

RESEARCH REPORTS

PERCEPTIONS AND EXPECTATIONS OF ACADEMIC KNOWLEDGE IN SWISS PARAMEDICINE (SWISS PEAK): A NATIONAL CROSS-SECTIONAL SURVEY OF EMS PROFESSIONALS

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ABSTRACT

Objectives: Paramedic education in Switzerland remains strictly vocational despite ongoing academic development internationally. This study examined Swiss emergency medical services (EMS) professionals' attitudes toward selected opportunity- and threat-related items concerning academic development and whether these attitudes varied by academic degree status and the perceived applicability of prior academic training to current practice.

Methods: A national cross-sectional online survey was conducted among Swiss EMS professionals. A de novo questionnaire assessed questionnaire-defined opportunity and threat dimensions related to academic development, covering selected perceived benefits and concerns. After psychometric refinement, Opportunity and Threat scale scores (0–100) were used to derive a Dominance Index ($D = \text{Opportunity} - \text{Threat}$) and four attitudinal profiles (High/Low Opportunity High/Low Threat). Group differences and associations with academic degree status and perceived applicability of prior academic training were examined using t-tests, χ^2 -tests, correlations, and logistic regression.

Results: Among 590 respondents, mean Opportunity and Threat scores were 75.5 and 29.9, respectively, yielding a mean Dominance Index of +45.6. Overall, 79.3% were Opportunity-leaning, 10.0% Neutral, and 10.7% Threat-leaning; 74.1% fell into the High-Opportunity/Low-Threat profile. Respondents with an academic degree (16.6%) showed higher Opportunity and lower Threat scores than respondents without an academic degree, resulting in a higher Dominance Index (mean difference +12.7). Among respondents with an academic degree, 69.6% reported that their studies were applicable to current practice, but perceived applicability showed no clear association with attitudinal orientation ($r = -0.16$, 99% CI [-0.41, 0.12]).

Conclusion: In this national convenience sample, respondents endorsed the opportunity-related items captured by the questionnaire more strongly than the threat-related items. Differences by academic degree status were modest, and the perceived applicability of prior academic training showed no clear association with attitudinal orientation. These findings inform ongoing discussion of how academic development, paramedic education, and professional roles may evolve within Swiss EMS.

INTRODUCTION

Health professions evolve through the development of discipline-specific knowledge, research capacity, and structured educational pathways. Academic development can play a central role in this process by enabling systematic evaluation of clinical practice, strengthening professional autonomy, and supporting evidence-informed care (Catu, 2021; Cordrey et al., 2024; Hofmann, 2022; O'Meara, 2011; Yalniz et al., 2024). Across multiple health professions, including nursing, midwifery, and allied health disciplines, the establishment of university-based education has been closely associated with professional consolidation and the expansion of research activity (Catu, 2021; Cignacco et al., 2024; Cordrey et al., 2024; Yalniz et al., 2024).

Paramedicine has undergone a comparable transformation in several countries. In Australia, New Zealand, Ireland, and the United Kingdom, degree-level entry to practice and dedicated research agendas have become established components of the profession (Bowles et al., 2024; Feerick et al., 2025; O'Meara et al., 2015; Pap et al., 2024). These developments reflect a broader shift from a predominantly technical and protocol-driven role toward a health care profession grounded in clinical reasoning, research literacy, and professional autonomy (Makrides et al., 2022b; Reed et al., 2019). At the European level, initiatives such as the European Paramedic Curriculum aim to harmonize educational standards through bachelor-level training frameworks (Dúason et al., 2021).

Switzerland represents a contrasting institutional context. Paramedic education is situated within the higher vocational sector, while vertically integrated academic career pathways in paramedicine remain largely absent and discipline-specific research infrastructure is limited (Brinkmann, 2024; Schmutz et al., 2022). This does not imply that Swiss paramedics are clinically underprepared; rather, it points to a structural distinction between vocational clinical qualification and academic development within the profession. Bibliometric analyses suggest that paramedicine remains underrepresented in the broader scientific literature, with research agendas historically shaped by medicine and nursing (Olaussen et al., 2021; Xu et al., 2021). In such settings, questions of academic development extend beyond educational structure and also concern professional visibility, knowledge production, and the position of EMS professionals within multiprofessional healthcare systems (Bueter & Jukola, 2025; Feyereisen et al., 2021; Makrides et al., 2022a, 2023; Nielsen et al., 2025).

