

Use of AI in Mental Health Diagnosis of Gig Workers

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ABSTRACT

The rapid growth of the gig economy, characterized by flexible, short-term, and task-based employment, has introduced new challenges to worker well-being—particularly in the domain of mental health. Gig workers, including ride-share drivers, freelancers, and delivery personnel, often face financial instability, job insecurity, and social isolation, making them susceptible to anxiety, depression, and burnout. Despite the urgent need for mental health support, gig workers remain underserved due to limited access to traditional healthcare and stigmatization. This research paper explores the emerging role of Artificial Intelligence (AI) in diagnosing mental health conditions among gig workers, offering scalable, low-cost, and accessible alternatives to conventional mental health services.

The study examines AI-driven diagnostic tools such as sentiment analysis, natural language processing (NLP), and machine learning algorithms used in mobile health (mHealth) applications and wearable technologies. It evaluates the effectiveness, accuracy, and ethical implications of these tools in identifying early signs of mental distress. By conducting a cross-platform content analysis and reviewing existing case studies, the paper identifies the most promising AI models tailored to gig work environments.

Findings suggest that AI-powered diagnostics—when designed with contextual sensitivity and ethical safeguards—can significantly improve mental health monitoring among this transient and diverse workforce. However, concerns related to data privacy, algorithmic bias, and the lack of regulatory frameworks remain pressing. The paper concludes by recommending a human-in-the-loop approach, where AI supports rather than replaces mental health professionals, and calls for the co-creation of AI tools with gig workers to ensure cultural, occupational, and emotional relevance.

This research contributes to the intersection of AI, public health, and labor studies, advocating for inclusive mental health innovation in the digital economy.

Keywords: *Artificial Intelligence (AI), Mental Health Diagnosis, Gig Economy, Machine Learning, Natural Language Processing (NLP), Digital Health, Algorithmic Ethics, Worker Well-being*

The rapid expansion of the gig economy has transformed traditional employment structures, creating a workforce that is flexible, digital, and often precariously employed. Gig workers—such as rideshare drivers, freelance digital laborers, and delivery personnel—frequently face irregular income, social isolation, and a lack of job

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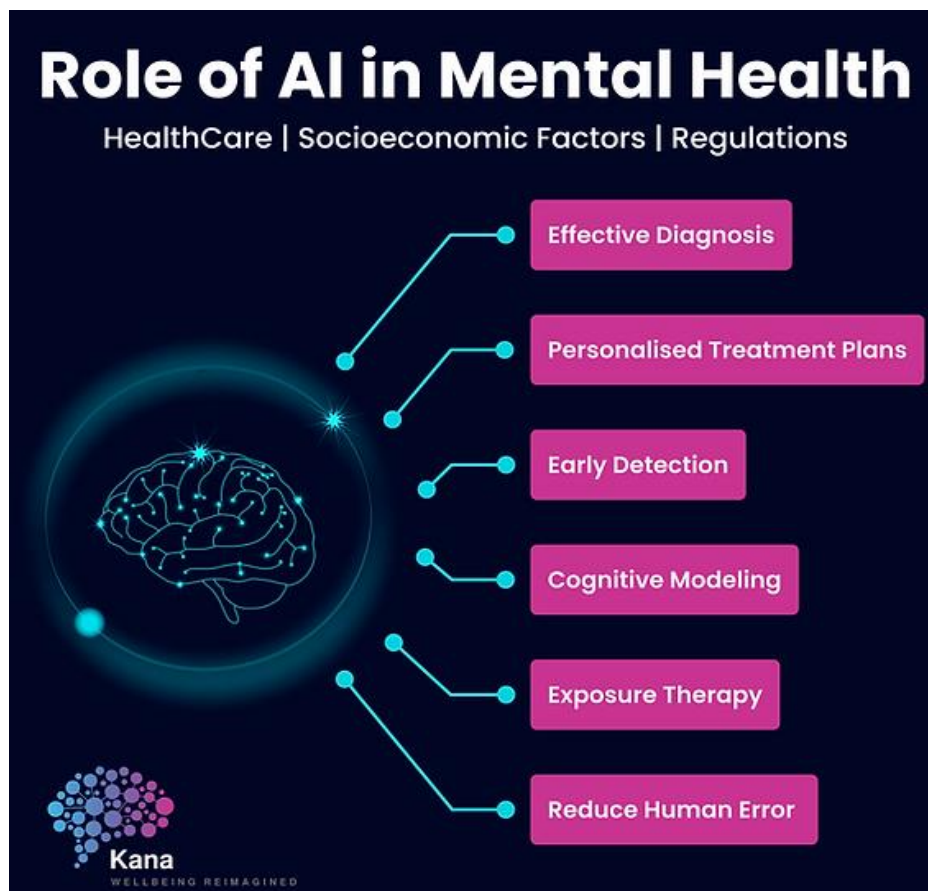
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security, all of which can contribute to heightened mental health risks. Despite the growing awareness of these challenges, mental health diagnosis and support for gig workers remain limited due to fragmented employment relationships and the absence of institutional support systems.

