

Potential applications of AI in enhancing occupational safety: sociological perspectives from Kazakhstan.

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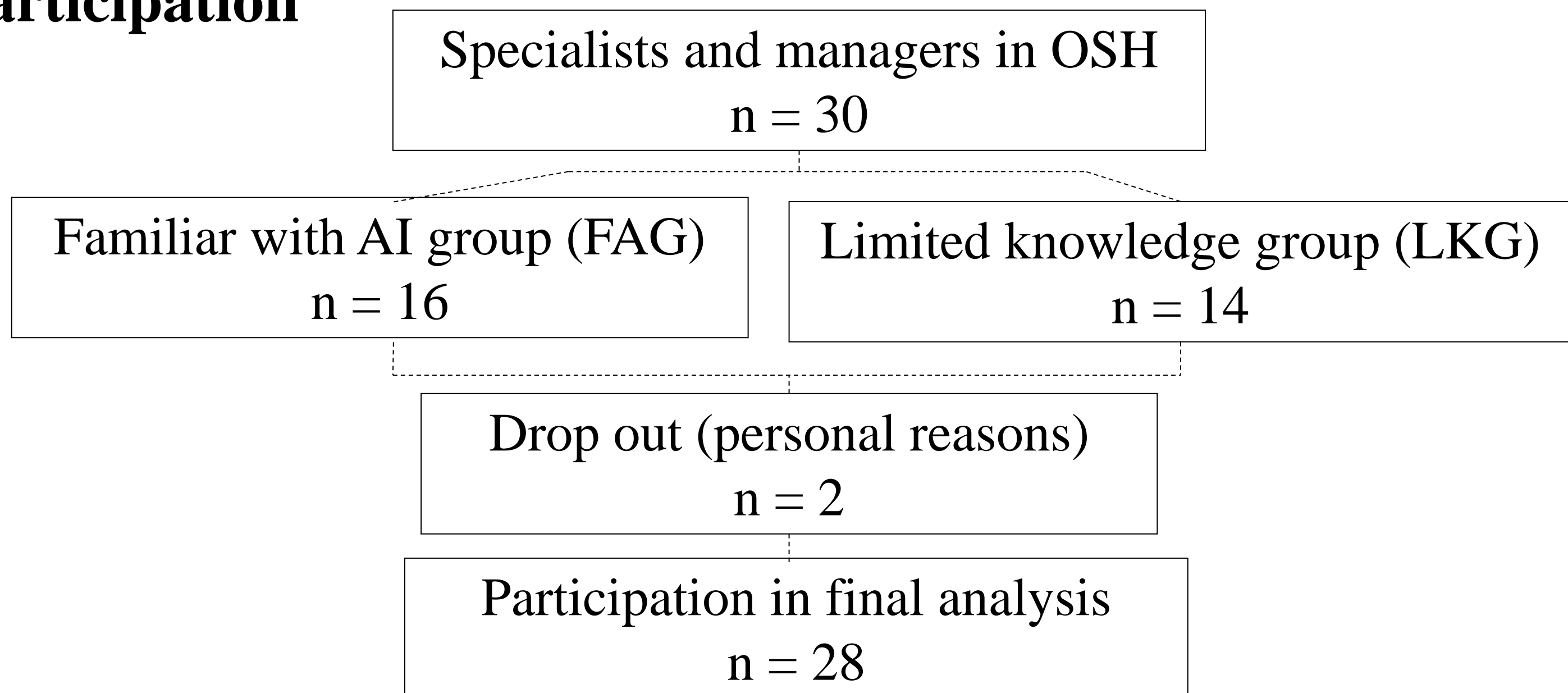
SUMMARY

This study investigates the sociological preparedness of occupational safety and health (OSH) professionals in Kazakhstan for the integration of artificial intelligence (AI). The results of the survey reveal that a majority of respondents, predominantly aged 45 and older, display moderate familiarity with AI, with many indicating limited knowledge of the technology. The primary AI applications deemed valuable by respondents include risk assessment (15 respondents) and compliance monitoring (12 respondents), although levels of trust in these applications vary significantly. Major concerns identified pertain to information gaps (13 respondents), the perceived complexity of AI systems, and issues of reliability, particularly regarding phenomena such as AI hallucinations. These findings underscore the sociocultural and informational barriers that must be addressed to facilitate the adoption of AI in OSH. This research was supported by the MSHE Science Committee, Kazakhstan (Project No. BR21882302).

