Does profession matter toward perception of Wearable Technology for Health Monitoring in the field?

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Introduction

Hazardous materials (HAZMAT) pose risk to health and safety of professionals involved with emergency response and transportation. Wearable technology is a tool to assist with monitoring the health of professionals involved in HAZMAT events. The REaCH (Real-Time Emergency Communication System for HAZMAT Incidents) application was created for real-time monitoring of the two occupational groups through wearable devices to capture health indicators and environmental exposures

Objective

The aim of our exploratory study was to compare and evaluate the perceptions of first responders (FR) and professional truck drivers (PTD) on wearable technology and attitudes toward real-time health monitoring.

Research Questions

1. Do first responders and professional drivers differ in their history of using wearable technology?
2. Do the two professions differ in their views of who should monitor their health data collected using wearable technology?
3. Do the two professions differ in acceptance of monitoring different health indicators?
4. Are there patterns in the acceptance of monitoring specific health indicators in the sample of the two professions?
5. What factors such as a history of using wearable technology, exposure to HAZMAT, or views on who should monitor health data explain any patterns identified in the acceptance of measuring health indicators?
6. What are the barriers of use for these professions using wearable technology?

Methods

- A 16-question self-administered survey for both first responders and professional truck drivers.
- There were 113 and 218 respondents used for analysis for first responders and professional truck drivers, respectively. The final sample with completed data was N=261.
- Statistical approach included bivariate analysis, latent class analysis, logistic regression analysis, and path analysis for the variables of interest.

Data Analysis/Results

Professional drivers were more likely to have a history of wearable technology use compared to first responders (OR=10.1; CI 4.42,22.9), reported greater exposure to HAZMAT (OR=4.32; CI 2.24-8.32), and were more willing to have their health data monitored by someone other than themselves (OR=9.27; CI 3.67, 23.4).

Multinomial regression model with three classes revealed that occupation was not significant predictor of class preference for high or low acceptance of monitoring specific health indicators.

Figure 1. Estimated probability of class inclusion for 13 possible health parameters
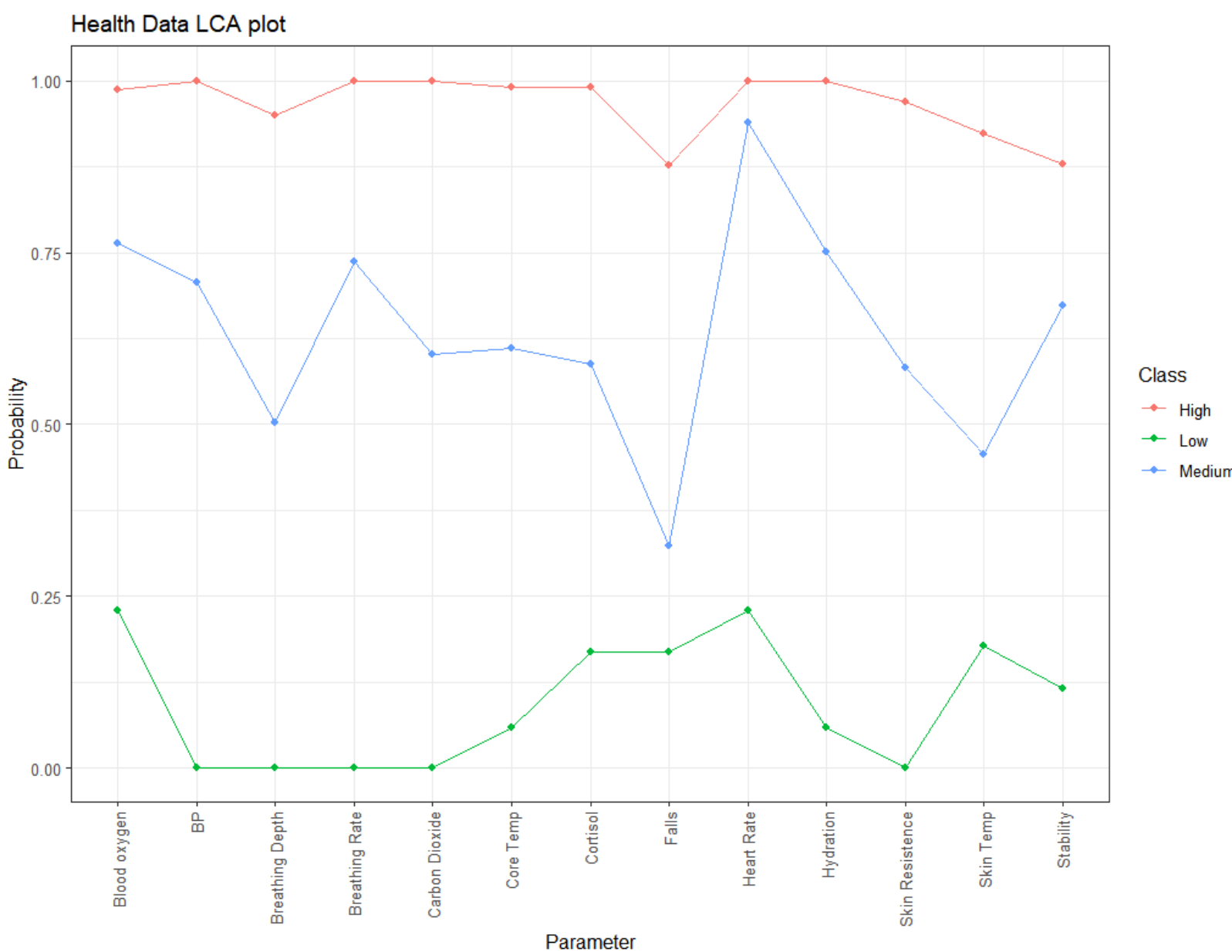

