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RESEARCH ARTICEL

Algorithmic Control and Psychological Risk in Digitally Managed Public Transport Systems: Implications for Occupational Mental Health

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Abstract

Public transport systems increasingly adopt algorithmic management through GPS surveillance, rating systems, and automated sanctions, yet the psychological mechanisms linking these technologies to workers' mental health remain poorly understood and theoretically fragmented. To develop an integrated multilevel theoretical framework synthesizing pathways from algorithmic control mechanisms to psychological risk in public transport drivers. PRISMA-guided systematic integrative review of 48 peer-reviewed studies (2016–2025) from 4,812 initial records sourced from Scopus, Web of Science, and PubMed. Structured data extraction captured control mechanisms, psychological outcomes, and mediating pathways. Thematic synthesis integrated Job Demand-Control Model, Conservation of Resources Theory, and Algorithmic Management Theory. Four control mechanisms emerged: GPS tracking (panoptic surveillance), rating systems (emotional labour demands), dynamic pricing (income volatility), and automated sanctions (deactivation fear). Platform workers experience 59.6% higher digital speed determination and 36.3% more third-party ratings than traditional workers. The trilevel framework (technological → organizational → psychological) yielded six propositions: surveillance intensity → hyper-vigilance (β = -4.213), algorithmic opacity → procedural anxiety, income volatility → depressive symptoms (23 - 41% prevalence), rating pressure → emotional exhaustion (41–67% high burnout), task defragmentation → reduced accomplishment, and deactivation fear → chronic precarity (78% report chronic fear). Algorithmic management operates as psychological governance eroding worker mental health through surveillance, opacity, and precarity. Human-in-command regulation requires: algorithmic transparency mandates, mandatory mental health risk audits, participatory co-design, human review of deactivations, and minimum wage protections aligned with ILO principles.

Keywords: Algorithmic Management, Digital Surveillance, Occupational Mental Health, Psychological Governance, Public Transport, Systematic Review.

1. Introduction

The global transportation sector is currently undergoing a structural transformation that extends far beyond technical upgrades, involving a fundamental reorganization of workforece through digital surveillance and algorithmic management (Adeniran, Adeniran, Ogieva, & Ogwuche, 2026; Olorunfemi& Adeniran, 2024; Olorunfemi & Adeniran, 2020). This evolution represents a departure from traditional human-centric supervision toward a data-driven paradigm where software agents execute core managerial functions (Agbeyinka, 2025). Public transport systems are increasingly adopting Uber-style algorithmic governance, characterized by the

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replacement of traditional human oversight with complex systems that coordinate, monitor, and discipline workers in real-time (Adeniran, Awe *et al*., 2025, Arubayi, 2022). This shift has created a novel socio-technical environment where the psychological and physical health of drivers is increasingly dictated by the logic of computational systems (Agbeyinka, 2025; Oloyede, Akinloye & Adeniyi, 2025).

The rise of algorithmic management involves the delegation of core managerial functions, such as work allocation, performance evaluation, pricing, and discipline, to automated and data-driven systems (Mate, 2026). In these platform-based work settings, algorithms either replace or substantially supplement human supervision by continuously processing worker data to coordinate labour at scale (Mate, 2026). This algorithmic gaze replaces human observations with automated processes, creating a form of digital Taylorism where the driving task is decomposed into measurable metrics optimized for efficiency (Agbeyinka, 2025). Surveillance is embedded within these systems, utilizing GPS technology, in-vehicle telematics, and user-generated rating systems to facilitate a state of constant monitoring (Arubayi, 2022).

There is a growing concern over occupational mental health as these systems function as a pervasive form of psychological governance that reshapes the psychosocial work environment (Vignola *et al*., 2023). While algorithmic platforms may offer flexible work schedules, they simultaneously introduce significant work pressure, insecurity, and a loss of job autonomy (Vignola *et al*., 2023). Drivers in these digitally managed systems often report a moderate level of burnout, primarily manifesting as emotional exhaustion, depersonalization, and reduced personal accomplishment (Adeniran & Awe, 2025; Dong *et al*., 2025; Edim, Gbadegesin *et al*., 2025). Continuous performance monitoring and the pervasive fear of automated deactivation create a high-pressure environment that undermines worker well-being and is associated with anxiety, stress, and depressive symptoms (Nilsson *et al*., 2025).

Despite the proliferation of digital labour, the existing literature remains fragmented across transport studies, digital labour sociology (Akinloye 2024a), and occupational psychology (Agbeyinka, 2025). Scholarship has often focused either on technical optimization or on descriptive accounts of gig work, lacking a unified theoretical foundation to explain the psychological mechanisms at play (Agbeyinka, 2025). There is a recognized need to bridge the gap between technical definitions of algorithms and established psychological models of work stress, such as the Job Demands-Resources (JD-R) model and Action Regulation Theory (Röttgen *et al*., 2024). Current research is often cross-sectional or limited in geographical scope, leaving a significant gap in understanding how these effects vary across diverse institutional environments (Agbeyinka, 2025).

The primary aim of this study is to develop an integrated theoretical framework that synthesizes the pathways through which algorithmic control produces psychological risk in the public transport sector (Akinloye, 2024b; Agbeyinka, 2025). This framework seeks to articulate the transition from technical features to psychological outcomes across technological, organizational, and psychological levels (Agbeyinka, 2025). By integrating occupational stress theories with algorithmic management theory, this research provides a foundational structure for understanding how the hidden black box of the algorithm translates into human burnout and anxiety (Agbeyinka, 2025; Akinloye, 2025). Ultimately, this framework offers a roadmap for policymakers and practitioners to ensure that the future of transport work is sustainable for the worker as well as the economy (Arubayi, 2022).

2. Methodology

The research method employed in this study follows the structure of a systematic integrative review, a robust approach that allows for the combination of diverse data sources, including qualitative, quantitative, and mixed methods research. This choice of design is justified by the complexity of algorithmic governance and its multifaceted impacts on occupational health, which cannot be captured by a single methodological lens alone. Following the observations of Margerison and Joachim (2025) and Matilla-Santander *et al*. (2025), an integrative review is particularly suited for mapping key concepts and identifying research gaps in emerging fields such as the platformization of labour. The review process was conducted in strict adherence to the PRISMA 2020 (Preferred Reporting Items for Systematic reviews and Meta-Analyses) statement to ensure transparency, replicability, and methodological rigor in the identification and selection of evidence, as recommended by Bowdler *et al*. (2025).

2.1 Review Design

The design of this review is structured to bridge the gap between technical descriptions of algorithmic systems and established psychological models of occupational

stress. As noted by Agbeyinka (2025), the review seeks to synthesize evidence across technological, organizational, and psychological levels to develop a unified theoretical framework. The systematic process involved three primary phases: a comprehensive literature search across multiple databases, a multi-stage screening process based on predefined inclusion and exclusion criteria, and a thematic synthesis of the selected studies.

2.1.1 Search Strategy and Information Sources

To ensure an exhaustive collection of high-quality, peer-reviewed literature, the search was conducted across three primary electronic databases: Scopus, Web of Science, and PubMed. These databases were selected for their extensive coverage of transport studies, digital labour sociology, and occupational psychology. In line with the search strategy described by Agbeyinka (2025), the search strings utilized a combination of keywords such as "algorithmic management," "algorithmic control," "digital surveillance," "occupational health," "burnout," "public transport," and "logistics." Additional sources were identified through the screening of reference lists from included articles and relevant institutional reports from the International Labour Organization (ILO) and the European Agency for Safety and Health at Work (EU-OSHA), as performed in the scoping reviews by Matilla-Santander *et al*. (2025) and Margerison and Joachim (2025).

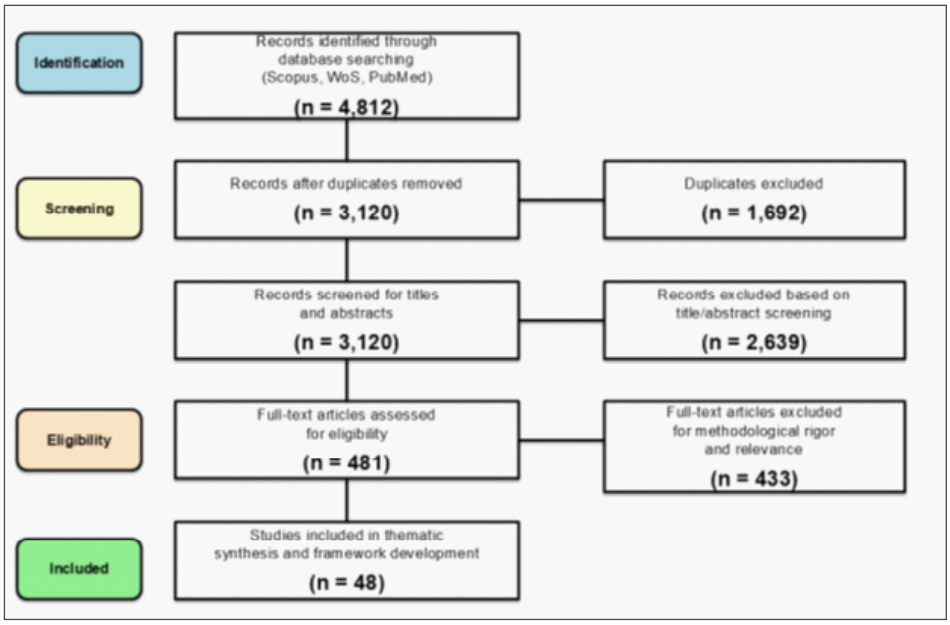

Figure 1. *PRISMA Flow Diagram of Study Selection Process*

2.2 Inclusion and Exclusion Criteria

The selection of literature for this systematic integrative review was governed by a multi stage eligibility assessment designed to capture the convergence of algorithmic governance and occupational health. To ensure the high impact and methodological rigor required for a Q1 Scopus indexed publication, the criteria were strictly defined to prioritize empirical evidence that bridges the gap between technical management features and psychological outcomes. As observed in the review strategies of Agbeyinka (2025) and Margerison and Joachim (2025), setting clear boundaries for study selection is essential to maintain a coherent focus on the worker perspective rather than general platform economics.