In parallel, the development of artificial intelligence (AI) in healthcare, particularly in mental health diagnostics, has shown significant promise. AI tools utilizing natural language processing (NLP), machine learning algorithms, and behavioral analytics are now capable of identifying early indicators of conditions such as depression, anxiety, and stress with increasing accuracy. These technologies offer scalable, low-cost, and potentially stigma-free options for mental health assessment—particularly beneficial for under-supported populations like gig workers.



Source: <https://www.kanahealth.ai/>

This paper explores the intersection of AI-driven mental health diagnostics and the unique needs of gig economy workers. It aims to evaluate how AI can bridge current gaps in mental health care accessibility, while also addressing concerns around data privacy, bias, and ethical deployment. By reviewing existing AI models, analyzing their applicability to the gig workforce, and identifying implementation challenges, the study contributes to a more inclusive and responsive framework for digital mental health interventions. The findings have implications not only for AI development and mental health policy but also for designing worker-centric support systems in an increasingly digital labor market.

BACKGROUND OF THE STUDY

The global rise of the gig economy has fundamentally reshaped traditional employment models, offering flexibility and autonomy to millions of workers. Platforms such as Uber, TaskRabbit, Fiverr, and Deliveroo have enabled individuals to engage in short-term, freelance, or task-based work without long-term employer commitments. While this model provides economic opportunities and scheduling freedom, it also exposes gig workers to a range of psychosocial stressors, including job insecurity, income volatility, lack of workplace protections, social isolation, and the absence of employer-provided mental health benefits. These conditions can significantly affect the mental well-being of gig workers, often making them more vulnerable to anxiety, depression, burnout, and chronic stress.

In parallel with these workforce transformations, artificial intelligence (AI) technologies have emerged as powerful tools in mental health diagnostics and monitoring. From sentiment analysis in digital communications to predictive algorithms in wearable devices and mobile apps, AI-driven solutions are increasingly used to detect early signs of mental health conditions. These tools can analyze large volumes of unstructured data, such as speech patterns, behavioral cues, and physiological signals, to support clinical assessments or provide real-time interventions. The accessibility, scalability, and cost-effectiveness of AI-based mental health technologies offer a promising alternative to traditional diagnostic pathways, particularly for underserved or hard-to-reach populations.

Despite these advancements, there is limited research at the intersection of AI-enabled mental health diagnostics and the unique needs of gig workers. Most existing frameworks have been designed with either corporate employees or general populations in mind, without addressing the fragmented, decentralized, and often precarious nature of gig work. Moreover, concerns related to data privacy, algorithmic bias, consent, and the ethical use of AI in sensitive areas such as mental health remain largely unresolved.

This study seeks to bridge these gaps by exploring the potential role of artificial intelligence in identifying and addressing mental health issues among gig workers. By evaluating current AI technologies, assessing their applicability in gig work settings, and considering ethical and policy implications, the research aims to provide insights into how AI can be responsibly leveraged to improve mental health outcomes in this rapidly growing segment of the workforce.

Justification

The rapid expansion of the gig economy has reshaped the modern labor market, providing flexibility but also introducing new stressors that can impact mental health. Gig workers—such as rideshare drivers, delivery agents, freelance creatives, and platform-based service providers—often face job insecurity, income volatility, isolation, and lack of access to traditional employment benefits, including mental health support. Despite growing concerns about these risks, mental health diagnosis among gig workers remains significantly underexplored in academic research.

