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ORIGINAL PAPER

WORKPLACE SAFETY BEHAVIORS IN THE CONTEXT OF SELECTED EMPLOYEE AND ORGANIZATIONAL FACTORS: A LATENT PROFILE ANALYSIS

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Highlights

- Five employee and 5 organizational latent profiles predict safety behaviors.
- Psychological need satisfaction and work performance drive safety compliance and participation.
- Organizations that foster a safety culture contribute to the safety behaviors.

Abstract

Background: This study aimed to identify distinct employee and organizational profiles influencing workplace safety behaviors (compliance and participation) using latent profile analysis (LPA), focusing on psychological need satisfaction, work performance, and organizational safety culture. **Material and Methods:** A cross-sectional survey of 1293 Polish employees across diverse sectors (industry, transportation, construction, agriculture) assessed individual factors (personal safety culture, basic psychological needs, task/contextual performance, counterproductive behaviors) and organizational factors (safety values, leadership commitment, training quality, psychosocial climate). Validated scales, including the *Basic Psychological Need Satisfaction and Frustration Scale at Work*, *Individual Work Performance Questionnaire*, individual safety culture questionnaire (*Kultura bezpieczeństwa jednostki*), and organizational safety culture questionnaire (*Kultura bezpieczeństwa zakładu*), were administered via computer-assisted web interview. Separate LPAs identified employee and organizational profiles; non-parametric tests compared safety outcomes across profiles. **Results:** Five latent profiles emerged for both employees and organizations. Employees with high basic need satisfaction, strong personal safety values, and high performance exhibited the highest safety compliance and participation. Conversely, those with unmet needs despite strong safety values showed the lowest level of safety behaviors. Organizations with holistic safety cultures (leadership commitment, tailored training, psychosocial support) achieved superior safety outcomes, while those neglecting systemic safety investments performed the poorest. **Conclusions:** Workplace safety behaviors are shaped by interactions between various individual and organizational variables. The study highlighted the importance of both organizational factors, such as safety climate, and individual factors, including need satisfaction, performance, and counterproductive behaviors. Med Pr Work Health Saf. 2025;76(6)

Key words: safety culture, safety climate, counterproductive work behavior, performance, basic needs satisfaction, LPA

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INTRODUCTION

Workplace safety behaviors refer to employees' deliberate actions aimed at adhering to safety protocols (e.g., using protective equipment, following procedures) and proactively mitigating risks (e.g., reporting hazards, promoting a culture of safety) to prevent injuries and workplace accidents [1]. These behaviors are critical as they directly influence the frequency and severity of incidents in the workplace. When safety practices are neglected, the likelihood of accidents increases, leading to human suffering, financial losses for organizations, and damage to their reputation. However, the extent to which employees engage in such behaviors is not uniform; it is shaped by a complex interplay of various factors. Understanding this dynamic is essential for de-

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signing targeted interventions aimed at fostering safer workplaces [1,2].

Employee engagement in workplace safety behaviors is shaped by both individual and organizational factors [1,3,4]. Individual factors include traits and states such as risk propensity, safety knowledge, motivation, and stress levels, which are influenced, among other things, by psychosocial working conditions [2,5,6]. On the other hand, organizational factors encompass leadership practices (e.g., supervisors modeling safe behavior), safety climate (i.e., shared perceptions of safety priorities), and the quality of training [2,7]. A strong safety climate – characterized by open communication about hazards and shared responsibility – helps reduce unsafe behaviors by reinforcing collective norms.

Two types of workplace safety behaviors are commonly distinguished. Safety compliance refers to employees' adherence to formal safety protocols, such as wearing protective gear or following operational procedures, to meet baseline regulatory requirements. Safety participation, in contrast, encompasses voluntary, proactive behaviors aimed at improving workplace safety, such as helping coworkers follow rules, reporting hazards, or promoting safety initiatives. While compliance focuses on "must-do" actions, participation reflects "extra-role" engagement in fostering a safety culture [2,8].

This study aims to conduct an exploratory investigation to identify, based on various variables, both employee and organizational profiles that promote safety behaviors in the workplace.

As indicated, one of the factors influencing safety behaviors is motivation. In their self-determination theory (SDT), Ryan and Deci [9,10] distinguish between 2 types of motivation: intrinsic and extrinsic. Extrinsic motivation refers to behavior regulated by rewards and punishments, while intrinsic motivation stems from the self; that is, it is autonomous. According to these authors [9], the fulfillment of basic psychological needs is essential for personal development and the emergence of intrinsic motivation – which, by extension, can be assumed to support safety behaviors as well. The authors identify 3 such needs: autonomy, competence, and relatedness. The need for autonomy refers to the ability to make decisions and to organize and regulate one's behavior voluntarily and independently. The need for competence involves engaging in challenges and experiencing one's effectiveness. The need for relatedness is associated with seeking relationships with others, a sense of connection, closeness, and security. The authors emphasize that when these needs are unmet, frustration may occur. It was hypothesized that employees with higher levels of need satisfaction are more likely to engage in safety behaviors. While the relationship between job satisfaction and safety behaviors has already been investigated [8], no studies were found that specifically examine the role of basic psychological need satisfaction in this context.