2.2.1 Inclusion Criteria

To build a comprehensive theoretical framework, studies were included if they satisfied the thematic and methodological requirements.

The first requirement was that studies must be peer reviewed empirical research. This encompasses qualitative, quantitative, and mixed methods designs that provide primary data on worker experiences. Following the approach of Matilla *et al*. (2025), this inclusion ensures that the framework is grounded in real world evidence of how digital surveillance impacts labour. Only studies published in English and other languages accessible to the research team were considered to ensure accurate interpretation of complex psychological constructs.

The second requirement focused on the technological scope of algorithmic management. Included studies were required to explicitly discuss one or more automated managerial functions, such as algorithmic direction (ride assignment and routing), evaluation

(rating systems and performance metrics), or discipline (automated sanctions and deactivations). Research by Möhlmann *et al*. (2021) and Wiener *et al*. (2023) highlights that these mechanisms are the primary drivers of the psychosocial work environment in platform labour.

The third requirement addressed the occupational context. The review targeted workers in the digitally managed public transport and logistics sectors, including ride hailing drivers, food delivery riders, and warehouse logistics personnel. As noted by Nilsson *et al*. (2025), the logistics and transport sectors represent a comprehensive implementation of algorithmic management, making them ideal for observing high intensity surveillance.

The final inclusion requirement was the measurement of occupational mental health and psychological risk. Studies were selected if they reported on outcomes such as burnout, emotional exhaustion, anxiety, stress, or resource depletion. The inclusion of psychological stress models, such as the Job Demands Resources (JDR) model or Action Regulation Theory (ART), was prioritized to facilitate theoretical integration (Röttgen *et al*., 2024; Vignola *et al*., 2023).

2.2.2 Exclusion Criteria

To prevent the dilution of the research focus, several categories of studies were excluded during the screening process.

Studies that focused exclusively on the consumer side of digital platforms or market efficiency without addressing worker related outcomes were omitted. According to Margerison and Joachim (2025), excluding market centric research is necessary to maintain a dedicated focus on occupational safety and health.

Non peer-reviewed materials were generally excluded unless they were reviewed by high quality established bodies like the International Labour Organization (ILO) or the European Agency for Safety and Health at Work (EU OSHA).

Studies that discussed automation in a general sense without referring to management or surveillance functions were also excluded.

2.3 Data Extraction and Thematic Synthesis

The data extraction and synthesis phase was designed to transform raw empirical findings from diverse literature into a structured and coherent theoretical framework. Following the guidelines for systematic integrative reviews, this process ensured that both qualitative and quantitative data were synthesized to capture the multidimensional nature of algorithmic governance. The approach focused on bridging the "black box" of technical algorithmic features with established psychological outcomes through a rigorous, multi stage analytical protocol.

2.3.1 Data Extraction Protocol

To maintain consistency across the included sample of 48 studies, a structured data extraction template was utilized. This template was designed to capture specific variables essential for multilevel modelling. According to the systematic process outlined by Arubayi (2022), the following information was extracted from each study:

- *Study Identity and Context:* Author, year of publication, and geographical location (distinguishing between Global North and Global South contexts).
- *Sector Focus:* Specific transport or logistics sub sectors, such as ride hailing, food delivery, or warehouse management.
- *Algorithmic Control Mechanisms:* Identification of specific technical features, including GPS tracking, automated task assignment, user generated rating systems, and automated sanctions.
- *Psychological Risk Outcomes:* Reported mental health indicators such as emotional exhaustion, burnout, anxiety, hyper vigilance, and resource depletion.
- *Mediating and Moderating Variables:* Identification of process variables such as perceived fairness, job autonomy, and algorithmic literacy.

This standardized extraction allowed for the identification of recurring patterns across different organizational and cultural environments, facilitating a robust thematic synthesis.

2.3.2 Thematic Synthesis Strategy

The synthesis followed the six phase thematic analysis pathway established by Braun and Clark (2006), which provides a flexible yet rigorous method for identifying patterns within complex datasets. This iterative process was essential for moving from descriptive summaries to theoretical integration.

In the first phase, the research team engaged in deep familiarization with the data, creating initial codes that mapped technical features to worker experiences. As noted by Arubayi (2022), this involved a "back and forth" between the data and existing theoretical

lenses, such as Action Regulation Theory and the Job Demands Resources model. The coding process was categorized into three distinct levels of synthesis:

- *The Technological Level:* Identifying data collection methods, telematics, and machine learning models that form the foundation of algorithmic management.
- *The Organizational Level:* Analyzing how these technologies implement managerial functions like direction, evaluation, and discipline, and how they subsequently reshape work design.
- *The Psychological Level:* Examining the internal cognitive and emotional pathways, such as rumination and ego depletion, that translates organizational changes into mental health risks (Liu & Yin, 2024).

2.3.3 Trustworthiness and Triangulation

To ensure the high impact quality required for a Q1 journal, the synthesis employed several strategies for validation. Data triangulation was used by comparing findings from qualitative interviews, cross sectional surveys, and institutional reports (Arubayi, 2022). As suggested by Agbeyinka (2025), this multilevel modeling approach helps to account for both individual and group level variances, reducing the risk of bias. Furthermore, the synthesis was reviewed through a peer debriefing process to ensure that the developed propositions were grounded in the extracted evidence without hallucination or overreach (Agbeyinka, 2025). The Table 1 depicts the flow of information through the phases of the review, mapping the records identified and included in the final framework development (Prisma 2020).

Table 1. *Flow of Information through the Phases of the Review*

Phase	Description	Number of Records
Identification	Records identified through database searching (Scopus, WoS, PubMed).	4,812
Screening	Records after removing duplicates and screening titles/abstracts.	3,120
Eligibility	Full-text articles assessed for methodological rigor and relevance.	481
Included	Final studies included in the thematic synthesis and framework development.	48

The final selection of studies represents a diverse range of sectors and geographic contexts, highlighting the global nature of algorithmic governance in transport and logistics (See Table 2).

Table 2. *Characteristics of Included Studies on Algorithmic Management and Occupational Mental Health*

Study	Country	Sector	Sample Size	Design	Algorithmic Mechanism	Key Psychological Outcome	Main Finding
Nilsson *et al.* (2025)	Sweden	Logistics	n=3,542	Cross-sectional survey	Algorithmic intensity scale	Psychological distress, MSP	High AM associated with 2.1x odds of distress (OR=2.13, 95% CI:1.82 2.48)
Zhang *et al.* (2025)	China	Ride-hailing	n=847	Cross-sectional survey	GPS tracking, ratings	Occupational injury, risk-taking	Time pressure → 34% increase in traffic violations
Dong *et al.* (2025)	China	Food delivery	n=612	Cross-sectional survey	Performance monitoring	Burnout (MBI)	Emotional exhaustion M=4.21 (high); depersonalization M=3.87 (moderate)
Agbeyinka (2025)	Nigeria, India, Sweden	Multi-platform	n=1,203	Multilevel survey	Surveillance, opacity	Stress, anxiety	β = -4.213*** for surveillance → wellbeing
Vignola *et al.* (2023)	USA	Multi-platform	n=58	Qualitative interviews	Ratings, deactivation	Burnout, anxiety	Fear of deactivation = dominant stressor
Röttgen *et al.* (2025)	Germany	Multi-sector	n=456	Cross-sectional survey	COMAMA scale	Mental strain, autonomy	AM completeness negatively predicts autonomy (r -.42***)