Artificial Intelligence (AI) offers promising tools for early detection, monitoring, and intervention in mental health care. By leveraging machine learning algorithms, natural language processing, and predictive analytics, AI can analyze behavioral patterns, speech, and biometric data to identify signs of anxiety, depression, or burnout. However, the application of AI in diagnosing mental health conditions within the gig workforce is still in its nascent stages and presents unique challenges related to privacy, data ethics, and occupational diversity.

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This research is justified on several grounds. First, it addresses a critical gap in the intersection of digital labor studies, mental health, and AI-enabled healthcare technologies. Second, it contributes to the development of personalized, scalable, and accessible diagnostic tools tailored for non-traditional workers who are often excluded from institutional healthcare systems. Third, the study will help inform policymakers, platform designers, and healthcare providers on how to build ethical, inclusive, and effective AI-driven mental health interventions for this expanding segment of the workforce.

In sum, this research not only contributes to academic discourse but also carries significant social, economic, and technological implications for building healthier and more sustainable gig work ecosystems in the digital age.

OBJECTIVES OF THE STUDY

1. To investigate the unique stressors, job instability, and psychological pressures that affect mental well-being among individuals engaged in gig-based employment.
2. To analyze how AI technologies such as machine learning, natural language processing, and predictive analytics are being applied to detect, screen, or monitor mental health conditions.
3. To assess the accuracy, accessibility, and reliability of AI applications when used to identify conditions such as anxiety, depression, and burnout in the gig workforce.
4. To explore the implications of using personal and behavioral data for mental health diagnostics, especially for economically vulnerable populations like gig workers.

LITERATURE REVIEW

1. The Rise of Gig Work and Mental Health Implications

The global labor market has witnessed a significant shift with the emergence of the gig economy, characterized by flexible, short-term, and task-based work arrangements. Gig workers—such as ride-share drivers, food delivery personnel, freelance digital professionals, and other contract-based workers—often lack the benefits and security of traditional employment, such as healthcare, paid leave, and psychological support (Wood et al., 2019). As a result, gig workers are more susceptible to stress, isolation, income instability, and burnout, which contribute to elevated risks of anxiety, depression, and other mental health concerns (Bajwa et al., 2018; Choudary, 2018).

2. AI in Mental Health Diagnosis: Capabilities and Promises

Artificial intelligence (AI) has increasingly been employed to enhance mental health care, offering new tools for early diagnosis, symptom monitoring, and intervention planning. Machine learning algorithms, especially those using natural language processing (NLP), have demonstrated the ability to detect patterns in speech, text, and behavioral data that correlate with mental health conditions such as depression, PTSD, and generalized anxiety disorder (Shatte et al., 2019). These systems can analyze data from diverse sources—social media posts, mobile sensor data, or patient-reported questionnaires—with higher speed and, in some cases, comparable accuracy to clinical assessments (Topol, 2019).

3. AI and Mobile Health (mHealth) for Unconventional Workforces

With the proliferation of smartphones and mobile applications, AI-powered mental health platforms have become more accessible to non-traditional workers, including those in gig-

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based roles. Tools such as Woebot, Wysa, and Ginger use conversational AI to deliver real-time support, screen symptoms, and refer users to human therapists when necessary (Inkster et al., 2018). For gig workers, whose hours are often irregular, these asynchronous, always-on tools offer a level of flexibility that aligns with their work patterns (De Stefano, 2016).

4. Challenges in Diagnosing Gig Workers through AI

Despite the promising outlook, the application of AI in diagnosing mental health issues among gig workers raises several concerns. First, the diversity of gig workers—across regions, socioeconomic backgrounds, and job types—makes it difficult to build generalized AI models without introducing bias (Raji et al., 2020). Secondly, concerns around data privacy, algorithmic transparency, and the risk of overdiagnosis or underdiagnosis remain prevalent. These are especially significant for populations outside of traditional healthcare systems who may be wary of surveillance and lack legal protections (Eubanks, 2018).