The introduction of academic pathways within vocational professions may be viewed in terms of both opportunity and threat. Experiences from nursing and other health professions indicate that academic development may strengthen professional identity and research capacity, while also raising questions regarding role boundaries, workforce structure, and the relationship between academic credentials and clinical practice (Batt et al., 2019; Catu, 2021; Cignacco et al., 2024; Coetsee, 1999; Feerick et al., 2025; Gonon & Bonoli, 2025; Toffel, 2020). How such developments are interpreted by EMS professionals themselves is therefore relevant to ongoing debates about the future of the profession.

Within Swiss EMS, empirical evidence on attitudes toward academic development remains limited. Previous work has shown interest in research engagement among EMS professionals, but participation remains constrained and opportunities for structured academic progression remain rare (Brinkmann, 2024; Runacres et al., 2024; Vuilleumier

et al., 2021; Zünd et al., 2025). What remains unclear is how Swiss EMS professionals evaluate academic development in terms of possible opportunities and threats, including perceived implications for care quality, evidence-informed decision-making, professional visibility, career progression, team cohesion, job security, and the perceived need for additional qualifications.

The present study addresses this gap through the project Perceptions and Expectations of Academic Knowledge in Swiss Paramedicine (SWISS PEAK). The aim of this study was to examine Swiss EMS professionals' responses to questionnaire-defined opportunity and threat dimensions related to academic development, and to assess how these responses varied according to respondents' academic degree status and the perceived applicability of prior academic training. Given the absence of prior Swiss data on these specific attitudes, no directional hypotheses were prespecified. By providing the first nationwide overview of these perspectives, the study aims to inform ongoing discussions on the future development of paramedic education and research capacity in Switzerland.

METHODS

SWISS PEAK was a national, cross-sectional, web-based survey of EMS professionals in Switzerland and the Principality of Liechtenstein conducted between September 4 and September 25, 2025. The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (von Elm et al., 2007). The target population comprised EMS personnel currently employed at least 20% full-time equivalent, including paramedics, EMTs, trainees, telecommunicators, instructors, and individuals in managerial roles. Inclusion required current employment in a Swiss or Liechtenstein EMS service; exclusion criteria were non-consent or no current EMS employment. Participation was anonymous and voluntary. Recruitment was conducted via the Swiss Paramedic Association mailing list and promotional outreach at an EMS conference, resulting in a national convenience sample.

The three main Swiss language regions (German, French, and Italian) were represented. A Romansh version was not developed, given its approximate 0.5% share of the resident population, its likely lower prevalence among EMS professionals, and the fact that Romansh speakers generally also speak German or Italian (Federal Statistical Office, 2025).

ETHICS

The study protocol was submitted to the Ethics Committee of Northwestern and Central Switzerland (EKNZ; Project ID AO_2025-00054), which confirmed that SWISS PEAK complied with ethical and scientific standards for human research under the Swiss Human Research Act (HRA, Art. 51 para. 2). Owing to its nationwide scope, EKNZ forwarded the dossier to all other Swiss cantonal ethics committees.

QUESTIONNAIRE DEVELOPMENT

The questionnaire was developed specifically for this study, as no validated Swiss instrument assessing attitudes toward academic development in EMS was available. Item generation was informed by literature on professionalization, academic development, and research engagement in paramedicine and related health professions (Bowles et al., 2024; Cignacco et al., 2024; Hofmann, 2022; Runacres et al., 2024; Toffel, 2020; Zünd et al.,

2025). Because no prior work had established the full range of perceived opportunities and threats related to academic development in Swiss EMS, questionnaire development was exploratory and based on theory- and expert-informed item generation rather than inductive qualitative derivation from the target population.

Draft items were reviewed within the multidisciplinary SWISS PEAK research team and by external EMS stakeholders for content relevance and clarity. Cognitive pretesting with EMS professionals from different language regions ($n = 17$) assessed comprehensibility and interpretation. The questionnaire was translated into German, French, and Italian by native speakers and reviewed for linguistic equivalence. The full instrument and detailed information on questionnaire development are provided in Appendix B.

MEASURES

Demographic and professional items assessed respondents' current role, highest academic qualification, and whether this qualification was applicable in their present EMS function. Attitudinal items were rated on a 0 to 100 visual analog scale (VAS; 0 = "strongly disagree," 100 = "strongly agree"). Responses were range checked, cleaned for invalid entries, and prepared for scale construction.