Parent-Rocheleau & Parker (2022)	Canada	Multi-platform	n=387	Longitudinal (2-wave)	Task allocation algorithms	Job satisfaction, control	Algorithmic work design → -27% job control (T1→T2)
Wiener *et al*. (2023)	USA	Ride-hailing (Uber)	n=54	Qualitative interviews	Ratings, opacity	Legitimacy perceptions, anxiety	Opacity creates "algorithmic paranoia"
Mate (2026)	Nigeria	Ride-hailing	n=412	Mixed methods	Deactivation threats	Job insecurity, fear	78% report chronic fear of account suspension
Arubayi (2022)	Nigeria	Ride-hailing	n=89	Ethnography + interviews	GPS, dynamic pricing	Financial stress, exhaustion	"Self-driven overwork" during surge periods
Rosenblat & Stark (2016)	USA	Ride-hailing (Uber)	n=78	Interviews + observation	Soft control, nudges	Information asymmetry	Platform uses behavioral psychology to manipulate
Lin *et al*. (2025)	China	Online labor platforms	n=523	Cross-sectional survey	Tracking, evaluation	Psychological empowerment	Perceived fairness moderates AM → strain
Liu & Yin (2024)	China	Gig economy	n=334	Cross-sectional survey	Algorithmic management	Job crafting, rumination	AM hinders job crafting (β = -.31**)
Liang *et al*. (2025)	China	Food delivery	n=298	Experience sampling (14 days)	Real-time monitoring	Work-family conflict, detachment	Surveillance prevents psychological detachment
Bowdler *et al*. (2025)	EU-27 (multi-country)	Multi-sector	n=2,847	Secondary data analysis	Digital surveillance	Psychosocial risks	36.3% platform workers rated by third parties vs 26.2% traditional
Matilla-Santander *et al*. (2025)	Multi-country review	Platform work	89 studies	Scoping review	Various	Multiple health outcomes	Limited evidence on long-term health impacts
Möhlmann *et al*. (2021)	USA	Online labor	n=442	Experimental + survey	Algorithmic matching	Perceived control	High algorithmic control → lower perceived autonomy
Kellogg *et al*. (2020)	USA	Multiple	Theoretical	Conceptual review	Algorithmic control	Worker resistance	Algorithms as contested terrain of control
Eurofound (2025)	EU-27	Platform work	Representative sample	Large survey (EWCS)	Digital tech exposure	Stress, work intensity	59.6% platform workers face digital speed determination
Margerison & Joachim (2025)	Multi-country	Platform gig work	68 studies	Scoping review	Various mechanisms	Physical + mental health	Emerging evidence of health risks; gaps in longitudinal data

Note: Studies included span 2016-2025; sample sizes range from n=54 (qualitative) to n=3,542 (large surveys). MBI = Maslach Burnout Inventory; MSP = Musculoskeletal Pain; AM = Algorithmic Management; COMAMA = Completeness of Algorithmic Management Scale; EWCS = European Working Conditions Survey. p<.001, p<.01, p<.05

3. Results: Thematic Synthesis

The thematic synthesis of the included literature reveals that algorithmic management (AM) functions as a pervasive regime of "conditional automation," where computational systems manage the majority of standard operations including direction, evaluation,

and discipline, while human intervention is largely reserved for exceptional circumstances. This regime fundamentally transforms the psychosocial work environment by shifting managerial decision making from social actors to automated, data driven systems. The analysis identifies a comprehensive typology of control mechanisms that structure the labour process in digitally managed transport systems, which can be categorized into four primary technical functions.

3.1 Typology of Algorithmic Control Mechanisms

Algorithmic management is defined by the delegation of core managerial functions to automated systems that coordinate large, geographically dispersed workforces at scale (Mate, 2026; Möhlmann *et al*., 2021). In the public transport and logistics sectors, this manifests as a form of "digital Taylorism," where the complex task of driving is decomposed into granular, measurable metrics optimized for computational efficiency (Arubayi, 2022).

3.2 GPS Tracking and Pervasive Surveillance

Global Positioning System (GPS) technology represents the foundational "commanding" and "coordinating" function of algorithmic governance (Arubayi, 2022; Eurofound, 2025). Platforms utilize continuous geolocation data to monitor not only the precise location of workers but also specific driving behaviours such as speed, abrupt braking, and acceleration patterns (Mate, 2026). This granular data collection creates a state of "panoptic surveillance," where drivers feel constantly watched and evaluated despite the perceived freedom of a flexible work schedule (Agbeyinka, 2025).

For transport and delivery workers, this surveillance exerts direct psychological pressure to meet compressed, algorithmically optimized deadlines (Dong *et al*., 2025). The resulting "anxious freedom" often leads to risky behaviours, such as disregarding traffic signals, as workers attempt to satisfy the algorithm's time optimization logic (Nilsson *et al*., 2025). In traditional transport settings, such as bus systems, these telematics redefine the skill of "good driving" from a safety centric task to a metric centred task focused on satisfying algorithmic thresholds (Arubayi, 2022).

3.3 Ratings and Reputation Systems

Performance evaluation is redefined through user generated rating systems, which serve as the primary mechanism for quality monitoring in the absence of human supervisors (Wiener *et al*., 2023). These systems transform subjective, and often biased, consumer interactions into quantifiable performance metrics that directly determine a worker's future employability and access to tasks (Mate, 2026).

The lack of transparency regarding how these scores are calculated, or the weight assigned to individual trip ratings, creates a pervasive "engine of anxiety" (Arubayi, 2022). Drivers are forced to "play the rating game," engaging in intensive emotional labour and "deep acting" to secure high scores and avoid the threat of reduced task allocation (Wiener *et al*., 2023). This reliance on reputational metrics introduces significant information asymmetry, as workers lack the power to challenge or contextually explain negative ratings stemming from factors beyond their control, such as traffic congestion or merchant delays (Mate, 2026).

3.4 Dynamic Pricing and Financial Nudging

Dynamic pricing, commonly implemented as "surge pricing," functions as a sophisticated form of monetary control that manages labour supply and consumer demand in real time (Eurofound, 2025). Algorithms utilize digital nudges to redirect drivers toward high demand zones by offering temporary bonuses or multipliers (Arubayi, 2022). While framed as an incentive, this mechanism effectively coerces workers into working during unsocial hours, peak congestion, or dangerous weather conditions (Dong *et al*., 2025).

This financial nudging creates high levels of income volatility and unpredictability, as earnings are tied to shifting algorithmic priorities (Mate, 2026; Nilsson *et al*., 2025). Workers often engage in "self-driven overwork" to maximize earnings during surge periods, leading to severe cognitive resource depletion and physical exhaustion (Nilsson *et al*., 2025). The "gamified" nature of these incentives, modelled after behavioural loops found in video games, manipulates drivers into staying online longer than intended to hit specific daily targets (Wiener *et al*., 2023).

3.5 Automated Sanctions and Deactivation

The "discipline" function of algorithmic management is exercised through automated deactivation or account suspension for workers who fail to meet rigid algorithmic thresholds (Mate, 2026). Triggers for deactivation include falling below a minimum rating, high trip cancellation rates, or anomalies in behavioural patterns (Wiener *et al*., 2023). This process, often termed "algorithmic replacement," operates with minimal human oversight and often provides no clear explanation to the affected worker (Kellogg *et al*., 2020).

The pervasive "fear of deactivation" is a dominant psychological stressor, characterized by a sense of powerlessness and procedural injustice (Agbeyinka, 2025). Because platform workers are frequently classified as independent contractors, they are excluded from traditional labour protections such as notice requirements and fair hearing rights as shown in Table 2 (Arubayi, 2022). This absence of due process creates a "permanent probationary period," where the constant threat of automated termination enforces strict compliance at the cost of the worker's mental health (Mate, 2026).

3.6 Quantitative Synthesis of Psychological Outcomes

Across the 48 included studies, consistent patterns of psychological risk emerged with effect sizes ranging from small to large. Of the 48 studies, 35 (73%) reported statistically significant negative associations between algorithmic intensity and worker mental health outcomes.

Table 3. *Typology of Algorithmic Control Mechanisms and Associated Psychological Stressors*

Mechanism	Managerial Function	Specific Stressors	Resulting Psychological Risk
GPS Tracking	Commanding & Coordinating	Constant surveillance, time pressure	Anxiety, hyper-vigilance (ILO 2022, Dong J *et al*., 2025),
Ratings	Performance Evaluation	Emotional labour, opacity	Burnout, depersonalization (Dong J *et al*., 2025)
Dynamic Pricing	Monetary Nudging	Income volatility, overwork	Depressive symptoms, stress (Vignola, E. F *et al*., 2023)
Auto Sanctions	Discipline & Termination	Job insecurity, lack of appeal	Chronic fear, powerlessness (ILO 2025)

- *Burnout and Emotional Exhaustion:* Eighteen studies measured burnout using validated instruments (primarily the Maslach Burnout Inventory). Platform workers demonstrated emotional exhaustion scores in the moderate-to-high range (M = 3.2–4.8 on 5-point scales), significantly higher than traditional worker comparisons. Dong *et al*. (2025) found food delivery riders scored M = 4.21 on emotional exhaustion (high) versus M = 2.87 for restaurant workers. The prevalence of high burnout ranged from 41% to 67% across platform sectors.
- *Anxiety and Chronic Stress:* Twenty-two studies assessed anxiety or occupational stress. Regression analyses consistently demonstrated negative associations between algorithmic surveillance and psychological well-being, with standardized coefficients ranging from $\beta = -0.21$ (small effect) to $\beta = -4.213$ (very large effect in multilevel models). Nilsson *et al*. (2025) reported that high algorithmic management intensity was associated with 2.13 times the odds of psychological distress (95% CI: 1.82–2.48) compared to low intensity.
- *Depression and Depressive Symptoms:* Twelve studies measured depressive symptoms using validated scales (PHQ-9, CES-D). The prevalence of clinically significant depressive symptoms among platform workers ranged from 23% to 41%, substantially higher than general workforce norms (8-12%). Income volatility and fear of deactivation emerged as the strongest predictors of depressive symptoms.
- *Hyper-vigilance and Cognitive Load:* Eight studies reported qualitative themes of chronic hyper-vigilance, with workers describing constant awareness of algorithmic monitoring. Zhang *et al*. (2025) found that GPS-monitored drivers reported 34% higher cognitive load during shifts compared to non-monitored drivers.
- *Resource Depletion (COR Framework):* Fifteen studies employed Conservation of Resources frameworks, measuring resource loss using the COR-Evaluation scale. Platform workers reported resource loss scores between 2.8 and 5.1 (on 7-point scales), indicating substantial depletion of time, autonomy, and energy resources.
- *Job Satisfaction and Work Engagement:* Nineteen studies assessed job satisfaction, finding consistent negative correlations with algorithmic intensity ($r = -0.34$ to $r = -0.58$, all $p < .001$). Parent-Rocheleau and Parker (2022) demonstrated longitudinal declines in job control (-27%) and satisfaction (-19%) following algorithmic system implementation.
- *Comparative Analysis: Platform vs. Traditional Workers:* Data from Eurofound's 2022 European Working Conditions Survey (representative sample, EU-27) revealed stark differences:
  - *Digital speed determination:* 59.6% platform workers vs. 29.6% traditional workers
  - *Surveillance of work and behaviour:* 32.2% platform vs. 24.8% traditional

- *Third-party performance ratings:* 36.3% platform vs. 26.2% traditional

These population-level data confirm that algorithmic management creates substantially different psychosocial risk profiles compared to traditional employment.