Another work-related behavior that has been examined in the literature is job performance. Individual job performance refers to behaviors that support the achievement of organizational goals and is distinct from productivity, which concerns the physical output of work. Performance is a multidimensional construct encompassing, among others, goal setting, time management, professional development, and the acquisition of new skills. Three main domains of performance are typically distinguished: task performance (carrying out job duties as expected), contextual performance (engaging in behaviors that go beyond formal responsibilities), and counterproductive work behaviors (e.g., complaining, exaggerating problems) [11,12]. Since performance reflects the pursuit of organizational goals, it can be assumed that safety behaviors may constitute one of those goals. It is proposed that task and contextual performance contribute to creating a safe work environment, and counterproductive behaviors (e.g., deliberately neglecting safety measures) undermine it by increasing the risk of workplace accidents [13].

Latent profile analysis (LPA) is a statistical method that identifies unobserved subgroups (profiles) within a population based on patterns of responses across continuous observed variables [14,15]. Unlike traditional variable-centered approaches (e.g., regression), which examine relationships between variables across the entire sample, LPA adopts a person-centered perspective, emphasizing heterogeneity among individuals by grouping those with similar characteristics into distinct profiles. This approach can be particularly valuable in safety research, as safety-related behaviors in the workplace are rarely uniform and instead tend to emerge from complex interactions among various factors. Moreover, LPA is considered appropriate in exploratory studies [15]. A review by Spurk et al. [15] highlights the growing popularity of LPA in work and organizational research while also pointing out the continued underuse of this method compared to variable-centered approaches, such as structural models based on a single population distribution.

In the present study, the use of LPA is proposed to identify profiles of employees and organizations that are conducive to workplace safety. The employee profile includes

the following variables: personal safety culture – an individual trait reflecting the perception of safety as a personal value, a risk-averse attitude encompassing a broader context than just occupational risk, basic need satisfaction, work performance, and counterproductive work behaviors. The organizational profile, in turn, comprises safety as an organizational value, management commitment to safety, occupational health and safety (OHS) training, and interpersonal relationships in the workplace. It is hypothesized that the identified individual and organizational profiles will significantly differentiate employees in terms of their safety behaviors. According to the best of current knowledge, no published study to date has applied LPA to examine these specific factors.

MATERIAL AND METHODS

Participants

The study involved a heterogeneous sample of 1293 employees. Men constituted 66.4% of the sample (N = 858), while women accounted for 33.6% (N = 435). Participants ranged in age 18–70 years (M±SD 40.33±10.84 years, Me = 39.00 years). Their job tenure ranged from <1 year to 50 years (M±SD 14.87±9.88 years, Me = 13.00 years).

All participants were employed within organizational settings and had a direct supervisor. Respondents represented various economic sectors (selected in a closed-ended question) and a wide range of occupations (reported in an open-ended question), including: industry (N = 684, 52.9%; e.g., production line operators, machine operators, assemblers, welders), transportation (N = 318, 24.6%; e.g., truck drivers, city bus drivers, tram drivers, signallers), construction (N = 244, 18.9%; e.g., bricklayers, roofers, welders, civil engineers), and agriculture (N = 47, 3.6%; e.g., warehouse workers, machine operators, gardeners, animal breeders). Most were employed in the private sector (N = 1137, 87.9%), while 12.1% (N = 156) worked in the public sector. In turn, 20.3% (N = 262) of respondents reported holding a managerial position (including lower-level managers overseeing small teams).

Although men predominated in the sample (66.4%), this distribution reflects the actual gender structure of employment in the studied sectors. According to official Polish labour market statistics [16], women represent 34.5% of the workforce in industry, 10.7% in construction, 23.4% in transportation, and 47.3% in agriculture. Thus, the predominance of men in this study sample is consistent with the demographic profile of employees in these economic sectors.

Table 1. Educational attainment and size of place of residence of workers in Poland, March–April 2025

Variable	Participants (N = 1293)	
	%	n
Education		
primary	1.1	14
vocational	11.0	142
technical secondary	25.6	331
general secondary	13.2	171
post-secondary	6.7	86
currently in higher education	0.7	9
higher education	41.8	540
Place of residence		
rural area	23.0	297
town		
≤50 000 inhabitants	21.3	275
≤100 000 inhabitants	18.3	237
city		
≤250 000 inhabitants	17.2	223
>250 000 inhabitants	20.2	261

Table 1 presents the distribution of participants' education levels and the size of their place of residence. Participants were recruited from all 16 administrative regions (voivodeships) in Poland. The largest proportion came from the Masovian Voivodeship (N = 490, 18.1%), while the smallest group was from the Podlaskie Voivodeship (N = 71, 2.6%).

Procedure

The study employed a quantitative, cross-sectional design utilizing the computer-assisted web interview method. Participants were randomly invited from the panel's registry using probability sampling. The inclusion criteria required current employment under the supervision of a direct manager and representation of one of the economic sectors covered by the study. Data collection occurred March–April 2025. All participants were treated following the ethical guidelines outlined in the Declaration of Helsinki. Before completing the questionnaire battery, participants received an information letter detailing the study's purpose and their right to withdraw at any time. Confidentiality and anonymity of data were strictly maintained. The study protocol was approved by Resolution No. 22/2023 of the Bioethics Committee of the Institute of Rural Health in Lublin, Poland.