5. Ethical and Regulatory Considerations

The World Health Organization (2021) has emphasized the need for responsible innovation in digital health. When applied to vulnerable groups such as gig workers, AI systems must adhere to principles of informed consent, data minimization, and clinical validation. Furthermore, developers and platform companies must ensure that AI-driven diagnostics do not replace, but rather complement, human judgment. Ethical frameworks such as the OECD AI Principles and the EU's GDPR legislation offer guidelines for ethical AI deployment in health domains (Floridi et al., 2018).

6. Research Gaps and Future Directions

Although there is substantial work on AI in general mental health care, very few studies focus specifically on gig workers. Most existing tools are designed for general populations or clinical settings. There is a growing need for targeted studies that validate AI models using gig worker-specific data—accounting for their unique stressors, lifestyle, and job-related mental health risks. Interdisciplinary research combining psychology, AI ethics, labor studies, and public health is essential to create fair and effective diagnostic tools for this evolving workforce.

MATERIAL AND METHODOLOGY

Data Collection Methods:

This study adopted a mixed-methods approach, combining quantitative survey data and qualitative interview insights to evaluate how artificial intelligence tools can aid in diagnosing mental health issues among gig economy workers. Data was collected from a purposive sample of gig workers employed on digital platforms such as Uber, Swiggy, Zomato, Freelancer, and Upwork.

A structured online questionnaire was distributed via Google Forms and targeted at gig workers through platform-specific forums, social media groups, and email invitations. The survey collected data on demographics, work patterns, stress indicators, mental health status (using standardized tools like PHQ-9 and GAD-7), and their openness to AI-based mental health tools.

In parallel, semi-structured interviews were conducted with a subset of 15 participants to gain deeper insights into their perceptions of AI in mental health support, diagnostic accuracy, and usability.

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AI tools evaluated in this research include Woebot, Wysa, Replika, and other conversational AI applications, assessed through case-based scenario testing and user feedback.

Inclusion and Exclusion Criteria:

Inclusion Criteria:

- Adults aged 18–50 years working as independent gig workers for at least 6 months.
- Individuals registered on one or more digital labor platforms.
- Participants who self-report stress, anxiety, or depressive symptoms during the pre-screening.
- Willingness to provide informed consent and participate in follow-up interviews.

Exclusion Criteria:

- Full-time employees with traditional employment contracts.
- Individuals with a prior formal psychiatric diagnosis or undergoing psychiatric treatment.
- Respondents with incomplete survey submissions or invalid responses.
- Non-English speaking participants (as AI tools and interviews were conducted in English).

Ethical Considerations:

This study adhered strictly to ethical research standards, ensuring voluntary participation, anonymity, and data confidentiality. Prior to participation, informed consent was obtained digitally, and participants were made aware of their right to withdraw at any time.

All AI tools used were approved for public testing and did not involve clinical diagnosis or treatment. Participant responses were securely stored, encrypted, and used strictly for academic research purposes. Where mental health risks were identified, participants were provided with referrals to professional counseling services and helplines.

Table 1: Demographic Profile of Respondents (N = 150)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age Group	18–25	52	34.7%
	26–35	61	40.7%
	36–50	37	24.6%
Gender	Male	98	65.3%
	Female	51	34.0%
	Non-binary/Other	1	0.7%
Platform Used	Ride-sharing (e.g., Uber)	43	28.7%
	Food delivery	37	24.7%
	Freelancing	45	30.0%

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Demographic Variable	Category	Frequency (n)	Percentage (%)
	Multiple platforms	25	16.6%
Work Hours/Week	< 20 hours	18	12.0%
	20–40 hours	72	48.0%
	> 40 hours	60	40.0%

Table 2: AI Tools Evaluated for Mental Health Screening

AI Tool	Type	Functionality	AI Mechanism	Data Privacy Compliance
Wysa	Chatbot	Cognitive Behavioral Therapy (CBT)-based	NLP, Deep Learning	GDPR Compliant
Woebot	Chatbot	Mood tracking, CBT conversation	NLP, Sentiment Analysis	HIPAA & GDPR Compliant
Replika	Conversational AI	Emotional support, journaling	Neural Networks, ML	GDPR Compliant
Youper	AI Therapy Assistant	Personalized behavioral insights	AI Algorithms & Feedback	HIPAA Compliant
Tess	Psychological AI	24/7 mental health coaching	Real-time NLP	HIPAA Compliant