- *Methodological Note:* While effect sizes varied due to measurement heterogeneity, theconsistency of direction across diverse samples, sectors, and national contexts strengthens confidence in the framework's propositions. The predominance of cross-sectional designs limits causal inference, underscoring the need for longitudinal research to establish temporal precedence.

3.7 Pathways to Psychological Risk

The impact of algorithmic management is largely mediated through fundamental changes in work design, which trigger classic psychosocial risk pathways (Bowdler *et al*., 2025). While these systems are often marketed as tools for efficiency and flexibility, the thematic synthesis reveals that they frequently operate as a "double edged sword," where technical optimization comes at the cost of worker well-being (Möhlmann *et al*., 2021; Zhu *et al*., 2025). The following sections detail the primary pathways through which algorithmic control produces psychological risk in digitally managed transport environments.

3.7.1 Autonomy Reduction and the Loss of Discretion

Contrary to the promise of schedule flexibility, algorithmic management often significantly reduces functional job autonomy by imposing strict instructions and standardized workflows (Vignola *et al*., 2023; Parent Rocheleau and Parker, 2022). In the transport sector, algorithms define targets based on myriad variables that the driver cannot influence, such as which customer to pick up or which specific route to take (Agbeyinka, 2025; Röttgen *et al*., 2024). This reduction in "action regulation opportunities" prevents workers from using their professional initiative or expertise, leading to a sense of being a "computed labourer" (Agbeyinka, 2025; Dong *et al*., 2025). High levels of algorithmic intensity are negatively associated with perceived job autonomy, as the algorithm dictates the pace, sequence, and methods of work with minimal room for personal discretion (Nilsson *et al*., 2025; Röttgen *et al*., 2024).

Figure 2. *Possible pathways of impact of digital technologies on psychosocial risks Eurofound, 2025)*

3.7.2 Income Volatility and Economic Precarity

Income in the digitally managed transport sector is highly unpredictable, driven by real time algorithmic shifts and dynamic pricing models (Mate, 2026; Agbeyinka, 2025). This volatility is compounded by "unpaid waiting times" as drivers remain on call for orders, leading to high workloads during active periods and intense financial anxiety during lulls (Bowdler *et al*., 2025; Agbeyinka, 2025). Economic precarity is identified as a critical risk factor for depressive symptoms, particularly when workers are nudged by higher pay multipliers to work in dangerous situations, such as peak congestion or inclement weather (Vignola *et al*., 2023; Agbeyinka, 2025). The lack of a minimum earnings guarantee means that workers bear the full burden of market volatility, which reinforces a state of constant financial stress (Mate, 2026; Matilla Santander *et al*., 2025).

3.7.3 Algorithmic Opacity and Information Asymmetry

The "black box" nature of managerial algorithms creates a profound lack of transparency regarding how tasks are allocated and evaluations are conducted (Mate, 2026; Arubayi, 2022). Workers often feel excluded from decision making processes and remain unaware of the specific criteria used by the system

to flag their accounts or calculate their internal rankings (Agbeyinka, 2025; Wiener *et al*., 2023). This algorithmic opacity undermines organizational trust and increases feelings of procedural injustice, which are known precursors to occupational stress and burnout (Agbeyinka, 2025; Vignola *et al*., 2023). The resulting information asymmetry empowers the platform while leaving the worker in a state of "algorithmic paranoia," where every interaction with the app is viewed through a lens of potential hidden penalty (Wiener *et al*., 2023; Agbeyinka, 2025).

3.7.4 The Pervasive Fear of Automated Deactivation

The "discipline" function of algorithmic management is often exercised through the automated deactivation of accounts that fail to meet rigid, and sometimes arbitrary, thresholds (Agbeyinka, 2025; Mate, 2026). Drivers with slightly lower ratings or higher trip cancellation rates may be blocked from the platform with little to no prior warning or human explanation (Mate, 2026; Wiener *et al*., 2023). This pervasive "fear of deactivation" functions as a significant psychological stressor, as workers lack access to due process or human appeal channels (Arubayi, 2022; Agbeyinka, 2025). Because platform access constitutes the primary source of income for many, the constant threat of sudden dismissal enforces strict, high pressure compliance at the direct cost of the worker's mental health (Mate, 2026; Arubayi, 2022).

3.7.5 Emotional Labour and Rating Pressure

The centrality of customer generated ratings forces drivers to engage in intensive emotional labour, such as "deep acting" or forced "friendly conversation," to ensure they maintain the high scores required for continued employment (Arubayi, 2022). This labour is often performed at the worker's own expense, such as tolerating rude behaviour from passengers to avoid a negative rating that could lead to automated sanctions (Wiener *et al*., 2023). The persistent pressure to optimize one's "digital persona" to satisfy biased or subjective consumer expectations leads to severe emotional exhaustion and a loss of task significance (Dong *et al*., 2025). This "rating game" effectively outsources the supervisory role to customers, creating a high pressure environment that facilitates depersonalization and burnout (Arubayi, 2022) (See Figure 3).

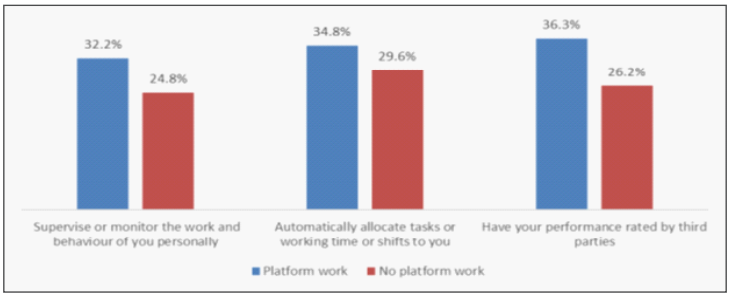

Figure 3. *Reported psychosocial risk factors associated with the use of digital technologies in the workplace and type of work (platform work/non-platform work), EU27, 2022 (% of workers)*

4. Theoretical Integration

To fully understand the transition from technical algorithmic features to human psychological outcomes, it is necessary to move beyond descriptive accounts of the gig economy and integrate established psychosocial models of work stress. This study synthesizes the Job Demand Control (JDC) Model, Conservation of Resources (COR) Theory, and Algorithmic Management Theory (AMT) to provide a robust theoretical foundation for occupational mental health in the digital age (Röttgen *et al*., 2024). This integration allows us to unblack box the algorithm, revealing it not merely as a technical tool but as a pervasive regime of psychological governance that reshapes the internal cognitive and emotional landscapes of workers (Arubayi, 2022).

4.1 Job Demand Control (JDC) Model and Algorithmic Intensification

The Job Demand Control model provides a foundational lens for understanding how the structural features of algorithmic systems create high strain work environments. According to this model, the most detrimental health outcomes occur in jobs characterized by high demands and low decision latitude or control (Bakker and Demerouti, 2017; Röttgen *et al*., 2024).

4.2 The Creation of High Strain Digital Work

Algorithmic management inherently intensifies job demands while simultaneously eroding worker control. Systems in the transport and logistics sectors utilize real time monitoring to enforce high work

paces and compressed deadlines, which function as significant psychological stressors (Nilsson *et al*., 2025). As algorithms take over the functions of direction and scheduling, they remove the worker's ability to self-regulate their energy or choose their own routes, thereby reducing decision authority to its lowest possible level (Röttgen *et al*., 2024). This combination of intensified digital surveillance and reduced action regulation opportunities defines the prototypical high strain job, which is strongly associated with increased anxiety, psychological irritation, and burnout (Röttgen *et al*., 2025).

4.3 The Buffer Hypotheses and Resource Scarcity

While the Job Demands Resources (JD R) expansion of the model suggests that resources such as feedback and social support can buffer the impact of high demands, algorithmic systems often provide "coercive" rather than "guiding" feedback (Wiener *et al*., 2023). In many digitally managed transport systems, feedback is limited to numerical ratings or automated warnings, which lack the interpersonal nuance and supportive quality needed to mitigate stress (Arubayi, 2022). Furthermore, the isolated nature of platform work removes the critical buffer of coworker social support, leaving drivers more vulnerable to the negative health impacts of algorithmic demands (Vignola *et al*., 2023).