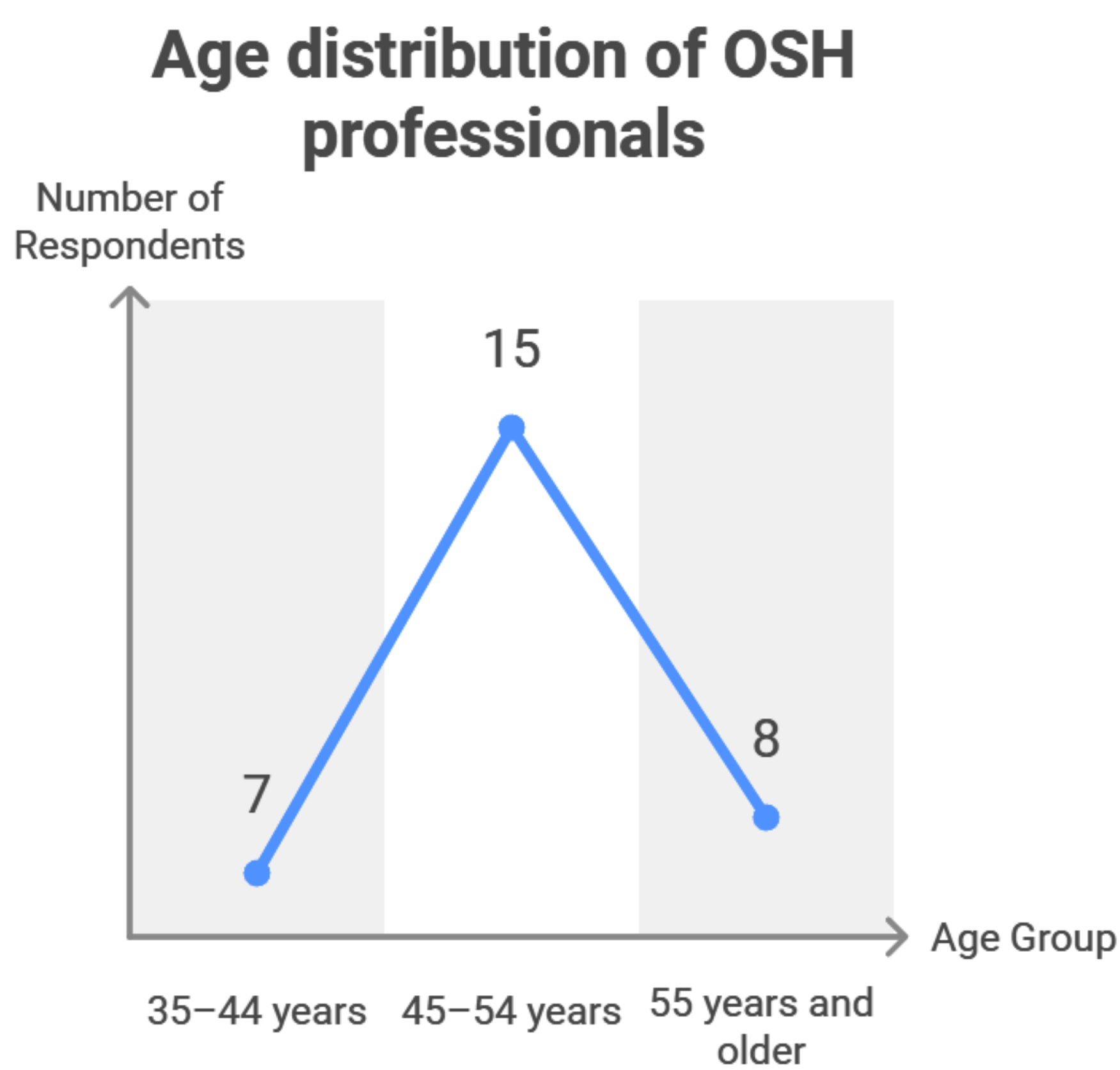
Introduction

AI technologies are increasingly acknowledged for their potential to augment OSH practices. However, the sociocultural readiness of workers and managers is critical for the successful integration of AI into OSH, particularly in Kazakhstan, where factors such as age and experience significantly influence technology adoption. This study investigates the familiarity of OSH professionals with AI, their perceptions regarding its applications, and the sociocultural barriers to acceptance. It aims to elucidate the preparedness of Kazakhstan's workforce for AI-driven transformations in safety practices.

Participation



Participant characteristics at baseline



The responses indicate a generally positive yet cautious attitude towards the application of artificial intelligence (AI) in OSH. Specifically, 7 respondents expressed full trust in AI, 18 indicated partial trust, 3 reported slight distrust, and none expressed complete distrust. This distribution suggests a moderate level of confidence in AI, accompanied by certain reservations.

Results

The main concerns raised by respondents included a lack of information (cited by 14 respondents as a barrier to trust), the perceived complexity of AI systems (3 respondents), and reliability issues, such as AI "hallucinations" (2 respondents). Job security was also a concern, with 2 respondents fearing potential job displacement due to AI. Additional comments included the suggestion by one respondent that full automation of OSH processes is necessary for effective AI integration, while another respondent noted having no concerns but mentioned a limitation in the response options provided. When asked about AI's potential to improve workplace safety, 11 respondents answered "Yes, definitely", 8 answered "Probably yes," and 3 were "Uncertain." No respondents expressed outright skepticism, indicating overall optimism about AI's potential in OSH, though a few remain hesitant.

Conclusion

AI presents significant potential advantages for OSH in Kazakhstan; however, its adoption is impeded by challenges related to costs, infrastructure, and sociocultural factors. Effectively addressing these challenges through targeted education, regulatory support, and the establishment of trust will be crucial for the successful integration of AI in this domain.

Purpose

To evaluate the sociocultural readiness of Kazakhstan's OSH professionals for the integration of artificial intelligence (AI). This evaluation will focus on their familiarity with AI, perceived benefits, and concerns, in order to identify key factors influencing the acceptance of AI in workplace safety.