Measures

Basic Psychological Need Satisfaction and Frustration Scale at Work

The *Basic Psychological Need Satisfaction and Frustration Scale at Work* (BPNSFS-Work) is a tool grounded in SDT [9,10], which posits 3 universal psychological needs: autonomy (the sense of volition and freedom in making choices aligned with one's values), competence (the experience of effectiveness in one's actions), and relatedness (the formation of meaningful and satisfying relationships with others). The original BPNSFS questionnaire, developed by Chen et al. [17], was adapted to the work context by Schultz et al. [18] as the BPNSFS-Work. The Polish version of the BPNSFS-Work, validated by Szulawski et al. [19], comprises 24 items organized into 6 subscales: satisfaction and frustration related to autonomy, competence, and relatedness. Some studies have reported difficulties with the frustration subscales, which may be attributed to methodological artifacts [20]. Taking this into account and considering the need for measurement economy, the present study used only the 12 items referring to need satisfaction. Sample items include: "At work, I feel a sense of freedom and choice in the things I undertake" (autonomy satisfaction), "I feel confident that I can do my job well" (competence satisfaction), and "At work, I feel connected with people who are important to me and feel close to them" (relatedness satisfaction). Moreover, some researchers calculate an overall need satisfaction index as the mean of the 3 subscales, treating it as a general indicator of psychological need fulfillment [21,22]. In this study, due to the large number of variables and the necessity to avoid an overly complex model, a single aggregated need satisfaction score was used.

Individual Work Performance Questionnaire

The *Individual Work Performance Questionnaire* (IWPQ) was originally developed by Koopmans et al. [11], and its Polish adaptation was conducted by Jasiński et al. [12]. The questionnaire consists of 18 items divided into 3 subscales:

- task performance – behaviors directly related to the execution of core job responsibilities, such as work planning and effectiveness. A sample item is: "I was able to carry out my work effectively";
- contextual performance – actions that go beyond formal job requirements, such as initiating tasks or developing competencies. A sample item is: "I took on extra responsibilities when I had completed my work";
- counterproductive work behavior – actions that may harm the organization, such as complaining or focusing on negative aspects. A sample item is: "I talked with colleagues about the negative aspects of my work."

Participants were asked to respond on a 5-point scale ranging from 1 – "never" to 5 – "always." The Polish version of the IWPQ demonstrates satisfactory psychometric properties, including high internal consistency and temporal stability [12]. The full version of the IWPQ was used in the present study.

Kultura bezpieczeństwa jednostki

The individual safety culture questionnaire (*Kultura bezpieczeństwa jednostki* – KBJ) is a unidimensional tool developed by Milczarek [23,24] to assess individual safety culture. It refers to safety culture understood as an individual's perceptions, attitudes, and beliefs related to their own behaviors [25]. In this sense, an individual's safety culture can be seen as an attitude opposing risk-taking and is applicable in various life domains, not limited to the occupational context. By measuring a person's approach to safety, the 11-item questionnaire addresses a range of everyday activities. Sample items include: "I reflect on how my lifestyle and eating habits affect my health," "A good driver knows when they can afford to break the rules" (reverse-coded item), and "I no longer repeat behaviors that have previously endangered my life or health (e.g., I give up certain substances)." Responses are given on a 5-point Likert scale ranging from 1 – "strongly disagree" to 5 – "strongly agree." The instrument has demonstrated satisfactory psychometric properties in the original author's research.

Kultura bezpieczeństwa zakładu

The organizational safety culture (*Kultura bezpieczeństwa zakładu* – KBZ) questionnaire, developed by Milczarek [4,23,24], is designed to assess safety culture within the workplace. It consists of 49 items rated on a 5-point Likert scale (from "strongly disagree" to "strongly agree"). Employees evaluate various aspects of the work environment related to OHS, as well as attitudes toward safe behaviors in the workplace.

The factor analysis conducted by the author revealed the following subscales:

- management commitment and employee participation – reflects the extent to which management undertakes and supports actions aimed at improving workplace safety, treats safety as equally important as core business operations, and shows genuine concern for employees' well-being, as well as em-

ployees' involvement in safety-related decisions. Sample items include: "Management ensures that the physical work environment is safe and not harmful to employees' health" and "Employees participate in hazard assessments at their workplaces";
- OHS training and accident analysis – covers the perceived value and relevance of OHS training, its tailoring to the nature of the work and employee needs, and the reporting and analysis of all accidents and incidents. Sample items: "OHS training in my company is tailored to employees' needs" and "All accidents and incidents are thoroughly analyzed in meetings";
- safety values – captures the perceived importance the organization places on health and safety, e.g., "Safety is a valued principle in my company," "Safe and hygienic work is actively promoted in my organization";
- interpersonal relations and organizational belonging – relates to collaboration and understanding between management and employees, as well as among employees across departments and levels of the organization. Sample items include: "Communication between management and employees is open and frequent" and "I feel a sense of belonging to the team I work with";
- safety behaviors – assesses adherence to safety rules and procedures, use of appropriate personal protective equipment, proactive elimination of hazards, and non-acceptance of risky behaviors among colleagues. Sample items: "I use the required personal protective equipment at my workstation" and "Sometimes I bypass safety procedures to get the job done faster" (reverse-coded);
- responsibility and safety awareness – reflects employees' sense of personal responsibility for occupational safety and health, their understanding of safety objectives, their role in achieving them, and their awareness of how improving OHS benefits the organization. Sample items: "I feel responsible for safety in my workplace" and "I feel responsible for the safety of my coworkers."