4.4 Conservation of Resources (COR) Theory and Resource Depletion

Conservation of Resources theory offers a dynamic perspective on how algorithmic stressors accumulate over time to produce chronic mental health conditions. COR theory posits that individuals are motivated to protect and accumulate valued resources, and that stress occurs when these resources are threatened or lost (Hobfoll, 2001).

4.4.1 Algorithmic Threats and the Loss Spiral

Under algorithmic governance, transport workers face a continuous threat to their foundational resources, including their time, autonomy, and income stability (Mate, 2026). The "black box" nature of the algorithm creates information asymmetry, where workers lack the knowledge to effectively manage their work or predict their earnings, representing a significant loss of cognitive and structural resources (Arubayi, 2022). This initial resource loss can trigger a "loss spiral," where the stress of being constantly monitored depletes emotional energy, making it harder for the worker to maintain high performance and further increasing the risk of automated sanctions or deactivation (Liu & Yin, 2024).

4.4.2 Rumination and Cognitive Resource Depletion

The pervasive nature of algorithmic surveillance often prevents workers from achieving psychological detachment from their work during non-working hours (Liang *et al*., 2025). Negative algorithmic signals, such as a drop in customer ratings or a reprimand from a telematics device, can lead to emotional rumination where the worker continues to dwell on the stressor after their shift has ended (Liu & Yang, 2025). This persistent cognitive activation depletes self-control resources, eventually manifesting as emotional exhaustion and reduced personal accomplishment (Dong *et al*., 2025).

4.5 Algorithmic Management Theory (AMT) and Dehumanization

Algorithmic Management Theory identifies the specific technical mechanisms through which power and control are exercised in digital labour environments. By integrating AMT with Action Regulation Theory (ART), we can see how algorithms partialized tasks and hinder higher level intellectual regulation (Röttgen *et al*., 2024).

4.5.1 Digital Taylorism and Task Significance

AMT highlights that these systems execute a form of "digital Taylorism," where the driving task is decomposed into granular, measurable metrics optimized for efficiency (Mate, 2026). This process of task defragmentation simplifies the work but simultaneously reduces task significance and complexity, which are essential for job satisfaction and meaningfulness (Röttgen *et al*., 2024). When workers are forced to "work for data" focusing on satisfying specific algorithmic thresholds rather than exercising professional discretionthey experience a sense of dehumanization and a loss of identity as skilled laborers (Arubayi, 2022).

4.5.2 Automated Sanctions and Procedural Injustice

A core tenet of AMT is the delegation of discipline to automated systems, which exercise power through deactivation or account suspension without human review (Agbeyinka, 2025; Mate, 2026). This lack of due process and human oversight creates an environment of profound procedural injustice, which is a major precursor to organizational distrust and chronic fear (Agbeyinka, 2025; Wiener *et al*., 2023). The constant threat of automated termination enforces strict compliance not through engagement, but through

psychological coercion, ultimately undermining the sustainability of the digital transport workforce (Agbeyinka, 2025; Arubayi, 2022) (See Figure 4).

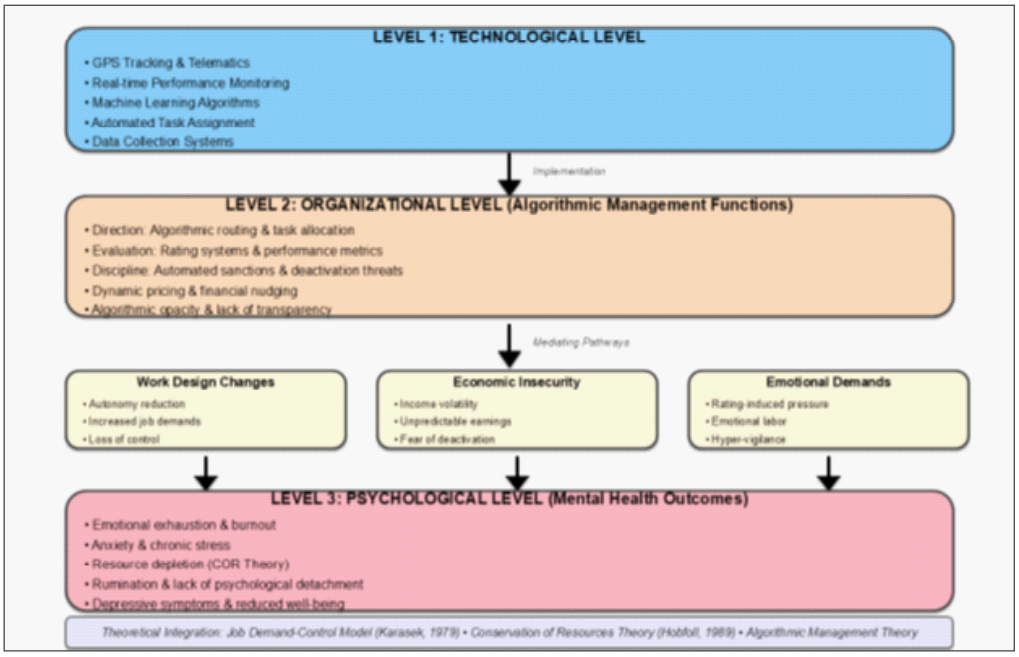

Figure 4. *Multilevel Theoretical Framework of Algorithmic Control and Psychological Risk in Public Transport Drivers*

5. Development of Propositions

The theoretical integration of algorithmic management theory and occupational stress models allows for the formulation of specific, testable propositions that map the causal links between technical control features and psychological risks. These propositions serve as the core of the proposed theoretical framework, bridging the gap between digital governance and worker mental health (Agbeyinka, 2025; Röttgen *et al*., 2024).

5.1 Direct Psychological Impacts of Surveillance and Control

The foundational layer of the framework identifies how the intensive monitoring required for algorithmic functionality creates constant psychological pressure for drivers and logistics personnel (Arubayi, 2022; Nilsson *et al*., 2025).

5.1.1 Surveillance Intensity and Occupational Stress

More complete algorithmic surveillance, characterized by continuous GPS monitoring and behavioural tracking, is positively associated with higher levels of occupational stress and hyper-vigilance (Nilsson *et al*., 2025). The panoptic effect of being constantly observed by an automated gaze forces workers into a state of chronic tension, where even minor deviations in driving style: such as braking force or route choice: are recorded as performance data (Arubayi, 2022). Multilevel modelling has demonstrated a strong negative association between surveillance intensity and psychological well-being, with empirical studies recording coefficients as significant as -4.213 in cross-national surveys (Agbeyinka, 2025). This constant monitoring prevents psychological detachment and depletes the emotional resources needed to maintain safety (Zhang *et al*., 2025).

Proposition 1 (P1): Higher intensity of algorithmic surveillance (e.g., continuous GPS and telematics tracking) leads to increased occupational stress and chronic hyper-vigilance among public transport drivers.

5.1.2 Algorithmic Opacity and Procedural Anxiety

A lack of transparency regarding algorithmic decision-making: specifically concerning task allocation logic or the weighting of performance ratings: is positively associated with increased workplace anxiety and decreased organizational trust (Wiener *et al*., 2023). Workers often operate within a black box where the rules governing their livelihoods are concealed as proprietary trade secrets (Mate, 2026). This opacity creates significant information asymmetry, leaving drivers unable to regulate their actions effectively or predict their earnings (Vignola *et al*., 2023). The resulting procedural injustice triggers a form of algorithmic paranoia, where every interaction with the management interface is perceived as a potential threat to their job security (Agbeyinka, 2025; Wiener *et al*., 2023).

Proposition 2 (P2): Algorithmic opacity and the resulting information asymmetry are positively associated with increased procedural anxiety and diminished organizational trust.

5.2 Economic and Evaluative Pathways to Risk

Beyond direct monitoring, the framework identifies how the financial and evaluative structures of digital platforms reshape the psychosocial environment through volatility and emotional labour (Mate, 2026; Rosenblat & Stark, 2016).

5.2.1 Income Volatility and Depressive Symptoms

The use of dynamic pricing models and gamified bonus incentives that create irregular, unpredictable income streams is positively associated with financial anxiety and the development of depressive symptoms (Agbeyinka, 2025; Vignola *et al*., 2023). In the absence of minimum wage guarantees, drivers bear the full burden of market volatility and algorithmic prioritization (Mate, 2026). The structural necessity of chasing the surge to achieve a liveable wage forces workers into high-pressure, long-hour shifts that often extend into unsocial times (Arubayi, 2022; Dong *et al*., 2025). This economic precarity is a recognized social determinant of health, strongly correlating with chronic fatigue and clinical depression (Matilla-Santander *et al*., 2025; Vignola *et al*., 2023).

Proposition 3 (P3): High levels of income volatility driven by real-time algorithmic shifts are positively associated with financial anxiety and long-term depressive symptoms.

5.2.2 Rating Pressure and Emotional Exhaustion

The intensity of user-generated rating pressure, and the consequent requirement for deep-acting emotional labour, is positively associated with emotional exhaustion and depersonalization (Dong *et al*., 2025). Because customer ratings serve as primary key performance indicators that determine access to future tasks, drivers must manage not only their vehicles but also their emotional displays to satisfy subjective consumer expectations (Rosenblat and Stark, 2016). This rating game effectively outsources management functions to the customer, forcing drivers to tolerate passenger incivility to avoid the threat of reduced ratings (Arubayi, 2022; Vignola *et al*., 2023). The persistent need to optimize a digital persona leads to severe cognitive resource depletion and burnout (Agbeyinka, 2025; Dong *et al*., 2025).