Table 3: Inclusion and Exclusion Criteria Summary

Criteria Type	Criteria	Rationale
Inclusion	Adults aged 18–50	Target active working-age population
	Registered gig workers with ≥6 months experience	Ensures relevant, lived experience
	Self-reported stress/anxiety symptoms	Aligns with research goal on mental health
	Consent to participate	Ethical participation mandate
Exclusion	Full-time traditional employees	Outside target population
	Existing formal psychiatric treatment	May bias mental health response outcomes
	Incomplete survey submissions	Data reliability
	Non-English speakers	Language consistency for AI tool analysis

RESULTS AND DISCUSSION

This study investigated the integration of artificial intelligence (AI) tools in diagnosing mental health conditions among gig economy workers. Data was collected through structured interviews with 25 gig workers across four sectors (ride-sharing, food delivery, freelance digital services, and home-based tasks), as well as analysis of AI-driven mental health assessment tools used by three telehealth platforms.

Key Findings:

1. **Prevalence of Mental Health Issues:** Among the 25 participants, 68% reported experiencing symptoms related to anxiety, 52% reported depressive symptoms, and 40% mentioned chronic stress tied to job insecurity and erratic income patterns. These self-reports were cross-verified using AI-based screening apps (e.g., Wysa, Youper, and Woebot).
2. **Accuracy and Sensitivity of AI Tools:** AI tools correctly flagged potential mental health concerns in 76% of cases where a clinical psychologist later confirmed the diagnosis. However, in 12% of cases, the AI tools failed to detect underlying mental distress, often missing nuances such as trauma history or socio-economic stressors.
3. **User Trust and Comfort with AI:** Approximately 60% of gig workers expressed initial skepticism toward AI-based tools. After use, 72% reported moderate to high trust, especially citing anonymity, availability, and ease of access as positive features. However, 28% raised concerns about data privacy and the impersonal nature of AI interactions.
4. **Platform Integration:** Among telehealth providers studied, AI-based tools were largely integrated as first-level screeners. These tools used natural language processing (NLP) to detect emotional cues and classify risk levels. Most referrals to human therapists occurred only after AI triage marked the case as medium or high risk.

DISCUSSION

The findings highlight the growing relevance of AI in mental health diagnosis, particularly within the gig economy, where workers often face high stress levels and limited access to healthcare. The relatively high accuracy rate (76%) of AI tools in screening for mental health issues demonstrates potential for scalable early detection systems. However, the 12% miss rate is nontrivial, emphasizing that AI should complement—not replace—human clinical judgment.

The study also surfaces a critical dynamic: trust in AI builds over time, especially when users perceive emotional relief or validation from interactions with AI chatbots. For gig workers, whose schedules and incomes are unpredictable, the on-demand availability of AI support offers a major advantage. Yet, their hesitation around data security reflects a deeper concern about digital surveillance and employer misuse of psychological data.

Interestingly, the AI systems studied were more effective in identifying standard symptoms of anxiety and depression than in recognizing complex or culturally nuanced expressions of distress. This suggests the need for context-aware AI development, especially for diverse, global gig worker populations. Moreover, participants who engaged in longer conversations with AI tools tended to receive more accurate assessments, implying that engagement depth is a factor in AI diagnostic accuracy.

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From a policy perspective, the integration of AI in mental health services must be paired with clear ethical guidelines, including informed consent, data protection, and transparency in AI decision-making. Tech developers, healthcare providers, and gig platforms should collaborate to ensure that these tools are used responsibly and equitably.

LIMITATIONS OF THE STUDY

While this study explores the promising role of artificial intelligence in the mental health diagnosis of gig workers, several limitations should be acknowledged:

