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Experience, Knowledge, and Risk Perception Among Adventure Tourism Workers in Yogyakarta

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ABSTRACT

This study examined occupational health and safety (OHS) risk perception and its influencing factors among adventure tourism workers in Yogyakarta, Indonesia. A cross-sectional, quantitative design was used with data collected via self-administered online questionnaire from 114 workers aged 17 to 58 years. Non-parametric tests were applied: Spearman's Rho, Kendall's Tau, Mann-Whitney U, and Kruskal-Wallis H. Workers rated most hazards at the "Medium Risk" level, though organizational failures and external conditions received consistent "High Risk" ratings. Contrary to expectations, education, work experience, and OHS knowledge all showed negative correlations with risk perception, indicating that familiarity with the job may foster complacency rather than heightened vigilance. Work-related stress and prior injury history, by contrast, correlated positively with risk perception. These findings suggest that experienced workers may develop overconfidence that dulls their sensitivity to occupational hazard. Knowledge-based training alone does not appear sufficient to counter this tendency. The study argues for OHS programs that target risk perception recalibration through experiential methods, and urges management to treat equipment quality and organizational preparedness as priority concerns.

Keywords: adventure tourism; cognitive bias; complacency; occupational safety and health; risk perception

INTRODUCTION

Indonesia's tourism sector is central to the national economy, contributing to growth at both the national and regional levels (Magalhães, 2023). Data from 2022 show that more than 15 million tourists visited the country, with Yogyakarta among the most visited destinations, home to over 200 attractions spanning natural, cultural, and adventure-based categories (Nurainina & Asmara, 2022; Oentoro & Wiyatiningsih, 2022). Mountaineering, hiking, rafting, and mountain biking have all grown steadily in visitor demand in recent years.

That growth comes with consequences for safety. Adventure tourism, by definition, involves perceived risk, remote or physically demanding terrain, and the need for specialized skills (Jenkins, 2019). Workers in this sector face elevated exposure to hazards, and serious injuries and deaths occur with some regularity (Bentley et al., 2001). A further complication is that many workers operate within Indonesia's informal economy, lacking adequate access to OHS training and safety infrastructure, which increases their vulnerability to both accidents and

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work-related illness (Sukismanto et al., 2023).

Risk perception, defined as a worker's subjective assessment of the probability and severity of harm from a given hazard, has been identified as a key factor shaping safety behavior across occupational settings. Previous research has documented relationships between risk perception and variables including education, experience, and psychosocial stress in various industries (Ghimire et al., 2023; Jafari et al., 2019; Liu et al., 2021; Mufidah & Tejamaya, 2019). The adventure tourism workforce in Indonesia, however, remains underexamined from this perspective.

This study is grounded in the dual-process model of risk perception, which posits that hazard assessment is driven by two distinct but interacting pathways, an analytic-cognitive pathway and an experiential-affective pathway. The cognitive pathway is shaped by rational inputs such as formal education, accumulated work experience, and specialized knowledge. The affective pathway is driven by visceral, emotional inputs, such as stress and direct physical encounters like prior injury (Loewenstein, et al., 2001; Slovic, 2013). This dual-process split is utilized to categorize the variables into sociodemographic (cognitive) and psychosocial (affective) factors, moving beyond mere incident reporting to examine the underlying mechanisms of hazard perception.

METHOD

The study employed a cross-sectional, quantitative observational design and was conducted between February and July 2025 in Yogyakarta Province. The target population was all adventure tourism workers in the Special Region of Yogyakarta. Participants were recruited through non-probability accidental sampling, selecting workers who met the inclusion criteria and were available during data collection (Kumar, 2019; Lwanga & Lemeshow, 1991). A total of 114 respondents participated, ranging in age from 17 to 58 years.

Derived from dual-process model of risk perception framework, the study tests the following hypotheses regarding adventure tourism workers in Yogyakarta; H1: Cognitive-pathway variables (education level, work experience, and OHS knowledge) will be negatively associated with risk perception, consistent with habituation and overconfidence effects; H2: Affective-pathway variables (work-related stress and prior injury history) will be positively associated with risk perception, consistent with the risk-as-feelings hypothesis.

Risk perception was assessed using a 43-item instrument developed from identified hazards in the tourism sector (Bentley et al., 2001) and refined through expert consultation. Respondents rated each hazard on two dimensions: perceived impact (consequences) and perceived frequency (likelihood). OHS knowledge was measured using a 16-item questionnaire adapted from Indonesia's National Work Competency Standards for tourism guides (Kementerian Ketenagakerjaan Republik Indonesia, 2024). Work-related stress was measured with the 10-item Indonesian version of the Perceived Stress Scale (PSS-10) (Hakim et al., 2024).