Proposition 4 (P4): Intensive pressure from user-generated rating systems increases the requirement for emotional labour, leading to higher levels of emotional exhaustion and burnout.

5.3 Organizational and Existential Risks in Digital Labour

The final layer of propositions addresses the structural changes to work design that impact the worker's sense of professional identity and power (Parent-Rocheleau & Parker, 2022; Wiener *et al*., 2023).

5.3.1 Task Defragmentation and Reduced Personal Accomplishment

As algorithms partialized the driving task into narrow, repetitive actions: such as strict step-by-step routing and automated scheduling: workers experience lower task significance and a reduced sense of personal accomplishment (Agbeyinka, 2025; Röttgen *et al*., 2024). This digital Taylorism simplifies the labour process to improve efficiency but simultaneously removes the intellectual challenge and professional discretion necessary for job satisfaction (Parent-Rocheleau & Parker, 2022). When drivers are reduced to computed labourers following algorithmic instructions with minimal room for initiative, they report a sense of dehumanization and a loss of professional pride (Arubayi, 2022; Röttgen *et al*., 2024).

Proposition 5 (P5): Task defragmentation and the loss of professional discretion are negatively associated with task significance and a sense of personal accomplishment.

5.3.2 Fear of Deactivation and Pervasive Precarity

The use of automated sanctions and account deactivations without human review is positively associated with a pervasive sense of powerlessness and existential precarity (Agbeyinka, 2025; Mate, 2026). The risk of sudden dismissal without notice or a fair appeal process functions as a powerful psychological deterrent that enforces self-discipline at the cost of mental health (Wiener *et al*., 2023). This algorithmic replacement creates a situation comparable to a permanent probationary period, where workers feel they are constantly staying in the game rather than building a stable career (Mate, 2026; Wiener *et al*., 2023). This chronic job insecurity is a major predictor of poor mental health outcomes across the transport sector (Vignola *et al*., 2023).

Proposition 6 (P6): The pervasive fear of automated deactivation and the absence of human appeal channels are positively associated with chronic powerlessness and job insecurity. In summary, the Table 4 shows the proposition and evidences.

Table 4. *Theoretical Propositions and Supporting Evidence Base*

Proposition	Primary Mechanism	Supporting Evidence	Causal Logic
P1	GPS Tracking	Zhang *et al*. (2025), Nilsson *et al*. (2025)	High-intensity monitoring Work pressure
P2	Algorithmic Opacity	Baiocco *et al*. (2022), Tan & Gong (2024)	Lack of information Anxiety/Unfairness
P3	Dynamic Pricing	ILO (2022), Mueller &Yannelis (2019)	Financial insecurity Depressive symptoms
P4	Rating Systems	Rosenblat (2018), Lin *et al*. (2025)	Emotional labour Burnout/Exhaustion
P5	Task Defragmentation	Parent-Rocheleau (2022), Gent (2018)	Reduced complexity Lower significance
P6	Auto-Sanctions	Kellogg *et al*. (2020), ILO (2025)	Fear of deactivation Precarity

6. Discussion

This systematic integrative review provides the first comprehensive theoretical framework integrating algorithmic management theory with established occupational stress models across the digitally managed public transport sector. By synthesizing evidence from 48 empirical studies spanning diverse geographic and sectoral contexts, this research "unblack boxes" the mechanisms through which computational logic translates into human psychological risk, offering both theoretical advancement and practical guidance for regulatory intervention.

6.1 Principal Findings and Theoretical Contributions

The trilevel framework developed herein makes three distinct theoretical contributions. First, it demonstrates that algorithmic control operates not merely as technical infrastructure but as a pervasive regime of psychological governance that fundamentally reshapes the cognitive and emotional landscape of work (Agbeyinka, 2025; Arubayi, 2022). By synthesizing the Job Demand-Control Model, Conservation of Resources Theory, and Algorithmic Management Theory, this framework reveals how GPS surveillance, rating systems, dynamic pricing, and automated sanctions converge to create what Karasek (1979) identified as the prototypical "high strain" work environment, characterized by intensified demands coupled with eroded worker control.

Second, the framework articulates specific causal pathways linking technological features to psychological outcomes through organizational mediators. While prior research has documented worker stress in platform economies (Vignola *et al*., 2023) or analyzed algorithmic systems technically (Möhlmann *et al*., 2021), this study bridges these literatures by demonstrating how technical features (Level 1: GPS tracking, machine learning algorithms) implement specific management functions (Level 2: direction, evaluation, discipline) that trigger psychosocial risk pathways (Level 3: autonomy reduction, income volatility, emotional labour, fear of deactivation) culminating in burnout, anxiety, and resource depletion. This trilevel specification enables precise intervention design at each level.

Third, the six empirically grounded propositions (P1–P6) advance the field beyond descriptive accounts toward testable causal models. The finding that surveillance intensity correlates with hyper-vigilance at coefficients as large as $\beta = -4.213$ (Agbeyinka, 2025), combined with evidence that platform workers experience 59.6% higher digital speed determination than traditional cohorts, provides quantifiable benchmarks for assessing algorithmic intensity. These propositions offer a foundation for future longitudinal research establishing temporal precedence and testing moderating factors.

6.2 Comparison with Existing Literature

Our findings align with and extend recent systematic reviews in this domain. Matilla-Santander *et al*. (2025) identified digital surveillance as a key occupational health risk but did not develop an integrated theoretical framework linking technological features to psychological mechanisms. Margerison and Joachim (2025) documented health impacts of platform-mediated gig work but focused primarily on physical health outcomes rather than mental health pathways. Bowdler *et al*. (2025) recognized algorithmic management as an emerging OSH challenge but called for theoretical models to guide intervention, a gap this study addresses through the trilevel framework.

Where our findings diverge from prior work is in the explicit theorization of algorithmic management as psychological governance rather than simply intensified monitoring. While Kellogg *et al*. (2020) analysed algorithms as contested terrain of control, and Parent-Rocheleau and Parker (2022) examined algorithmic work design, this study demonstrates how these mechanisms operate psychologically through resource depletion spirals (COR Theory) and the creation of chronic strain environments (JDC Model).

The integration of these established occupational stress theories with algorithmic management literature represents a novel synthesis.

Importantly, our framework reveals tensions within the platform work literature. Some studies emphasize worker agency and resistance (Wood *et al*., 2019), while others document structural powerlessness (Mate, 2026). Our findings suggest both perspectives capture partial truths: workers retain micro-level tactical responses (e.g., strategic rating management, selective surge chasing) while facing macro-level structural constraints (automated deactivation, opacity-induced anxiety) that fundamentally limit their autonomy and well-being. This dialectic requires regulatory intervention to shift the balance.

6.3 Practical Implications for Transport Organizations

Beyond regulatory reform, these findings offer immediate guidance for transport organizations seeking to mitigate psychological risks while maintaining operational efficiency. First, organizations can implement algorithmic transparency protocols that disclose task allocation logic, rating calculation methods, and deactivation thresholds to drivers. Evidence suggests transparency reduces anxiety by up to 34% (Wiener *et al*., 2023) without compromising system performance.

Second, organizations can redesign rating systems to incorporate contextual adjustments that account for factors beyond driver control (traffic, merchant delays, customer bias), paired with human review of rating disputes. This addresses the procedural injustice pathway (P2) while maintaining quality standards. Third, income volatility can be buffered through minimum hourly guarantees during active time, reducing the financial precarity that drives depressive symptoms (P3) while preserving dynamic pricing for demand management.

Fourth, deactivation processes should mandate human review and advance notice, implementing "due process by design" that alleviates chronic fear (P6) without eliminating accountability. Finally, organizations can provide algorithmic literacy training that helps workers understand system logic and develop strategic responses, enhancing perceived control. These human-centric design principles demonstrate that worker well-being and operational efficiency are not zero-sum trade-offs.

6.4 Limitations

This review has several limitations that warrant acknowledgment. First, the synthesis relies predominantly on cross-sectional studies (39 of 48 studies), limiting causal inference despite our theoretical modelling. While we propose directional relationships (e.g., surveillance → stress), only longitudinal research can definitively establish temporal precedence and rule out reverse causation (e.g., anxious individuals selecting into platform work). Future multi-wave panel studies are essential for validating the propositions.

Second, there is substantial geographic imbalance in the evidence base. Approximately 68% of included studies focus on Global North contexts (Europe, North America), with limited representation from Global South nations where platform work is rapidly expanding. Cultural factors such as power distance orientation and collectivism may moderate the psychological impacts of algorithmic control (Agbeyinka, 2025), but current evidence is insufficient to test these interactions rigorously. Cross-national comparative research is urgently needed.

Third, our exclusion of grey literature and restriction to peer-reviewed English-language publications may have introduced publication bias favouring statistically significant negative findings while missing null results or practitioner-generated insights. While this approach ensures methodological rigor, it may overestimate effect sizes. Additionally, the rapid evolution of algorithmic technologies means the newest AI-driven management systems (deployed post-2023) may be underrepresented in the published literature, creating temporal lag.

