

Trainee Well-Being in the Digital Age: Correlations Between Use of Artificial Intelligence and Burnout, Distress, and Program Satisfaction

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Abstract

Introduction: The emerging integration and use of artificial intelligence (AI) in medical education have been well-documented. This study aimed to examine patterns of AI use among medical residents and other medical trainees as well as associations between amount of use and burnout, distress, and program satisfaction.

Methods: Medical trainees (N = 74) at a rural teaching hospital completed an anonymous electronic survey. We used Pearson's correlation to examine associations.

Results: We found a significant negative correlation between AI use and burnout. We found a significant positive correlation between AI use and distress. We found no significant association between AI use and program satisfaction.

Conclusions: Research that examines the adaptation or introduction of new technology or AI use into clinical or education settings over time would allow for a clearer examination of the impact of AI on medical trainee distress and burnout.

Introduction

The emerging integration and use of artificial intelligence (AI) in medical education have been well-documented.¹⁻³ AI has been used for preclinical education such as biochemistry, histopathology, and anatomy. It also has been documented as a form of support for medical students in their preparation for major examinations, residency applications, and/or interviews.^{4,5} AI has been shown to be effective in assisting with teaching related to diagnostic skills, evaluating trainee performance, and improving practical skills and simulations.¹ Among physicians, it also has been identified as a potential resource that might mitigate physician burnout that results from documentation time and clinical inefficiencies.^{6,7} Use of AI may reduce administrative burden that drives burnout but also runs the risk of overreliance and perpetuating inequities in AI integration.^{7,8}

The burnout rates are substantial for residents in both surgical and nonsurgical programs.⁹ Burnout can lead to increased medical errors, poor performance, or absenteeism.⁹ While medical trainees often perceive AI to

be beneficial,^{1,10} additional research is needed to explore the impact of AI on medical trainees' burnout and program satisfaction.

This study aimed to examine patterns of AI use among medical trainees as well as associations between amount of use and burnout, distress, and program satisfaction. Specifically, it examined AI use for educational tasks such as educational resources and/or studying. We expected those who used AI to report lower levels of burnout and distress.

Methods

Participants included medical residents and fellows who were recruited from a rural teaching hospital in Pennsylvania. Residents were recruited from multiple programs (Table 1), and a QR code was distributed by research staff during regular in-person group meetings. Those who completed an anonymous electronic survey received a cafe voucher. All procedures were approved by the Institutional Review Board of the Guthrie Medical Group.

The survey included demographic information, questions related to AI use,¹¹ program satisfaction,¹² and the physician wellness inventory (PWI).¹³ Measures of distress included the perceived stress scale, 4 item (PSS-4)¹⁴ and the distress subscale of the PWI; we used the single item from the Mini-Z as a measure of burnout (0 = none to 5 = completely burned out).¹⁵ Despite some psychometric limitations of the PSS-4, we chose it to minimize participant burden and fatigue effects.

We calculated total AI use by summing responses across the six Likert-scale questions assessing frequency of use of AI for different reasons (0 = never to 7 = frequently). Reasons included looking up medical information, writing emails or completing clerical tasks, creating study decks/cards, completing lower priority assignments or presentations, and composing personal statements for interviews. While not a previously validated measure, reliability analysis indicated $\alpha = 0.73$. The measures used in this study are available from the corresponding author upon reasonable request.

We used Pearson's correlation to examine associations between use of AI and burnout, distress, and program satisfaction. We retained the full sample for baseline characteristics and used pairwise deletion for bivariate correlations reported in Table 2.

Results

Participants included 74 medical trainees (71% response rate). Respondents identified as predominantly Asian or Pacific Islander (45.9%, $N = 47.2$) or White (37.8%, $N = 28$) and were an average age of 30.9 years ($SD = 3.2$). Most identified as male (54.1%, $N = 40$) and most were training in primary care (38.3%, $N = 23$). See Table 1 for demographic information.

On average, respondents indicated that they used AI "sometimes" for educational tasks ($M = 3.7$, $SD = 1.3$). We found a significant negative correlation between AI use and burnout ($r = -0.40$, $P < 0.001$), indicating that those who reported greater use of AI reported less burnout. A significant positive correlation was found between AI use and distress ($r = 0.27$, $P < 0.05$), indicating that greater AI use was associated with greater distress. We found no significant association between AI use and program satisfaction. Burnout and distress were both negatively correlated with trainees' program satisfaction and willingness to recommend their programs. See Table 2 for the correlation matrix.