Figure 2 : The path analysis shows that being a professional driver mediates the relationship between hazmat and preferring that others monitor personal health data. The chi-square statistics was not significant (p=0.68), the CFI and TLI were 1.00, and RMSEA was 0.
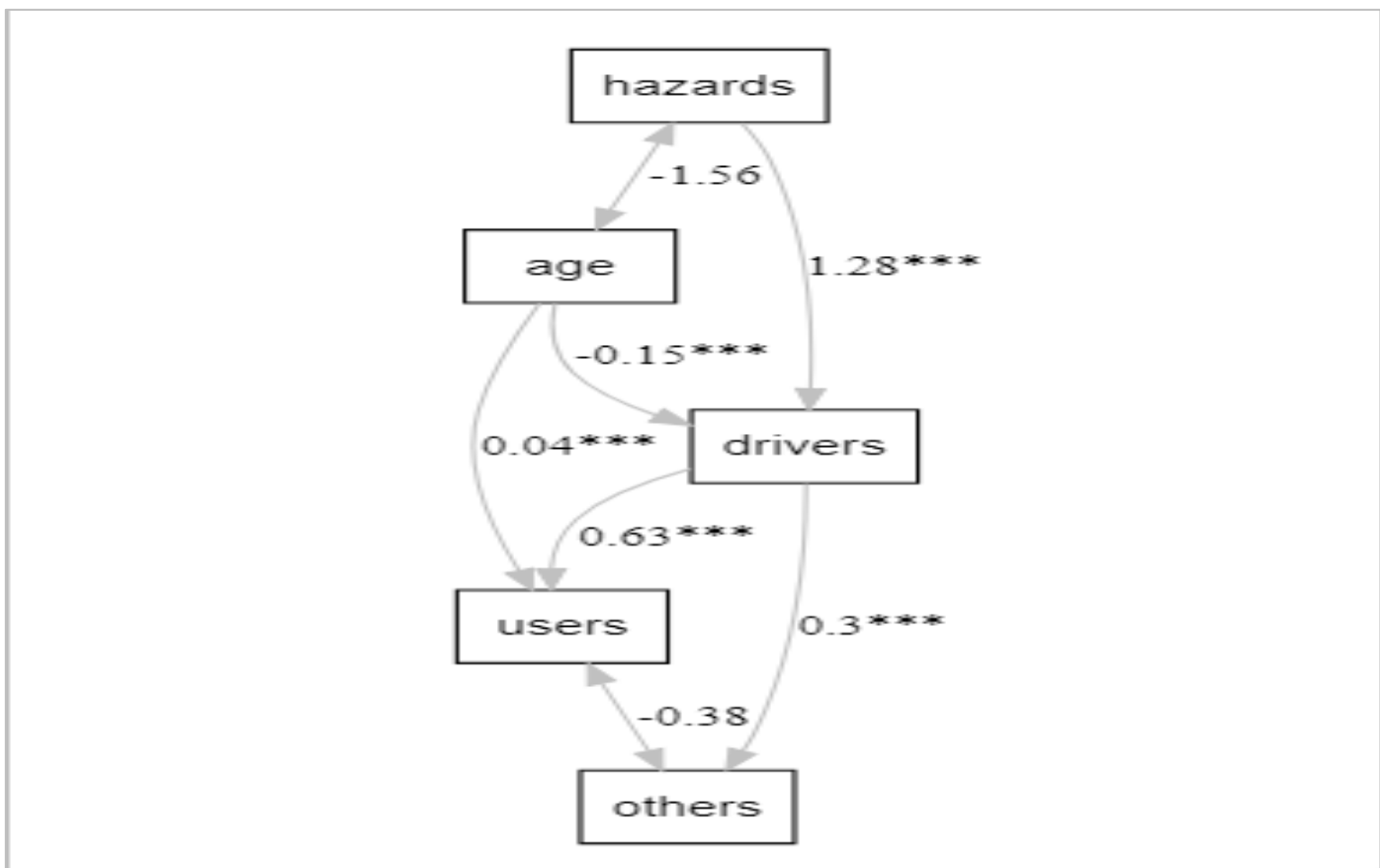