Data were collected via self-administered online questionnaire and analyzed using Python with the SciPy and Scikit-posthocs libraries, at a significance level (α) of 0.05. Descriptive statistics summarized respondent profiles through frequencies, percentages, means, and standard deviations. Correlations between ratio or ordinal independent variables and the

ordinal dependent variable were tested using Spearman's Rho (ρ) (Pallant, 2020) and Kendall's Tau (τ) (Field, 2018). Gender differences were assessed using the Mann-Whitney U test. Differences across job types were examined with the Kruskal-Wallis H test, followed by Dunn's post-hoc analysis where results were significant (Dinno, 2024).

RESULT

Characteristics of Respondents

The adventure tourism sector in Yogyakarta is dominated by land-based activities. As visualized in Figure 1, terms such as 'Mendaki Gunung' (mountaineering), 'Hiking,' and 'Trekking' appear most prominently among the work types reported by respondents. 'Arung Jeram' (white water rafting) also represented a substantial sector.

Figure 1. Word Cloud of Adventure Tourism Activity Types Among Respondents
Source: Primary Research Data (2025)

This section presents the findings of the research. The data presented should be processed data, not raw data. Usage of tables, figures, or charts is encouraged to be used when necessary, with proper captions and explanations. The results must highlight what was found in the study, showing the outcomes of tests, measurements, or data collection. Each result must be described completely and clearly to reflect the significance of the findings and to be presented in an organized and concise manner.

Table 1. Descriptive Statistics: Age, Work Experience, Prior Injury Experience, and OHS Knowledge

Variable	N	Mean	SD	Min	Max
Sociodemographic Factors	114				
Age (years)		39.47	10.46	19.0	63.0
Work Experience (years)		11.80	10.08	0.0	44.0
Psychosocial Factors					
Prior Injury Experience		0.94	1.353	0.0	10.0
OHS Knowledge Score (/100)		50.11	13.40	12.5	87.5

Source: Primary Research Data (2025)

From a psychosocial perspective, OHS knowledge scores averaged 50.11 out of 100 (SD = 13.40), indicating a moderate knowledge base overall. A large majority, 73.7%, reported a medium level of work-related stress. On average, each worker had experienced approximately

one work-related injury (mean = 0.94), with some reporting up to 10 incidents over their career. These characteristics are summarized in Tables 1 and 2.

Table 2. Distribution of Sex, Education Level, Job Type, and Work Stress

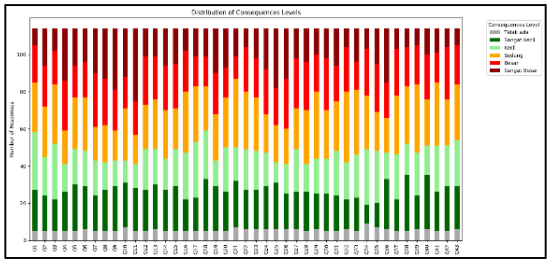
Variable	Category	Min	Max
Sociodemographic Factors			
Sex	Male	94	82.5
	Female	20	17.5
Education Level	No School	0	0
	Primary School	1	0.9
	Junior High School	5	4.4
	High School	40	35.1
	Higher Education	68	49
Job Type	Field	97	85.1
	Management	12	10.5
	Office & Field	3	2.6
	Office	2	1.8
Psychosocial Factor			
Work Stress	Low Stress	24	21.0
	Medium Stress	84	73.7
	High Stress	6	5.3

Source: Primary Research Data (2025)

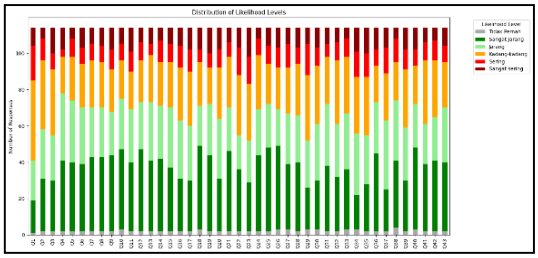
OHS Risk Perception Assessment

Workers' ratings of the 43 hazard items revealed a clear pattern across the two dimensions of consequence and likelihood (Figure 2). Impact was generally rated as 'Large' to 'Very Large' for most hazards, indicating that workers recognize the potential severity of incidents. Hazards related to organizational and equipment failures, particularly 'failure to provide for extreme conditions' and 'using improper or non-standard equipment,' received the highest impact ratings.