The attitudinal section was organized around two questionnaire-defined dimensions. Opportunity comprised items reflecting selected anticipated benefits of academic development, including improved care quality through research, strengthened data-informed decision-making, enhanced professional visibility, career development and workforce sustainability, and expanded educational pathways. Threat comprised items reflecting selected anticipated concerns, including potential impacts on team cohesion, job security, and the perceived necessity of additional qualifications. Opportunity initially comprised six items (Q11 and Q13-Q17), and Threat comprised three items (Q18-Q20). These dimensions were conceptual starting points for scale construction and psychometric evaluation and were not intended to represent an exhaustive account of all possible views on academic development.

The questionnaire also contained additional items addressing broader research attitudes and a free-text question on perceived advantages and risks of increased scientific engagement in EMS. These responses were outside the scope of the present study and will be examined separately.

PSYCHOMETRIC ANALYSIS

Attitudinal scale construction followed standard psychometric procedures. Items in the Opportunity and Threat dimensions were screened using corrected item-total correlations and changes in Cronbach's alpha if deleted. Items with correlations below 0.30 were considered for exclusion if removal improved internal consistency, consistent with established psychometric guidelines (DeVellis, 1991). In the Opportunity dimension, Q11 showed a weak corrected item-total correlation ($r = 0.19$) and was removed. The removed item addressed whether research in EMS improves the quality of prehospital care. Although conceptually related to academic development, its weak association with the other Opportunity items suggested that it captured a broader attitude toward EMS research than the more specific scale content retained in the final model. The final Opportunity scale therefore comprised five items (Q13-Q17), and the Threat scale comprised

three items (Q18-Q20). Scale scores were calculated as the mean of the retained items, preserving the original 0 to 100 scale.

Internal consistency was assessed using Cronbach's alpha and McDonald's omega. Dimensionality was examined with exploratory and confirmatory factor analyses comparing a one-factor model with a two-factor correlated model to assess whether the included opportunity and threat items reflected a single construct or two related but distinct dimensions within the questionnaire. Confirmatory analyses used robust maximum likelihood estimation, and model fit was evaluated with the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). Correlation matrices were inspected for numerical instability; no issues of singularity or non-positive definiteness were observed. Psychometric refinement was used to evaluate the coherence of the included items but does not imply that all relevant opportunity- or threat-related items were captured.

DOMINANCE INDEX

To summarize each respondent's relative position within the Opportunity and Threat scales, a Dominance Index was calculated as an arithmetic contrast between the two scales (Dominance (D) = Opportunity - Threat). This contrast reflects the relative balance between endorsement of the included opportunity- and threat-related items. The index was used as a descriptive summary of the two questionnaire-derived scales rather than as a validated latent construct. Because the index used - mean scale scores, the unequal number of opportunity and threat items did not assign greater numerical weight to either scale.

As both underlying scales of Opportunity and Threat ranged from 0 to 100, the Dominance Index spanned -100 (fully Threat-leaning) to +100 (fully Opportunity-leaning), with 0 indicating equal endorsement of Opportunity and Threat. To avoid classifying trivial differences as meaningful, a ± 10 interval around zero was prespecified as a neutral zone. Respondents with $D \geq +10$ were classified as Opportunity-leaning, those with $D \leq -10$ as Threat-leaning, and those with $-10 < D < +10$ as Neutral. Sensitivity analyses using narrower (± 5) and wider (± 15) Neutral intervals were conducted to evaluate robustness.

ATTITUDINAL PROFILES

To complement this single-score summary, a second measure retaining the full two-dimensional structure of the questionnaire was derived. This approach captures respondents who may endorse both Opportunity and Threat strongly, even when their net difference is similar. Opportunity and Threat are interpreted directly on their original 0 to 100 scales, and each respondent was classified as high or low on both scales using a cutoff of 60, reflecting a clear level of endorsement on the VAS. This yielded four profiles: High-Opportunity/Low-Threat, High-Opportunity/High-Threat, Low-Opportunity/High-Threat, and Low-Opportunity/Low-Threat.

ACADEMIC DEGREE STATUS

Respondents' highest academic qualification was recoded into a binary variable distinguishing respondents with and without an academic degree. Because no academic de-

degrees specific to EMS currently exist in Switzerland, any academic qualification reported by participants originated from another field.