Previous research has confirmed satisfactory reliability and validity of the KBZ [23,24]. The questionnaire battery was accompanied by a demographic and occupational background survey.

Statistical analyses

The questionnaire results were divided into 3 groups. The first group focused on individual factors, for which corresponding items were formulated in the first person (e.g., "I feel confident that I can perform my job well"; BPNSFS-Work). The second group referred to organizational factors, represented by items phrased in the third person and referring to the organization (e.g., "In my company, safe and hygienic work practices are promoted"; KBZ). The group of individual factors included the results from the KBJ, BPNSFS-Work, and IWPQ scales. Organizational factors were assessed using the following KBZ subscales: management's attitude toward safety and employee participation, OHS training and accident analysis, the value placed on OHS within the organization, and interpersonal relations among employees. In turn, the KBZ subscales – safe behaviors (as an indicator of safety compliance) and responsibility and awareness (as an indicator of safety participation) – were used as dependent variables in between-group comparisons.

Preliminary analyses included descriptive statistics and internal consistency analysis using McDonald's ω, which many researchers consider to be a more appropriate reliability coefficient than Cronbach's α [26,27]. Internal consistency was considered as acceptable if the coefficient reached ≥0.70 [27]. Before conducting the main analyses, all variables were standardized. The main analyses were conducted in 2 stages. The first stage involved identifying employee profiles using LPA [14,15]. To avoid an excessive number of variables in the model, the aforementioned classification of variables (individual and organizational) was used to distinguish between employee and organizational profiles [15]. Accordingly, 2 separate LPAs were conducted – 1 for individual-level factors and another for organizational-level factors. Models with 2–5 latent profiles were estimated using 3 covariance structures. The optimal number of profiles was determined by minimizing the Akaike information criterion (AIC) and Bayesian information criterion (BIC), maximizing entropy (>0.80), and ensuring interpretability [28,29]. In the case of LPA, due to the complexity of the estimated parameters, it is not necessary to determine sample size based on power analysis; however, a sample size of >500 is generally recommended [15], which was substantially exceeded in the present study. In the second stage, levels of safety compliance and safety participation were compared across groups of respondents assigned to the identified profiles. Due to unequal group sizes, the non-parametric Kruskal-Wallis test was applied. Pairwise comparisons were conducted using Dunn's test [30]. The significance level was set at 0.05. In line with contemporary recommendations, difference testing was complemented by effect size measures: ε^2 for the Kruskal-Wallis test and Glass's

Table 2. Descriptive statistics of the studied variables of 1293 workers in Poland, March–April 2025

Variable	Min.	Max	M±SD	Me	ω
BPNSFS-Work					
need satisfaction	1.00	7.00	4.90±1.06	4.92	0.91
IWPQ					
task performance	1.00	5.00	3.77±0.81	4.00	0.87
contextual performance	1.00	5.00	3.24±0.85	3.29	0.88
counterproductive work behaviors	1.00	5.00	2.55±0.92	2.40	0.86
KBJ					
individual safety culture	2.00	5.00	3.47±0.56	3.38	0.92
KBZ					
management commitment and employee participation	1.00	5.00	3.21±0.99	3.33	0.94
occupational health and safety training and accident analysis	1.00	5.00	3.34±1.05	3.50	0.90
safety values	1.00	5.00	3.41±1.06	3.50	0.93
interpersonal relations and organizational belonging	1.00	5.00	3.29±1.05	3.50	0.93
safety behaviors	1.00	5.00	3.32±1.01	3.50	0.79
responsibility and safety awareness	1.00	5.00	3.68±0.92	4.00	0.91

BPNSFS-Work – *Basic Psychological Need Satisfaction and Frustration Scale at Work*, IWPQ – *Individual Work Performance Questionnaire*, KBJ – *Kultura bezpieczeństwa jednostki*, KBZ – *Kultura bezpieczeństwa zakładu.*
ω – McDonald's omega.

rank-biserial correlation coefficients for post hoc comparisons [31].

All statistical analyses were performed using R, v. 4.3.2 (R Core Team, Vienna, Austria). Latent profile analysis was conducted with the tidy LPA package, and pairwise difference analysis was carried out using the dunn.test package. Figures were created with the ggplot2 package.

RESULTS

Descriptive statistics

The database contained no missing data. In the first stage of the analysis, descriptive statistics of the studied variables were calculated, and an internal consistency analysis of these variables was performed. The results are presented in Table 2.

The internal consistency of the scales was evaluated using ω, with results ranging 0.79–0.94. These coefficients indicate that the scales exhibit high reliability, providing a strong foundation for subsequent analyses.

Individual factors

Estimates of the models used to extract latent profiles are shown in Table 3. The results presented in Table 3 indicate that, based on both AIC and BIC criteria, model 3 with 5 classes can be considered the most optimal [29]; this is further supported by the entropy index. The profiles identified by this model are illustrated in Figure 1a.