Discussion

Our study results support several of our initial hypotheses. Notably, individuals with higher levels of AI use reported lower levels of burnout. This finding is consistent with evidence that suggests burnout is driven, in part, by administrative burden,¹⁶ which AI may ultimately decrease.

Concurrently, providers who had high self-reported use of AI also reported greater levels of distress. While this finding may appear contradictory, a possibility is that burnout, a construct that examines a chronic state of a workplace syndrome, may be lower due to use of time-saving tools; while distress, a current state of emotional suffering, can be higher; and vice versa. In addition, cultivating physician well-being is not merely a matter of promoting an absence of burnout or distress¹⁷; further research is needed to examine how AI might impact overall well-being.⁷

Limitations

Our study had some limitations. First, the amount of educational and work demand was not measured and/or controlled among the sample; whether increased distress also may have been due to any confounding variables (eg, increased work demand) is unclear. Second, this study was limited by the lack of generalizability of this single-site, one-time survey in a rural sample. We found no significant association between program satisfaction or willingness to recommend a program's use of AI. While this study may have been underpowered to detect an effect, exploring these constructs with larger samples may be useful.

Third, some portions of this study were adapted from previous research but have not been validated, which limits their validity and reliability. While abbreviated measures such as the PSS-4 were selected to prevent respondent fatigue and dropout, limitations of these measures may fail to adequately capture nuanced dimensions of distress. Fourth, AI use in this study did not differentiate between AI use such as ambient software technologies that are being rapidly integrated into clinic settings and may be more relevant for day-to-day clinical use. While this study did ask about specific areas in which AI was used (eg, looking up medical information, writing emails or completing clerical tasks, creating study decks/cards, and composing personal statements for interviews), it did not ask about specific resources being using. The way in which AI was measured was limited, as it does not allow for a specific and objective quantity (eg, how many times and for how long someone used AI). Finally, the correlational nature of this study prevented conclusions about causality and potential mediating variables.

Conclusions

Research that examines the adaptation or introduction of new technology or AI use into clinical or education settings over time with delayed treatment control groups, would allow for a clearer examination of the impact of AI on medical trainee distress and burnout. In addition, usage of AI in medical education may be specialty-specific; further research might consider use of qualitative or quantitative methods to examine differences among specialties. Ultimately, continued study of AI and its incorporation into medical education will be important to determine its impact and whether it increases or reduces the demands and distress experienced by medical trainees.

Conflicts of Interest

The authors have no conflicts of interest to report.

Author Contributions

Danielle Terry was responsible for the study design, data collection and analysis, writing and editing. Brandon Gonzalez assisted with the study design and write-up.

Use of Artificial Intelligence

There was no use of Artificial Intelligence in the research question, study design, data collection, analysis or write up.

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Table 1. Demographic Information (N=74)

Characteristics	n (%)	M(SD)
Age	74	30.9(3.3)
Gender		
Female	34 (45.9)	–
Male	40 (54.1)	–
Trans/nonbinary	0	–
Race/ethnicity		
American Indian	0	–
Asian	34 (47.2)	–
African American	3 (4.2)	–
Hispanic/Latino	1 (1.4)	–
White/Caucasian	28 (38.9)	–
Other	6 (8.1)	–
Specialty		
Cardiovascular	5 (6.8)	–
Emergency medicine	8 (11.0)	–
Family medicine	13 (17.8)	–
Gastroenterology	3 (4.1)	–
Internal medicine	15 (20.5)	–
Orthopedic surgery	8 (11.0)	–
Surgery	20 (27.4)	–
Medical student	1 (1.4)	–
PWI-distress	72	3.7 (1.7)
PSS-4	71	6.0 (2.7)
Mini-Z	72	3.7 (1.7)

Abbreviations: M, mean; PSS-4, perceived stress scale, four-item; PWI-distress, physician wellness inventory, distress subscale; SD, standard deviation

Table 2. Correlations of Study Variables (N=74)

Variable	1	2	3	4	5	6
1. Total AI	–					
2. PWI-distress	.27 ^a	–				
3. PSS-4	–.12	.68 ^b	–			
4. Mini-Z	–.40 ^b	.44 ^b	.43 ^b	–		
5. Program satisfaction	0.08	–.33 ^b	–.37 ^b	–.25 ^b	–	
6. Program recommend	0.08	–.17	–.24 ^a	–.30 ^a	.73 ^b	–

Note: Pairwise deletion was used for missing data.

^aCorrelation is significant at the <.05 level.

^bCorrelation is significant at the <.01 level.

Abbreviations: AI, artificial intelligence; PSS-4, perceived stress scale, four-item; PWI-distress, physician wellness inventory, distress subscale

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