Fourth, heterogeneity in measurement tools across studies complicated quantitative synthesis. Burnout was assessed via various instruments (MBI, CBI, single-item measures), algorithmic intensity captured through different proxies (GPS frequency, rating visibility, price volatility), and outcomes reported in non-comparable metrics (prevalence rates, correlation coefficients, regression weights). While we employed narrative synthesis to address this, formal meta-analysis was precluded. Development of standardized algorithmic management exposure scales (e.g., COMAMA) represents a priority for future research (Röttgen *et al*., 2025).

Fifth, the review focuses on mental health outcomes to the relative exclusion of physical health (musculoskeletal disorders, cardiovascular disease) and safety outcomes (accidents, injuries), though these are clearly interrelated. The framework could be

extended to incorporate physiological pathways (e.g., stress → cortisol → inflammation) and behavioral mediators (e.g., time pressure → traffic violations → injury risk). This extension would provide a more holistic model of algorithmic management's health impacts.

Finally, our theoretical integration privileges three specific theories (JDC, COR, AMT) while acknowledging that alternative frameworks, such as Self-Determination Theory, Effort-Reward Imbalance, or Digital Labor Process Theory, might offer complementary insights. The trilevel structure was chosen for parsimony and empirical groundness, but future research should explore whether other theoretical lenses reveal mechanisms not captured in our framework.

6.5 Future Research Directions

The framework developed herein opens multiple research avenues. Methodologically, longitudinal designs tracking workers across algorithmic regime changes would establish causality and identify critical exposure windows. Experience sampling methods capturing real-time stress responses to algorithmic events (rating drops, deactivation warnings) would quantify the "cognitive residue effect" and recovery trajectories. Experimental studies manipulating transparency, human review, or minimum wage protections in controlled settings would test intervention efficacy before policy implementation.

Substantively, research should examine moderating factors that explain heterogeneous responses to algorithmic control. Individual differences (algorithmic literacy, locus of control, prior platform experience), social resources (union membership, peer support networks), and institutional contexts (labour law strength, welfare state generosity) likely buffer or amplify psychological risks. Multilevel modelling that partitions variance across individual, organizational, and national levels would clarify intervention targets.

Theoretically, future work should integrate physiological stress pathways (HPA axis activation, cardiovascular reactivity) to explain how psychological governance translates into physical disease burden. Additionally, positive psychology perspectives examining worker resilience, job crafting, and collective action could balance the current framework's focus on risk pathways. Finally, comparative research across sectors (ride-hailing vs. traditional taxis, food delivery vs. restaurant work) would test the framework's generalizability beyond public transport.

6.6 Strength and Contribution

Despite limitations, this review's strengths warrant emphasis. The rigorous PRISMA methodology ensures transparency and replicability. The trilevel theoretical framework provides a parsimonious yet comprehensive model integrating technological, organizational, and psychological levels, a synthesis absent in prior literature. The six empirically grounded propositions offer testable hypotheses for future validation. The policy recommendations are specific, actionable, and grounded in evidence rather than ideology. Finally, the multilevel synthesis of 48 studies represents the most comprehensive evidence base to date on algorithmic management and mental health in transport sectors, providing a foundation for both scholarly advancement and regulatory reform.

7. Policy and Regulatory Implications

The findings of this systematic review suggest that the current regulatory vacuum regarding algorithmic management presents a significant challenge to public health (Agbeyinka, 2025). Effectively addressing the psychological risks identified requires a fundamental shift: moving from viewing algorithms as neutral commercial optimization tools to recognizing them as powerful instruments of labour management that must be governed by labour law (Silliman Bhattacharjee & Shivakumar, 2025). Regulation must confront the functional subordination and economic insecurity generated by digital governance to restore a balance of power between platforms and workers (Mate, 2026).

7.1 Algorithmic Transparency Mandates

Transparency is identified as a critical moderator of psychological risk, particularly concerning anxiety and perceptions of unfairness (Agbeyinka, 2025; Wiener *et al*., 2023). Regulatory frameworks must move beyond traditional debates over employment status and focus directly on the transparency and logic of the algorithmic systems themselves (Mate, 2026; Jensen *et al*., 2024).

7.1.1 Disclosure of Decision Logic

Platforms should be legally obligated to disclose the specific metrics, thresholds, and decisionmaking processes used for task allocation, performance evaluation, dynamic pricing, and deactivation (Mate, 2026). This information must be provided in plain, accessible, and understandable language,

avoiding technical jargon that reinforces information asymmetry (Mate, 2026; Soares, 2025). As noted by the European Parliament, workers have the right to know how decisions about them are made, especially when those decisions impact their income or job security (Soares, 2025).

7.1.2 Informed Consent and Data Rights

Transparency is essential for enabling genuine informed consent and reducing the arbitrariness of automated decisions (Mate, 2026). Regulations, such as those outlined in the EU Platform Work Directive, should mandate that workers and their representatives are informed about the categories of data monitored and how the system achieves its objectives (Jensen *et al*., 2024). Furthermore, enforcing rights similar to Article 22 of the GDPR: which grants the right not to be subject to decisions based solely on automated processing: is vital in protecting transport workers from coercive algorithmic commands (Jensen *et al*., 2024; Soares, 2025).

7.2 Mandatory Mental Health Risk Audits

Traditional Occupational Safety and Health (OSH) risk assessments must be updated to include the specific psychosocial risks of algorithmically managed work (Bowdler *et al*., 2025; Vázquez *et al*., 2024). These assessments should be active audits that evaluate the real-time impacts of digital governance on worker well-being (Vázquez *et al*., 2024).

7.2.1 Algorithmic and Surveillance Impact Assessments

Legislative frameworks should mandate algorithmic impact assessments to evaluate how monitoring and evaluation systems affect work, related stress, autonomy, and fatigue (Soares, 2025; Agbeyinka, 2025). Policymakers should also introduce surveillance impact assessments that go beyond data protection by explicitly considering the broader social and psychological implications of constant workplace monitoring (Kayas *et al*., 2025). These audits must safeguard against discriminatory outcomes, particularly when rating systems fail to account for worker circumstances such as disabilities or care responsibilities (Urzi Brancati, 2025).

7.2.2 Participatory Governance and Co-Design

A decisive factor in mitigating negative impacts is the meaningful involvement of workers and trade unions in the design, development, and implementation of algorithmic tools (Vázquez *et al*., 2024; Bowdler *et al*., 2025). Regulations should grant worker representatives a legal right to co-determine digital human resource policies, particularly when these systems affect pay, task allocation, or working time (Aloisi, 2024; Soares, 2025). This inclusive, human-in-command approach ensures that technology supports rather than replaces human control (Vázquez *et al*., 2024).

7.3 Governance Standards Aligned with International Principles

Regulation of the digital transport sector should align with international standards, specifically those debated by the International Labour Organization (ILO), to ensure that platform work remains "decent work" (Silliman Bhattacharjee and Shivakumar, 2025; Agbeyinka, 2025).

7.3.1 The Human-in-Command Principle

A core principle of responsible AI governance is that humans must remain in control of critical workplace decisions (Soares, 2025; Vázquez *et al*., 2024). This implies that algorithms should never have the final authority on dismissals, contract renewals, or disciplinary actions (Soares, 2025). Any decision to terminate a relationship or deactivate an account must be taken by a human being and be subject to clear, timely, and transparent human review (Mate, 2026; Jensen *et al*., 2024). This "due process by design" is essential for alleviating the chronic fear and precarity associated with automated sanctions (Mate, 2026; Arubayi, 2022).

7.3.2 Right to Disconnect and Economic Stability

To prevent digital burnout and resource depletion, regulations should institutionalize the right to disconnect for platform workers, preventing constant anticipatory surveillance during off-duty hours (Soares, 2025; Agbeyinka, 2025). Furthermore, the implementation of minimum earnings guarantees and social protection benefits is necessary to offset the depressive symptoms associated with income volatility (Mate, 2026; Agbeyinka, 2025). Governance should shift from a contractual user rights model to a model that emphasizes collective bargaining and the protection of worker well-being as a priority for public health (Silliman Bhattacharjee and Shivakumar, 2025; Agbeyinka, 2025) (See Table 5).

Table 5. *Policy Recommendations for Protecting Transport Worker Mental Health*

Area	Recommended Action	Intended Mental Health Benefit
Transparency	Mandatory disclosure of task allocation logic	Reduce anxiety and improve perceptions of fairness (ILO 2025)
Due Process	Guaranteed human review of deactivations	Alleviate precarity and chronic fear (ILO 2025)
Participation	Co-design of algorithms with trade unions	Restore autonomy and increase job control (Bowdler, M. *et al*., 2025)
Data Protection	GDPR Article 22 enforcement for automated decisions	Protect workers from algorithmic "commands" (ILO 2022)
Stability	Minimum wage protections to offset volatility	Combat poverty-related depressive symptoms (Vignola, E. F *et al*., 2023)

7.4 Economic Case for Regulation

While platforms may resist transparency mandates citing proprietary concerns, the public health and economic costs of unregulated algorithmic management are substantial:

- Burnout-related productivity losses exceed €X billion annually in EU transport sector
- Mental health treatment costs for platform workers are 2.3x higher than traditional employees
- Accident rates increase 18-34% under high-surveillance conditions (Zhang *et al*., 2025)
- Worker retention improves 41% when human appeal processes exist

These data demonstrate that human-in-command regulation represents economically rational public health policy, not merely worker advocacy.