Table 4 presents the group sizes of individuals assigned to the profiles illustrated in Figure 1a. The largest group consists of individuals in profile 3. These participants are characterized by a slightly below-average level of personal safety culture, average need satisfaction, slightly above-average task and contextual performance, and significantly above-average levels of counterproductive work behaviors. The second largest group comprises individuals with profile 4, who differ from those in profile 3 primarily by their markedly lower level of task performance, as well as slightly lower contextual performance and counterproductive work behaviors. Profiles 2 and 1 are particularly noteworthy. Participants in profile 2 exhibit high levels of personal safety culture, the highest levels of need satisfaction and work performance, and the lowest levels of counterproductive work behaviors. In contrast, individuals in profile 1 (the smallest group) also display high personal safety culture, but report the lowest levels of need satisfaction and work performance, along with the highest levels of counterproductive work behaviors.

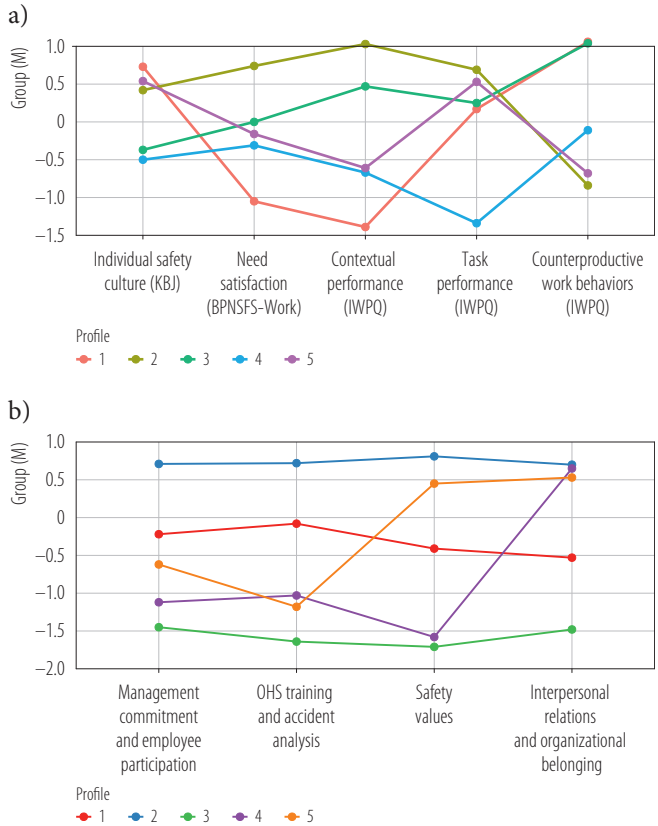
Based on the 5 identified employee profiles, a between-group comparison was conducted for the KBZ outcomes related to workplace behavior, the sub-

Table 3. Fit statistics for the profile solutions of individual and organizational factors of 1293 workers in Poland, March–April 2025

Solution	AIC	BIC	Entropy
Individual profiles			
model 1			
2 classes	17 715.86	17 798.49	0.84
3 classes	17 524.59	17 638.22	0.90
4 classes	17 259.47	17 404.08	0.89
5 classes	17 150.53	17 326.13	0.88
model 2			
2 classes	17 572.13	17 680.59	0.69
3 classes	17 338.75	17 504.02	0.74
4 classes	17 121.49	17 343.57	0.73
5 classes	16 983.77	17 262.66	0.71
model 3			
2 classes	17 224.84	17 359.12	0.85
3 classes	17 090.76	17 256.03	0.87
4 classes	16 971.68	17 167.94	0.89
5 classes	16 879.99	17 107.24	0.90
Organizational profiles			
model 1			
2 classes	12 881.49	12 948.63	0.81
3 classes	12 122.83	12 215.79	0.84
4 classes	12 037.00	12 155.79	0.80
5 classes	11 818.32	11 962.93	0.82
model 2			
2 classes	12 764.59	12 852.39	0.83
model 3			
2 classes	11 847.26	11 945.39	0.68
3 classes	11 769.08	11 893.03	0.73
4 classes	11 788.73	11 938.51	0.73
5 classes	11 662.55	11 838.15	0.78

AIC – Akaike information criterion, BIC – Bayesian information criterion.
Model 1 – equal variances and covariances fixed to 0, model 2 – varying variances and covariances fixed to 0, model 3 – equal variances and equal covariances.
The individual and organizational profiles were identified through 2 independently conducted latent profile analyses (LPAs).

scales of safety behaviors and responsibility and safety awareness. For the safety behaviors subscale, the Kruskal-Wallis test yielded a statistically significant result, with a large effect size: $\chi^2(4) = 174.40$, $p < 0.001$, $\varepsilon^2 = 0.135$. Similarly, for the responsibility and safety awareness subscale, the result was also statistically significant with a comparable effect size: $\chi^2(4) = 180.47$, $p < 0.001$, $\varepsilon^2 = 0.140$. The comparison of results is presented in Figures 2a and 2b as well as in Table 5.



Abbreviation explanations as in Table 2. Profile explanations as in Table 4.

Figure 1. Latent profiles of a) individual variables and b) organizational variables of 1293 workers in Poland, March–April 2025

The results presented in Table 5 indicate that each difference in safety behaviors, analyzed pairwise between profiles, was statistically significant. As shown in Figure 2a, the highest average scores are observed for individuals in profile 2, and the lowest for profile 1. The strongest effects were observed for the differences between profiles 2 and 4, 1 and 2, and 2 and 5 (Table 5). For responsibility and safety awareness, the difference between profiles 1 and 3 was not statistically significant, with no effect recorded. All other differences were statistically significant. Figure 2b indicates that, once again, employees in profile 2 have the highest average scores, while the lowest scores were observed for profile 4. The strongest effects were observed for the pairs 2 and 4, and 4 and 5 (Table 5).