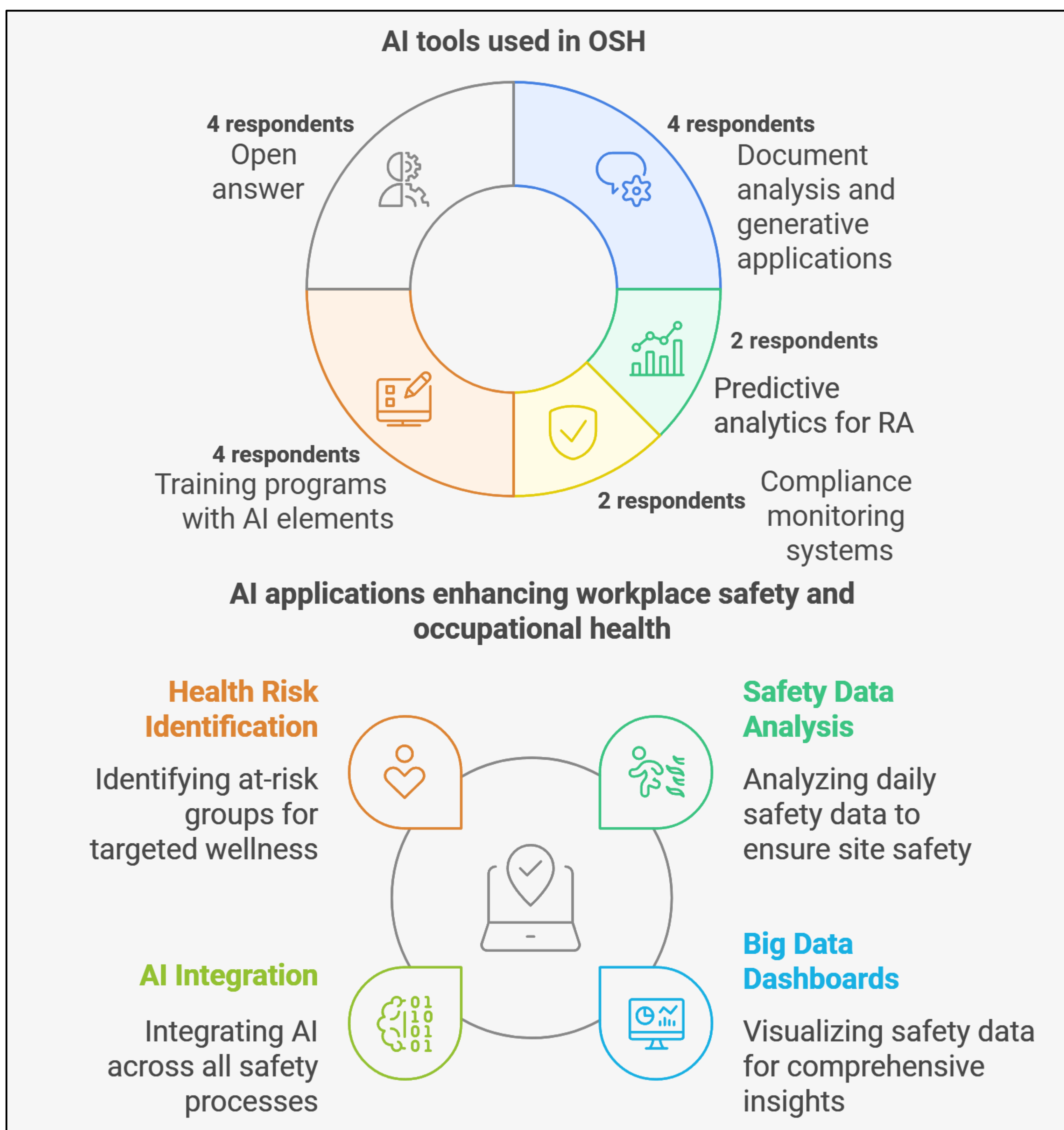
Measurement

Survey (online interview format by Teams Microsoft)

- Measured familiarity with AI concepts and perceived applications.
- All interview respondents were over 35.
- Consists of 8 questions.

Contingency question format (CQF)

Do you use any of the following AI tools in your work in occupational safety and health (OSH): Effects of CQF



Literature review

AI has strong potential to improve OSH through proactive risk management, training, and compliance monitoring (Tang, 2024; Shah & Mishra, 2024). In Kazakhstan, adoption faces barriers, including high costs, limited infrastructure, and a shortage of skilled personnel (Tang, 2024). Sociocultural factors, such as resistance to change and low technological literacy, further hinder acceptance (Johnson et al., 2024). Distrust, especially among older workers, is heightened by AI "hallucinations", emphasizing the need for targeted education to build trust (Johnson et al., 2024). Addressing these barriers with capacity-building and regulatory support could bridge knowledge gaps and prepare the workforce for AI integration (Johnson et al., 2024). AI's ability to automate safety processes could reduce human error and improve safety outcomes, though ethical concerns and clear communication remain crucial (Rybak & Hassall, 2024).