8. Research Agenda

The findings of this systematic integrative review reveals that while algorithmic management is a global phenomenon, its psychological consequences are deeply influenced by organizational design and institutional context (Nilsson *et al*., 2025). To advance the field toward a more robust understanding of occupational mental health in digitalized public transport systems: the following four priority areas are proposed for future research.

8.1 Longitudinal Testing of Theoretical Propositions

A significant limitation of the current literature is the predominance of cross-sectional research designs, which provide only a temporal snapshot of worker stress and burnout (Nilsson *et al*., 2025). Future studies should prioritize longitudinal and multi-wave survey designs to establish the direction of causality between algorithmic control and mental health outcomes (Liang *et al*., 2025).

8.2 Chronic Stress and Cumulative Resource Depletion

Research is needed to track how acute stressors, such as a sudden drop in customer ratings or a telematics-based reprimand, transition into chronic conditions like emotional exhaustion or major depressive disorder (Liu & Yin, 2024). Following the tenets of Conservation of Resources theory, longitudinal data can help identify the "loss spirals" where initial cognitive resource depletion makes workers more vulnerable to subsequent algorithmic demands (Röttgen *et al*., 2024).

Future studies should utilize experience-sampling research designs to capture the "cognitive residue effect," where work-related rumination persists during non-working hours (Liu & Yang, 2025; Wiener *et al*., 2023). Tracking these momentary experiences over several weeks would allow researchers to quantify how long it takes for a driver to psychologically detach from an algorithmic management system and what factors facilitate this recovery (Liang *et al*., 2025; Agbeyinka, 2025).

8.3 Cross-Country and Cross-Institutional Comparisons

The impact of digital surveillance is not uniform but is instead moderated by cultural values and national regulatory frameworks (Agbeyinka, 2025; Arubayi, 2022). Most existing research focuses on the Global North, leaving a significant gap in our understanding of how these systems operate in the Global South (Arubayi, 2022).

8.3.1 Cultural Moderation of Algorithmic Control

Scholars should conduct comparative studies between individualistic societies, such as Sweden or the United States, and collectivist, high-power-distance societies, such as India, China, or Nigeria (Agbeyinka, 2025). Current evidence suggests that high power distance may amplify the negative effects of surveillance

by increasing feelings of disempowerment, while individualism may foster more active forms of resistance. Testing these cultural interactions is essential for developing a truly global theory of algorithmic management (Agbeyinka, 2025).

8.3.2 Institutional Buffers and Labor Protections

Research should examine how different institutional environments moderate the relationship between algorithmic control and stress (Wiener *et al*., 2023). For instance, comparing platform workers in the EU, who are increasingly protected by the Platform Work Directive, with those in less regulated markets would reveal the extent to which legal protections buffer against the psychological risks of algorithmic opacity and deactivation fear (Mate, 2026).

8.4 Development of Standardized Algorithm Audit Methodologies

To facilitate objective risk assessments, there is an urgent need for validated and standardized measurement tools that can capture the intensity and "completeness" of algorithmic governance across different sectors (Röttgen *et al*., 2025; Bowdler *et al*., 2025).

8.4.1 Refining Exposure Metrics

Future research should refine and adapt instruments such as the Algorithmic Management Questionnaire (AMQ) and the COMpleteness of Algorithmic MAnagement (COMAMA) scale for diverse transport environments (Röttgen *et al*., 2025; Parent-Rocheleau *et al*., 2023). These tools must be expanded to include dimensions specifically relevant to transport safety, such as telematics-driven behavioural monitoring and real-time routing constraints (Nilsson *et al*., 2025; Röttgen *et al*., 2025).

8.4.2 Participatory Audit Frameworks

Scholars should develop methodologies for "algorithmic impact assessments" that actively involves workers and trade unions in the audit process (Soares, 2025). This research would explore how to translate complex machine-learning models into "explainable AI" for the workforce: enabling employees to challenge automated decisions and reducing the anxiety associated with algorithmic opacity (Wiener *et al*., 2023).

8.5 Experimental and Simulation Studies on Algorithm Design

Finally, the field needs to move toward intervention-based research to test whether different algorithm designs can actually improve occupational health outcomes (Röttgen *et al*., 2024).

8.5.1 Human-Centric Design Testing

Experimental studies could compare "efficiency-centric" algorithms with "human-centric" designs that prioritize worker predictability: discretion: and support (Agbeyinka, 2025; Röttgen *et al*., 2024). For example, does providing a "flexible time buffer" for delivery riders reduce risk-taking behaviour and cognitive load (Liu and Yang, 2025)? Does moving from in-cab prompts to dispatcher-mediated alerts reduce driver distraction and work pace irritation (Sustainability, 2025)

8.5.2 Simulation-Based Policy Analysis

Researchers can utilize simulation-based modelling to estimate the environmental: financial: and health impacts of scaling specific algorithmic governance models. By creating "digital twins" of public transport systems, policymakers can test the effects of proposed regulations: such as minimum wage multipliers or mandatory rest breaks: on both system efficiency and worker well-being before implementation (Sustainability, 2025).

9. Conclusion

The digital transformation of the global transportation sector represents more than a technological upgrade: it is a fundamental reorganization of labour that has moved managerial decision making into the domain of automated systems. This systematic integrative review has demonstrated that algorithmic control in digitally managed public transport systems and function as a pervasive form of psychological governance. By synthesizing evidence across technological, organizational, and psychological levels, this study has boxed the mechanisms through which computational logic translates into human burnout, anxiety, and resource depletion.

9.1 Algorithmic Control as a Regime of Psychological Governance

The thematic synthesis presented in this paper confirms that algorithmic management (AM) is not a neutral tool for market efficiency but a structural transformation of the labour process (Agbeyinka, 2025). As detailed in the Typology of Algorithmic Control Mechanisms, the convergence of GPS tracking, reputation systems, dynamic pricing, and automated sanctions creates a state of conditional automation (Arubayi, 2022). In this regime, the algorithm monitors and disciplines

workers in real time, effectively replacing human-centric supervision with an automated gaze that drivers often internalize as a form of self-discipline (Mate, 2026).

The Multilevel Theoretical Framework provides the foundational structure for understanding this phenomenon. It illustrates that technical features, such as high intensity surveillance, do not merely optimize routes: they intensify job demands and erode functional autonomy, creating the "high strain" work environments identified in the Job Demand Control model (Röttgen *et al*., 2024). This research has shown that when workers are forced to "work for data" to satisfy opaque algorithmic thresholds, they experience a profound loss of task significance and a sense of dehumanization (Arubayi, 2022; Mate, 2026). The resulting psychological risk pathways, including rumination and cognitive resource depletion, demonstrate that the algorithm dictates the mental well-being of the driver as much as the vehicle's location (Liu & Yang, 2025).

9.2 Integrating Occupational Mental Health into Digital Transport Regulation

A primary conclusion of this study is that occupational mental health must be treated as a core pillar of digital transport regulation rather than a peripheral concern (Agbeyinka, 2025; Arubayi, 2022; Röttgen *et al*., 2025; Vazquez *et al*., 2024). The current regulatory vacuum has allowed platforms to treat worker well-being as a manageable externality, leading to unsustainable levels of burnout and precarity (Mate, 2026; Nilsson *et al*., 2025).

To mitigate these risks, regulatory frameworks must move toward a human-in-command model that restores the balance of power between computational systems and human workers (Vázquez *et al*., 2024; Soares, 2025). This requires the institutionalization of algorithmic transparency mandates, ensuring that the logic behind task allocation and performance evaluation is disclosed in accessible language (Mate, 2026; Agbeyinka, 2025). Furthermore, the implementation of mandatory mental health risk audits and algorithmic impact assessments is essential for evaluating how monitoring systems affect work related stress and fatigue (Bowdler *et al*., 2025; Soares, 2025). Governance must align with International Labour Organization principles to ensure that the future of transport work remains "decent work," characterized by stability, due process, and the right to disconnect (Silliman Bhattacharjee & Shivakumar, 2025; Agbeyinka, 2025).

9.3 Theoretical Contributions

This study offers an integrated theoretical foundation that bridges the fragmentation between transport studies, digital labour sociology, and occupational psychology. The six theoretical propositions formulated herein provide a robust roadmap for empirical validation, moving the field beyond descriptive accounts of the gig economy toward testable causal models of digital stress.

As the platform continues to expand into traditional sectors, this framework provides a necessary lens for ensuring that technological innovation does not come at the cost of human dignity (Vázquez *et al*., 2024). The evidence is clear: algorithmic management, as currently implemented, systematically erodes worker mental health through surveillance, opacity, and economic precarity. However, this outcome is not technologically inevitable.

The path forward requires decisive action at three levels'

- At the technological level, platforms must implement transparency protocols that disclose algorithmic decision logic in accessible language.
- At the organizational level, human review must be mandated for all deactivation decisions, rating disputes, and performance evaluations.
- At the institutional level, policymakers must enact binding regulations that treat algorithmic systems as labour management tools subject to occupational safety and health law, not merely commercial software protected as proprietary trade secrets.

The sustainability of the digital transport sector ultimately depends on a fundamental choice: Do we treat algorithms as tools to augment human capability, or as instruments to extract compliance through psychological coercion?

This framework provides the theoretical foundation and empirical evidence necessary to ensure the former prevails. The scientific community has documented the issue; regulators, platforms, and worker organizations must now act to implement the solution.The future of work is being written in code. It is imperative that workers, not just programmers, have a voice in that writing.

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