Table 1. Characteristics of first responders (n=112) and professional drivers (n=159) and their preferences for monitoring health parameters using wearable technology grouped by statistically significant differences at p<0.05

Variable	FR n (%)	PTD n (%)	Chi-square (p)
Ever used wearable technology			
Yes	46 (45.1)	142 (89.9)	62.0
No	56 (54.9)	16 (10.1)	(0.02)
Exposed to hazardous materials at work			
Yes	31 (30.7)	117 (75.0)	49.3
No	70 (69.3)	39 (25.0)	(<0.0001)
Preferred person to monitor health data			
No one	2 (2.0)	2 (1.26)	
Myself	25 (25.0)	34 (21.4)	
Someone else	10 (10.0)	67 (42.1)	32.2
Myself and someone else	63 (63.0)	56 (35.2)	(<0.0001)

Table 2. First responders (n=112) and professional drivers (n=159) preferences for monitoring health parameters using wearable technology grouped by statistically significant differences at p<0.05

Variable	FR n (%)	PTD n (%)	Chi-square (p)
Heart rate			
Yes	100 (98.0)	140 (88.1)	8.38
No	12 (2.0)	19 (11.9)	(0.004)
Blood Pressure			
Yes	95 (93.1)	110 (69.2)	21.2
No	7 (6.9)	49 (30.8)	(<0.0001)
Core Body Temperature			
Yes	91 (89.2)	101 (63.5)	21.1
No	11 (10.8)	58 (36.5)	(<0.0001)
Stability			
Yes	48 (47.1)	141 (88.7)	53.9
No	54 (52.9)	18 (11.3)	(<0.0001)
Blood oxygen levels			
Yes	93 (91.2)	122 (76.7)	8.93
No	9 (8.8)	37 (23.3)	(0.003)
Respiration CO2 levels			
Yes	87 (85.3)	104 (65.4)	12.5
No	15 (14.7)	55 (34.6)	(0.0004)
Cortisol Levels (stress)			
Yes	88 (86.3)	103 (64.8)	14.6
No	14 (13.7)	56 (35.2)	(0.0001)

Key Findings

1. Professional drivers were more likely to have a history of wearable technology use. **(Table 1)**
2. Professional drivers were more willing to have someone other than themselves monitor their health data
3. There were significant differences between first responders' and professional drivers' acceptance of monitoring certain health indicators **(Table 2)**
4. Characteristics of professional truck drivers including age, exposure to HAZMAT, and wearable technology use were correlated with class inclusion for those that with strong acceptability for health monitoring **(Figure 1)**
5. Acceptance of someone else monitoring health data was a strong predictor for using wearable technology among the professional truck driver group **(Table 1)**
6. Barriers for both occupations were lack of interest. Barriers among first responders were durability and cost while among professional drivers was lack of owning wearable devices.

Conclusion

This study successfully compared the two occupational groups using the six research questions via strong statistical models, which provided plausible effect on the direction of variables that impacted perceptions of health monitoring between the two groups. This is important for further investigation of additional factors that might influence attitudes toward wearable technology application for monitoring of health and safety of workers in dangerous occupations involving HAZMAT.

Acknowledgements

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