**.
- **Historical Interaction Success (HIS):** Captures the quality of prior collaborations, adding **85 points**, weighted to **17 points**.

4.3.4 Final Relationship Health Score

By combining all dimensions, the final **RHS** for AR and MA is:

$$\text{RHS} = 27.3 + 20 + 22.5 + 17 = 86.8$$

This score, falling within the **85+ range**, indicates a very strong working relationship, reflecting high compatibility and collaborative potential.

From Metrics to Actionable Insights

Applying the RHS framework across all employees generates a comprehensive **Relationship Health Matrix**, visualizing scores between 0-100 for every relationship:

- **Scores of 85+:** Very strong relationships, ideal for high-stakes collaboration.
- **Scores between 75-84:** Healthy relationships, suitable for routine teamwork.
- **Scores below 75:** Relationships requiring improvement through targeted interventions.

The sample calculation demonstrates the framework's ability to provide precise relationship health assessments, enabling targeted interventions and strategic team building.

While Granovetter and Moreno provided valuable foundational insights, modern organizational complexity requires more sophisticated analytical tools. The proposed RHS framework builds upon these classical theories while adding quantitative rigor and contemporary relevance.