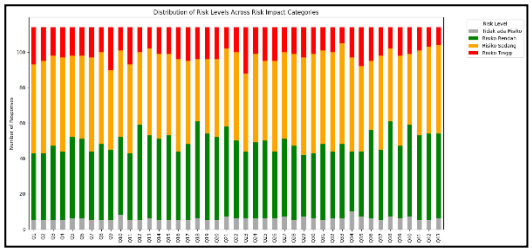
The perceived likelihood of those same hazards, however, was rated as 'Rare' to 'Very Rare.' When consequence and likelihood scores were combined to produce an overall risk classification, the majority of hazards fell into the 'Medium Risk' category. Five hazards were rated consistently as 'High Risk': (1) tourists lacking experience, (2) use of non-standard equipment, (3) danger of slipping, stumbling, or falling from height, (4) bad weather, and (5) failure to provide for extreme conditions. The prominence of external and organizational factors in this list indicates that workers are more attuned to systemic vulnerabilities than to personal ones.



(a)



(b)



(c)

Figure 2. Distribution of Consequence Levels (a); Distribution of Likelihood Levels (b); Distribution of Risk Levels Based on Worker Perceptions (c)

Source: Primary Research Data (2025)

Relationship Between Variables

Bivariate analysis identified several notable relationships between independent variables and OHS risk perception (Table 3). Age showed no statistically significant relationship with risk perception (ρ = .01, p = .670). Gender likewise showed no significant difference (Mann-Whitney U = 1,752,053, p = .690), as presented in Table 4.

Education level showed a weak but statistically significant negative correlation with risk perception (ρ = -.15, p < .001). A similar weak but significant negative correlation was found for work experience (ρ = -.10, p < .001). Job type demonstrated a significant effect on risk perception (H = 62.30, p < .001). Post-hoc Dunn's analysis (Table 5) revealed significant differences between field workers and those in management or administrative roles, with no significant difference between the Office/Administration and Field groups.

Table 3. Spearman's Rho and Kendall's Tau Correlation Test Results

Independent Variable	Spearman's Rho Correlation		Kendall's Tau Correlation	
	rho (ρ)	P-Value	Tau (τ)	P-Value
Age	.01	.670	.00	.793
Education Level	-.15	< .001*	-.14	< .001*
Work Experience	-.10	< .001*	-.08	< .001*
OHS Knowledge	-.14	< .001*	-.11	< .001*
Work Stress	.06	< .001*	.06	< .001*
Prior Injury Experience	.08	< .001*	.07	< .001*

** denotes statistically significant relationship (p < .001)*

Source: Primary Research Data (2025)

Among psychosocial factors, OHS knowledge showed a weak but significant negative correlation with risk perception (ρ = -.14, p < .001). Work-related stress showed a weak positive correlation (ρ = 0.06, p < .001), and prior injury experience also showed a weak positive correlation (ρ = 0.0821, p < .001). Complete correlation results are reported in Table 3.

Table 4. Mann-Whitney U Test Results by Gender

Group	N*	Mean Rank	Sum of Ranks	U	P- Value
Male	4,042	2,454.96	9,922,956	1,752,053	.690
Female	860	2,435.23	2,094,297		

** N = numbers of respondent x 43 hazard items*
(Male: 94 x 43 = 4,042; Female: 20 x 43 = 860)

Source: Primary Research Data (2025)

Table 5. Kruskal-Wallis H Test and Dunn's Post-Hoc Test Results by Job Type

No.	Job Type	Kruskal-Wallis Test		Dunn's Test (pairwise)		
		H	p	1	2	3
1	Office & Field	62.30	< .001			
2	Office/Administration			***		
3	Field			***	ns	
4	Management			***	**	***

*Note: ns = not significant (p > .05); * p ≤ .05; ** p ≤ .01; *** p ≤ .001.*
Dunn's test columns (1, 2, 3) indicate the comparison group:
1 = Office & Field, 2 = Office/Administration, 3 = Field.