Organizational factors

For organizational profiles, issues arose with estimating model 2, which included 3–5 profiles. It can be observed

Table 4. Distribution of individual and organizational profiles of workers in Poland, March–April 2025

Profile	Participants (N = 1293)		Profile description
	n	%	
Individual profile			
1	62	4.80	highest personal safety culture, low need satisfaction and contextual performance, and a high level of counterproductive work behaviors
2	280	21.66	high personal safety culture, highest need satisfaction, highest performance (both task and contextual) and the lowest level of counterproductive work behaviors
3	367	28.38	below-average personal safety culture, average need satisfaction, and a high level of counterproductive work behaviors
4	325	25.14	below-average personal safety culture, average need satisfaction, low performance, and an average level of counterproductive work behaviors
5	259	20.03	high personal safety culture, high task performance, and a low level of counterproductive work behaviors
Organizational profile			
1	466	36.04	moderate organizational concern for safety and psychosocial working conditions
2	566	43.77	high organizational concern for both safety and psychosocial working conditions
3	147	11.37	low organizational concern for both safety and psychosocial working conditions
4	33	2.55	organizational focus on social relationships, with little attention to OHS
5	81	6.26	organizational emphasis on social relationships and valuing safety as a core value, but low-quality safety training and limited management involvement in OHS matters

OHS – occupational health and safety.

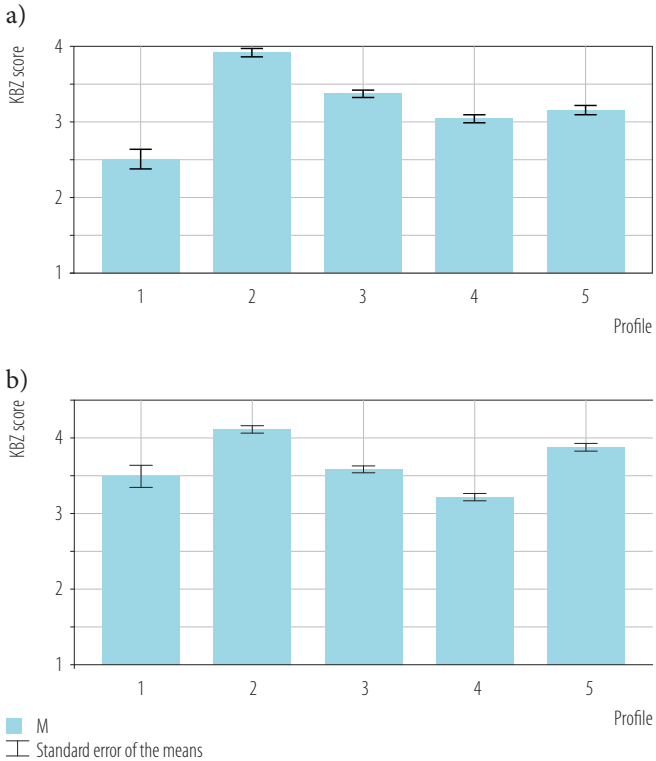
(Table 3) that among the estimated models of organizational profiles, the model 3 with 5 profiles had the lowest AIC and BIC values. The entropy of this model was slightly <0.80 threshold and was not the lowest among the analyzed models; however, due to the AIC and BIC values, this solution was chosen. The organizational profiles are presented in Figure 1b, and their frequencies are shown in Table 4.

The largest group consisted of respondents with profile 2. These employees highly rate the safety culture in their organization across all assessed areas. In contrast, those in profile 3 rate the safety culture in their workplace as low. Profile 1 can be characterized as individuals who rate their organization as average, and this is the second largest group. Profile 4 consists of individuals who highly rate the organization's efforts in maintaining workplace relationships but rate the organization's approach to safety issues as low. This is the smallest group (Table 4).

Individuals assigned to organizational profiles 1 through 5 were compared in terms of their results on safety behaviors and responsibility and safety awareness. The results were statistically significant, with large effect sizes. For safety behaviors: $\chi^2(4) = 402.24$, $p < 0.001$, $\varepsilon^2 = 0.311$, and for responsibility and safety awareness: $\chi^2(4) = 370.39$, $p < 0.001$, $\varepsilon^2 = 0.287$. The differences are presented in Table 5 and Figures 3a and 3b. All differences, except for the comparison between profiles 1 and 5, were statistically significant. The results reveal that the lowest scores for safety behaviors were observed among participants who rated their organization according to profile 3. In comparison to any other profile, the difference was statistically significant, with the strongest (moderate) effect observed in the comparison to profile 2. A moderate effect was also observed in the comparison between profiles 1 and 2. Similarly, for responsibility and safety awareness, the lowest scores were found for individuals with profile 3, and all comparisons were statistically significant, with the largest effect observed in the comparison to profile 2. Individuals with profile 2 had the highest scores, with a moderate effect size also noted in the comparison to profile 1 (Table 5).

DISCUSSION

Two separate applications of LPA were conducted in this study to identify employee and organizational profiles conducive to workplace safety behaviors. This dual ap-



Profile explanations as in Table 4.