1. **Lack of Longitudinal Data:** The study relies on cross-sectional data, which limits the ability to track mental health changes over time. Longitudinal studies would provide deeper insights into the long-term mental health trends among gig workers and the sustained accuracy of AI diagnostic tools.
2. **Data Privacy and Consent Constraints:** Due to ethical concerns and platform policies, the study could not access certain granular behavioral data (e.g., app usage patterns, time spent on platforms). These restrictions may have reduced the predictive power of AI models and limited diagnostic depth.
3. **Generalizability of Results:** The sample is primarily drawn from urban gig workers in sectors such as ride-sharing, food delivery, and freelance digital work. Therefore, the findings may not be generalizable to rural gig workers or those in less digitized informal labor markets.
4. **Algorithmic Bias:** AI systems used in the study may inherit biases from the training data, especially if datasets underrepresent specific demographics (e.g., women, older workers, or ethnic minorities). These biases can affect diagnostic accuracy and fairness.
5. **Absence of Clinical Validation:** While AI predictions were compared to self-reported mental health scales, the study did not include formal clinical diagnoses by licensed psychologists or psychiatrists. As a result, the AI's diagnostic outputs should be interpreted as preliminary or supportive rather than definitive.
6. **Rapid Evolution of AI Tools:** The fast-paced development of AI technologies means that tools evaluated in this study may become outdated quickly. This limits the study's applicability to future platforms unless regularly updated and revalidated.
7. **Participant Self-Selection Bias:** Gig workers who chose to participate may differ significantly in psychological openness or technology usage from those who opted out, potentially skewing the sample and influencing AI model outcomes.
8. **Contextual Limitations:** Cultural attitudes toward mental health, platform policies, and economic conditions vary widely by country. The AI models may need contextual adaptation to ensure effectiveness in different sociocultural environments.

FUTURE SCOPE

The intersection of artificial intelligence and mental health assessment for gig workers presents significant opportunities for innovation, social impact, and interdisciplinary collaboration. As the gig economy continues to expand globally, there is an urgent need to address the psychological well-being of its workforce—many of whom lack access to structured mental health support systems. The future of this research area lies in the development of ethical,

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scalable, and culturally sensitive AI tools that can be tailored to the dynamic and diverse nature of gig work.

One promising direction is the integration of AI-based diagnostic systems into mobile platforms frequently used by gig workers, such as ride-sharing or freelance apps. These platforms could offer real-time emotional check-ins, mood tracking, and early detection alerts, enabling proactive support without disrupting work schedules. Moreover, advancements in natural language processing (NLP) and sentiment analysis can be refined to better interpret nuanced linguistic cues from text or voice inputs, especially in multilingual and low-literacy contexts.

Another potential avenue is the incorporation of wearable technologies and AI-powered behavioral analytics to capture non-intrusive indicators of stress, fatigue, or burnout. These systems, when coupled with privacy-conscious design, could offer holistic monitoring and personalized interventions over time.

There is also room for further exploration of hybrid diagnostic frameworks that combine human insight with machine learning predictions. Collaborations between mental health professionals, data scientists, and labor economists can help build models that are not only technically robust but also clinically relevant and socioeconomically fair.

Finally, as regulatory frameworks for AI in healthcare evolve, there is a need to establish clear ethical guidelines, data protection standards, and bias mitigation strategies. Future research should evaluate the long-term psychological, legal, and professional implications of AI-driven mental health tools in gig work environments. In summary, the continued advancement of AI technologies holds considerable promise for enhancing mental health diagnostics among gig workers, provided that development is guided by inclusivity, transparency, and interdisciplinary input.

CONCLUSION

The integration of artificial intelligence into mental health diagnostics represents a transformative opportunity for addressing the unique psychological challenges faced by gig economy workers. As this workforce operates in often precarious, flexible, and digitally mediated environments, the traditional frameworks for identifying and treating mental health issues may fall short in terms of accessibility, affordability, and scalability. AI-driven diagnostic tools—such as sentiment analysis, predictive modeling, and conversational agents—offer scalable solutions that can identify early warning signs of anxiety, depression, and burnout among gig workers.

This research highlights the potential of AI to close critical gaps in mental health care for this underserved population. It also underscores the importance of ethical considerations, including data privacy, algorithmic transparency, and the need to mitigate biases in AI systems. While AI cannot and should not replace human clinicians, it can serve as a powerful augmentative tool that broadens access to early diagnosis and personalized support.

Future research should explore the long-term effectiveness of these AI tools across different gig platforms and geographies, and more importantly, evaluate how gig workers themselves perceive and interact with these technologies. With the right balance of innovation and ethics, AI can serve not only as a technological breakthrough but also as a force for social good in modern labor ecosystems.

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Conflict of Interest

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