Source: Primary Research Data (2025)

DISCUSSION

Theoretical Contribution

This study delivers a focused theoretical contribution to the risk perception literature. First, it is among the earliest to test the dual-process account of risk perception in an informal-economy, adventure-tourism, non-Western context, bridging a gap in research that has traditionally relied on the construction, manufacturing, or healthcare sectors. Second, it highlights that cognitive and affective pathways do not just coexist, but can move in starkly opposite directions within the same population. This offers a much more rigorous validation of the dual-process split than environments where all variables trend uniformly. Finally, the study expands the application of the Dunning-Kruger effect. While commonly associated with self-assessed competence in task performance, this research extends its relevance into the domain of hazard perception, proving that a worker's operational confidence can actively mask their sensitivity to underlying risk.

The Paradox of Experience and Knowledge

The finding that higher education, greater work experience, and stronger OHS knowledge all correlate negatively with risk perception runs against a common assumption in safety research: that more knowledgeable and experienced workers will be more attuned to hazard. The data from this study show the opposite.

Two psychological mechanisms help explain this pattern. The first is habituation. A worker who has guided dozens of rafting groups or led hundreds of mountaineering trips without serious incident begins to process those hazards as routine. The heightened alertness a first-week worker feels gradually gives way to a kind of operational autopilot. Research by Aytekin et al. (2025) illustrates the depth of this effect: even after experiencing occupational accidents and physical strain, including falls in tour vehicles, back pain, and vocal injury, tourist guides showed very little intention to leave their jobs. The hazards had simply become part of the job's background. This normalization is something the adventure tourism industry can inadvertently reinforce, given that it operates on a deliberate tension between safety assurance and the thrill delivery that clients expect. As Hansen et al. (2019) note, the industry seeks a working balance between well-tested safety technologies and the thrill effects that attract customers, a balance that, for the worker managing it daily, can push toward minimizing visible danger rather than amplifying it.

The second mechanism is overconfidence. Experienced workers may develop a genuine belief that their skill set allows them to manage situations that would harm a less-capable colleague. That belief is not entirely wrong, but it tends to overshoot its accuracy. What the Dunning-Kruger literature describes as a mismatch between perceived and actual competence (Kruger & Dunning, 1999; Pennycook et al., 2017; Yazdi, 2025) applies directly here: a worker may possess the theoretical knowledge of safety protocols while no longer fully feeling the danger those protocols were designed for. Cognitive understanding and emotional response to risk become decoupled (Xiong et al., 2025). This explains why training programs centered on information transfer alone are insufficient. If experienced workers are already performing well on knowledge measures yet perceiving less risk, the problem is not a knowledge deficit. It is a calibration problem.

Psychosocial Factors and Vigilance

Where the experience and knowledge findings are counterintuitive, the psychosocial results are more consistent with established theory. Prior injury experience correlated positively with risk perception. This fits what researchers in occupational health have long documented: a direct, physical encounter with harm shifts risk from an abstract category to a concrete personal reality, recalibrating future vigilance (Burke et al., 2006; Méndez-Maturrano et al., 2023). As Loewenstein et al. (2001) and Slovic (2013) have described, visceral experience can update risk assessment in ways that received information cannot.

Work-related stress also correlated positively with risk perception. Adventure tourism workers carry considerable job pressure: responsibility for client safety, long or irregular hours, and physically demanding conditions (Carrillo et al., 2020). Elevated stress may push some workers into a state of heightened alertness that raises their perceived risk scores (Vaziri et al., 2020). This relationship deserves caution in interpretation, however. While stress may sharpen immediate awareness, chronic stress is well-documented to impair judgment, slow reaction times, and produce worse safety decisions over time (Useche et al., 2019). Research in the adjacent hospitality sector finds that wellness programs can improve employee engagement without necessarily resolving the underlying occupational stressors (Torres & Zhang, 2021). The positive correlation between stress and risk perception is therefore not straightforwardly reassuring.

Implications for Risk Management

The overall pattern of results argues against treating OHS training as primarily an informational exercise. If more knowledge correlates with lower perceived risk, then adding more knowledge modules is unlikely to solve the complacency problem. What the data point toward instead are interventions aimed at recalibrating how workers emotionally engage with hazard, not just what they know about it.

For experienced and highly educated workers, this could mean realistic incident simulations, structured case discussions involving accidents that happened to veteran professionals, and formalized near-miss sharing programs that make risk personal again for workers who have operationally distanced themselves from it (Raharjo et al., 2025; Suryani, 2024). For newer workers, foundational knowledge training remains necessary but should be paired with formal mentorship arrangements in which senior guides take explicit responsibility not only for

technical skill transfer but also for instilling ongoing vigilance and appropriate humility in the face of hazard.