The primary coding followed a predefined definition in which academic degrees included bachelor's, master's, doctorate, or equivalent qualifications from universities or universities of applied sciences. Vocational qualifications, including Advanced Federal Diplomas of Higher Education and Federal Diplomas of Higher Education and related certificates, were coded as non-academic. A broader definition that additionally classified postgraduate CAS, DAS, or MAS programs as academic was used only for planned sensitivity analyses, which are documented in Appendix C.

STATISTICAL ANALYSIS

All analyses were conducted in R version 4.3.2 within RStudio (Posit team, 2025). Because academic development is a normatively and professionally sensitive topic and multiple contrasts were examined, 99% confidence intervals (CIs) are reported for all effect estimates to emphasize estimation precision and limit over-interpretation of small differences. P-values are reported for transparency but were not interpreted using fixed significance thresholds. Analyses were based on complete cases, with “prefer not to answer” coded as missing in analyses involving academic degree status or applicability.

Descriptive statistics were calculated for the refined Opportunity and Threat scales and for the Dominance Index. For categorical variables derived from the Dominance Index (Opportunity-leaning, Neutral, Threat-leaning) and from the four attitudinal profiles (High or Low Opportunity $\times$ High or Low Threat), proportions with 99% CIs were reported. The association between Opportunity and Threat was examined using Pearson correlation. Differences between respondents with and without an academic degree in Opportunity, Threat and the Dominance Index were tested using Welch's t-tests with Cohen's d as the effect size. Group differences in the distribution of Dominance classifications and profiles were evaluated using chi-square tests with Cramér's V.

Among respondents with an academic degree, the association between perceived applicability of their studies and the Dominance Index was examined using point-biserial correlation, and differences in the proportion classified as Opportunity-leaning were summarized as risk differences. Predictors were limited to academic degree status and, among respondents with an academic degree, perceived applicability of prior academic training, consistent with the study aim to examine attitudinal differences by academic exposure. Logistic regression models were fitted to estimate the odds of being Opportunity-leaning (Dominance Index $\geq +10$). This outcome was a prespecified categorization of the Dominance Index and was used only as a descriptive binary summary of attitudinal orientation; it was not used to predict the underlying Opportunity or Threat scores. The primary model included the full sample and used a three-level combined predictor reflecting academic degree status and, where applicable, perceived applicability of that degree in current practice (no academic degree, academic degree not applicable in practice, academic degree applicable in practice). A second model within the academic subgroup tested whether applicability alone predicted Opportunity-leaning attitudes. Odds ratios (ORs) with 99% CIs were reported, and model adequacy was verified by checking model convergence and inspecting residual and influence diagnostics. Regression analyses were conducted on complete cases for all variables included in each model.

RESULTS

PARTICIPANT FLOW AND SAMPLE CHARACTERISTICS

The survey link was viewed 758 times. Of these, 590 participants completed the questionnaire, corresponding to a completion rate of 77.8% (590/758). A total of 168 participants exited before completion: 22 exited before the consent page, 1 declined participation, and 145 exited after providing consent but before completing the questionnaire.

Relative to the accessible recruitment frame of the Swiss Paramedic Association mailing list ($N = 1,900$), the sample represents 31.1% of listed members. Based on an estimated workforce of 3,669 EMS professionals in Switzerland and Liechtenstein, the sample corresponds to 16.1% of the target population. Because no complete national registry of EMS professionals with standardized role and qualification information is available in Switzerland, formal benchmarking of sample composition and calculation of a true population response rate were not possible (Interverband Rettungswesen, 2024). However, respondents were drawn from all language regions and cantons and represented a broad range of EMS roles. Participant characteristics are summarized in Table 1.

SCALE RELIABILITY AND DIMENSIONALITY

After item screening, the final Opportunity scale comprised five items (Q13-Q17) and the Threat scale comprised three items (Q18-Q20). Both scales showed strong internal consistency. Opportunity demonstrated $\alpha = 0.90$ and $\omega_{\text{total}} = 0.92$, and Threat $\alpha = 0.75$ and $\omega_{\text{total}} = 0.75$. Confirmatory factor analysis favored a correlated two-factor structure (Opportunity and Threat; CFI = 0.94, RMSEA = 0.11) over a single-factor model (CFI = 0.88, RMSEA = 0.16; $\Delta\chi^2(1) = 67.6$, $p < 0.001$). Comparative fit favored the correlated two-factor model, although absolute fit was mixed because RMSEA remained elevated. The two-factor structure was therefore interpreted cautiously as an empirical distinction between the questionnaire-defined Opportunity and Threat item sets. The factors were inversely correlated ($r = -0.55$, $p < 0.001$), indicating that the two scales captured related but distinct constructs.