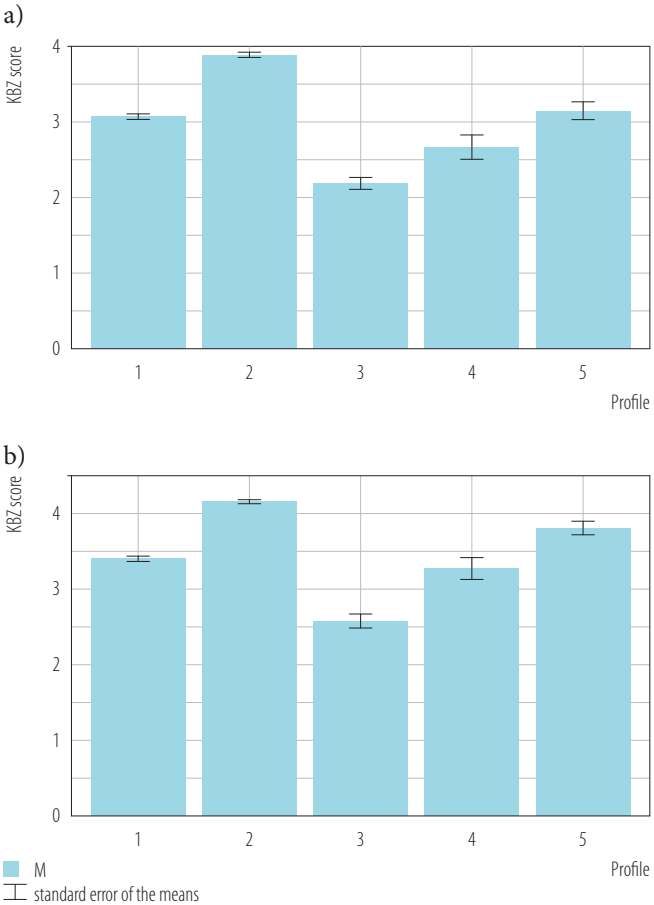
Figure 2. Comparison of organizational safety culture (*Kultura bezpieczeństwa zakładu* – KBZ) subscale scores: a) safety behavior and b) responsibility and safety awareness across individual profiles of 1293 workers in Poland, March–April 2025

proach offered novel insights into the interplay between psychological need satisfaction, work performance, and organizational safety culture. The results from the LPA of individual and organizational factors show that, based on the studied variables, the most optimal models, both individual and organizational profiles, were those with 5 classes. For individual profiles, the largest group (profile 3) exhibited low safety culture, average need satisfaction, and high counterproductive behaviors, while profile 2 had the highest satisfaction and performance levels, with the lowest counterproductive behaviors. In terms of organizational profiles, profile 2 had the highest safety culture ratings, while profile 3 rated organizational safety the lowest. The comparisons between profiles revealed significant differences in safety behaviors and responsibility/safety awareness. For individual profiles, those in profile 2 exhibited the highest scores, while profile 1 had the lowest scores. For organizational profiles, the lowest safety behavior and safety awareness scores were observed in profile 3, and profile 2 had the highest scores for both. The results indicated large effect sizes, highlighting the importance of safety

Table 5. Pairwise comparisons of organizational safety culture (*Kultura bezpieczeństwa zakładu*) subscale scores – safety behaviors and responsibility and safety awareness – between different individual and organizational profiles of 1293 workers in Poland, March–April 2025

Variable	Compared profile pairs																					
	1								2						3				4 vs. 5			
	vs. 2		vs. 3		vs. 4		vs. 5		vs. 3		vs. 4		vs. 5		vs. 4		vs. 5					
	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g	Z	r_g
Individual profile																						
safety behaviors	−9.60***	−0.27	−5.64***	−0.16	−3.16**	−0.09	−4.07***	−0.11	7.24***	0.20	11.15***	0.31	8.96***	0.25	4.40***	0.12	2.44**	0.07	−1.65*	−0.05		
responsibility and safety awareness	−4.28***	−0.12	0.18	<0.01	3.17**	0.09	−2.12*	−0.06	7.90***	0.22	12.76***	0.35	3.50***	0.10	5.43***	0.15	−4.01***	−0.11	−8.87***	−0.25		
Organizational profile																						
safety behaviors	−14.29***	−0.40	7.37***	0.21	1.82*	0.05	−1.32	−0.04	17.19***	0.48	6.82***	0.19	6.19***	0.17	1.92*	0.05	−6.18***	0.17	−2.35*	−0.07		
responsibility and safety awareness	−14.65***	−0.41	5.99 ***	0.17	0.50	0.01	−4.20***	−0.12	16.03***	0.45	5.62***	0.16	3.46***	0.10	−2.48**	0.07	−7.75***	−0.22	−2.88**	−0.08		

r_g – Glass's rank-order correlation coefficient (effect size), Z – standardized test statistic.
* $p_{adj} < 0.05$, ** $p_{adj} < 0.01$, *** $p_{adj} < 0.001$.



Profile explanations as in Table 4.

Figure 3. Comparison of organizational safety culture (*Kultura bezpieczeństwa zakładu* – KBZ) subscale scores: a) safety behavior and b) responsibility and safety awareness across organizational profiles of 1293 workers in Poland, March–April 2025

culture and organizational factors in influencing workplace behaviors.