Workers also identified a clear set of systemic and organizational concerns as the highest-priority hazards: tourists lacking experience, non-standard equipment, and organizational failure to prepare for extreme conditions topped the high-risk list. These perceptions reflect genuine systemic issues (Daryana & Angriani, 2025). Hansen et al. (2019) confirm that adoption of critical safety innovations, such as smart belay systems, is frequently constrained by financial limitations, especially for smaller operators, producing inconsistent safety standards across the industry. When equipment quality falls short of what operations demand, the worker absorbs the gap between client expectations and operational reality (Morgan, 2024). That gap is not a training problem; it requires direct organizational investment in standardized, well-maintained equipment and clear emergency protocols.

At the systems level, the OSH 5.0 model proposed by Ávila-Gutiérrez et al. (2022) provides a framework for this broader shift, moving from a focus on individual worker behavior toward human-centric, technology-integrated, and sustainability-oriented safety design. Within the Indonesian context, Nopiyani et al. (2022) have demonstrated a practical approach using online training combined with ongoing information sharing through accessible platforms, grounded in the Theory of Planned Behavior to address not just knowledge but attitudes and social norms. For proactive stress management, Torres & Zhang (2021) provide evidence that wearable-based wellness programs can improve employee commitment in tourism settings, though the evidence on long-term effectiveness remains limited.

The connection between OHS investment and destination sustainability should also be made explicit for industry operators and regulators. Documented safety outcomes affect destination reputation, and reputation affects the long-term viability of adventure tourism in Yogyakarta (Muhtasom et al., 2025). Investments in worker safety are therefore also investments in the sector's economic resilience, consistent with the broader goals articulated in the OSH 5.0 model and Agenda 2030 (Ávila-Gutiérrez et al., 2022). Aytekin et al. (2025) similarly recommend regular in-service OHS training as a means of minimizing occupational risk in tourism settings.

CONCLUSION & RECOMMENDATION

This study advances occupational safety literature by validating the dual-process model of risk perception within a non-Western, informal adventure tourism context, demonstrating that cognitive and affective pathways can operate in stark opposition. By extending the Dunning-Kruger effect to the domain of hazard perception, this research establishes that operational confidence can actively mask sensitivity to risk.

Beyond these theoretical contributions, two main conclusions emerge from this study. First, OHS risk perception among adventure tourism workers in Yogyakarta is paradoxically shaped by experience and knowledge. Workers with higher education, more years on the job, and stronger OHS knowledge scores actually perceived lower levels of occupational risk. The data point toward cognitive bias, specifically overconfidence and habituation, as the underlying

mechanisms. These are not character flaws but predictable occupational patterns, which means they can be addressed through deliberate design rather than individual blame.

Second, psychosocial factors move in the opposite direction. Prior injury experience and work-related stress both correlated positively with risk perception. Direct, felt encounters with danger, and the pressures that come with the job, appear to keep risk emotionally salient in ways that accumulated knowledge and experience do not.

The practical recommendation that follows is clear. OHS programs for this workforce should move away from knowledge delivery as the primary format and toward approaches that deliberately disturb complacency: incident simulations using veteran cases, structured near-miss reporting, and formal mentorship that embeds safety culture alongside technical skills. Organizational investment in equipment quality and emergency preparedness is not optional; workers have already identified these as their top hazards. Stress management initiatives are warranted, with the goal of reducing chronic burden rather than simply sustaining short-term alertness.

For future research, a larger sample across multiple regions would help establish whether these patterns hold beyond Yogyakarta. Qualitative methods, including in-depth interviews and ethnographic observation, would be particularly useful for exploring the psychological and cultural dynamics that underlie these quantitative findings, especially the social norms around risk tolerance that develop within long-established guide communities. Finally, longitudinal designs would help establish whether the negative relationship between experience and risk perception strengthens over a career, or whether specific events, such as near-misses or serious injuries, can reliably recalibrate it.

This study has several limitations. Its cross-sectional design can establish correlation but not causation. Self-report data are subject to social desirability bias and recall bias. With 114 respondents in one province, the findings should not be generalized without caution to other regional, national, or cultural contexts.

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DECLARATION

There is no conflict of interest associated with this study. This study was approved by the STIKES Guna Bangsa Ethics Committee under approval number 032/KEPK/VII/2025. All

participants provided informed consent prior to their involvement. They were fully informed about the purpose, procedures, potential risks, and benefits of the research, and participation was voluntary and confidential. The research data are available upon request from the corresponding author, subject to any applicable ethical or legal restrictions.

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