The identification of 5 distinct employee profiles underscores the heterogeneity in how individuals function in an organization. Profile 2 – characterized by high personal safety culture, need satisfaction, and task/contextual performance – emerged as the most safety-compliant group. This aligns with SDT [9,10], where fulfillment of autonomy, competence, and relatedness fosters intrinsic motivation, likely extending to safety behaviors. Notably, this profile's low counterproductive behaviors further support the notion that need satisfaction mitigates disengagement [19]. Conversely, profile 1 – despite a high personal safety culture – displayed the lowest safety participation, likely due to unmet psychological needs and high counterproductive tendencies. This paradox suggests that personal safety values alone are insufficient without organizational support for basic needs, echoing emphasis on person-organization fit and other psychosocial factors [3,6,32]. It confirms the role of employee performance – more efficient employees tend to engage more readily in safety behaviors. Notably, different patterns emerged for safety behaviors reflecting safety compliance and those reflecting safety participation. While profile 1 showed the lowest scores in safety compliance, profile 4 had the lowest scores in safety participation, significantly lower than all other profiles. In contrast, profile 5 scored higher than only profiles 1 and 4 in safety compliance (with a small effect size), but in safety participation, profile 5 scored lower than only profile 2 (also with a small effect size). These differences may be influenced by personal safety culture, which was relatively high among respondents in profile 5. A strong personal belief in the value of safety appears to empower employees to engage in safety-related behaviors even beyond formal job requirements. These findings support the established distinction in the literature between safety compliance and safety participation [2,8].

Regarding organizational profiles, the study confirmed previous findings on the importance of organizational factors [2,4]. The highest levels of both safety compliance and safety participation were reported by employees who perceived their organization as committed to safety and providing favorable psychosocial working conditions. By applying LPA, this study demonstrates that organizational safety does not result from the additive effects of isolated factors (e.g., training and leadership), but rather emerges from configurations of these elements. For instance, profile 5, characterized by strong safety values coexisting with poor training. These results challenge regression-based assumptions that such variables necessarily linearly reinforce one another. On the other hand, the study does not allow for determining whether psychosocial conditions or the organization's approach to safety play a more critical role, as no profile was identified that combined high levels of OHS training or safety values with low levels of interpersonal relations and belonging – conditions that would enable a comparison with profile 4, which demonstrated the opposite pattern. Moreover, the results suggest that organizational factors similarly shape both safety compliance and safety participation, as the pattern of differences between profiles for these 2 dimensions was largely consistent.

The above conclusions indicate that the findings make a meaningful contribution to the understanding of safety-related behavior at work. Furthermore, this study represents an additional application of LPA, thereby advancing the use of this method and addressing the ex-

isting gap in its application within the field of work and organizational psychology.

In addition to its theoretical contribution, the study also offers practical implications. To enhance workplace safety, organizations should foster a robust safety culture by prioritizing management commitment, transparent communication about hazards, and shared accountability for safety outcomes. This requires investing in tailored OHS training programs that address role-specific risks and empower employees to proactively apply safety knowledge in their daily tasks. Simultaneously, organizations must support and fulfill employees' psychological needs – autonomy, competence, and relatedness – e.g., by involving them in safety-related decision-making, providing skill-building opportunities, and promoting team-based safety initiatives. Recognizing and rewarding proactive safety behaviors, such as hazard reporting or mentoring peers, can further encourage employees to move beyond compliance and actively participate in cultivating a safer environment. Additionally, organizations should regularly assess psychosocial risks, such as excessive workload or stress, which may drive counterproductive behaviors [33] and reduce performance [34]. It is essential to integrate safety strategies into broader employee well-being programs. By aligning systemic support – through leadership engagement, training, and resource allocation – with individual empowerment, workplaces can transform safety from a regulatory obligation into a collective, intrinsically motivated practice rooted in shared values and mutual responsibility.

This study is not without limitations. The most significant issue is its cross-sectional design. Longitudinal studies can reveal the dynamics of the examined variables and potential causal relationships. In the context of latent profiles, they also allow for the exploration of changes over time through latent class growth analysis [14]. Moreover, the study was limited solely to the group of Polish employees. Future research should focus on other occupational groups and consider additional variables, particularly those related to psychosocial working conditions.

CONCLUSIONS

This study demonstrates that workplace safety behaviors emerge from a dynamic interplay between various individual and organizational variables. By applying LPA, distinct patterns of employee and organizational functioning were uncovered, which shape safety compliance and participation. Employees who combined strong personal safety values with high basic need satisfaction and optimal work performance exhibited the most robust safety engagement. Conversely, even employees with strong personal safety beliefs showed diminished safety participation when their psychological needs were unmet, underscoring the critical role of organizational support in translating values into action. Employees evaluating their organizations as fostering holistic safety cultures, including leadership commitment, tailored training, and a good social climate, achieved higher scores in safety behaviors, both compliance and participation. Methodologically, this work highlights the value of person-centered approaches like LPA in capturing the non-linear, context-dependent nature of safety behaviors.

AI USE

Artificial intelligence tools were used to perform minor language improvements and stylistic editing after the initial human proofreading.

AUTHOR CONTRIBUTIONS

Research concept: Łukasz Kapica, Witold Sygocki
Research methodology: Łukasz Kapica, Andrzej Najmiec
Collecting material: Andrzej Najmiec, Łukasz Kapica
Statistical analysis: Łukasz Kapica
Interpretation of results: Łukasz Kapica
References: Łukasz Kapica, Witold Sygocki

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