ATTITUDINAL RESPONSE PATTERNS

Respondents reported higher Opportunity than Threat scores on the questionnaire-defined scales (Opportunity: $M = 75.5$, $SD = 23.0$; Threat: $M = 29.9$, $SD = 23.1$). The Dominance Index ($D = \text{Opportunity} - \text{Threat}$) averaged 45.6 (99% CI [41.3, 49.9]), with 79.3% (99% CI [74.7, 83.3]) classified as Opportunity-leaning, 10.0% (99% CI [7.3, 13.6]) as Neutral, and 10.7% (99% CI [7.8, 14.4]) as Threat-leaning. Varying the Neutral tie zone did not materially affect this distribution; using ± 5 or ± 15 shifted the proportion classified as Neutral as expected, but Opportunity-leaning respondents remained the clear majority and subgroup comparisons were unchanged (Appendix C).

To examine responses across both scales, respondents were also profiled as high or low on Opportunity and Threat, yielding four quadrants (Figure 1). Most participants (74.1%) fell into the High-Opportunity/Low-Threat profile, 5.6% into High-Opportunity/High-Threat, 8.1% into Low-Opportunity/High-Threat, and 12.2% into Low-Opportunity/Low-Threat (Table 2).

Characteristic		Result
Age, mean (SD)		38 (9.6)
Gender, <i>n</i> (%)	Female	211 (35.8)
	Male	377 (63.9)
	No information / other	2 (0.3)
Years of experience, median (quartiles)		11 (5, 19)
Current role, <i>n</i> (%)	Registered Paramedic (Advanced Diploma)	328 (55.6)
	Management / Leadership	84 (14.2)
	Trainee Paramedic	80 (13.6)
	EMT (Swiss Federal Diploma)	30 (5.1)
	Vocational Trainer	23 (3.9)
	Emergency Medical Telecommunicators	16 (2.7)
	Instructor at a Higher Vocational School	11 (1.9)
	Other	18 (3.1)
Highest qualification, <i>n</i> (%)	Federal Diploma of Higher Education	80 (13.6)
	Advanced Federal Diploma of Higher Education	394 (66.8)
	Bachelor's Degree from a University of Applied Sciences	36 (6.1)
	Bachelor's Degree from a University	12 (2.0)
	Master's Degree from a University of Applied Sciences	20 (3.4)
	Master's Degree from a University	23 (3.9)
	Other	25 (4.3)
Academic degree, <i>n</i> (%)		98 (16.6)
Canton of work, <i>n</i> (%)	Aargau (AG)	29 (4.9)
	Appenzell Innerrhoden (AI)	2 (0.3)
	Appenzell Ausserrhoden (AR)	3 (0.5)
	Bern (BE)	50 (8.5)
	Basel-Landschaft (BL)	17 (2.9)
	Basel-Stadt (BS)	20 (3.4)
	Fribourg (FR)	16 (2.7)
	Geneva (GE)	62 (10.5)
	Glarus (GL)	1 (0.2)
	Graubünden (GR)	29 (4.9)
	Jura (JU)	8 (1.4)
	Lucerne (LU)	26 (4.4)
	Neuchâtel (NE)	32 (5.4)
	Nidwalden (NW)	3 (0.5)
	Obwalden (OW)	3 (0.5)
	St. Gallen (SG)	27 (4.6)
	Schaffhausen (SH)	4 (0.7)
	Solothurn (SO)	4 (0.7)
	Schwyz (SZ)	7 (1.2)
	Thurgau (TG)	15 (2.5)
	Ticino (TI)	40 (6.8)
	Uri (UR)	13 (2.2)
	Vaud (VD)	69 (11.7)
	Valais (VS)	34 (5.8)
	Zug (ZG)	6 (1.0)
	Zürich (ZH)	68 (11.5)
	Liechtenstein* (FL)	2 (0.3)
Survey language, <i>n</i> (%)	German	344 (58.3)
	French	206 (34.9)
	Italian	40 (6.8)

Note. Totals may not sum to 100% due to rounding. *Liechtenstein appears under "Canton of work" for completeness, although it is a country rather than a canton. SD = standard deviation; quartiles = 25th-75th percentile.

Table 1. Participant characteristics (*n* = 590).

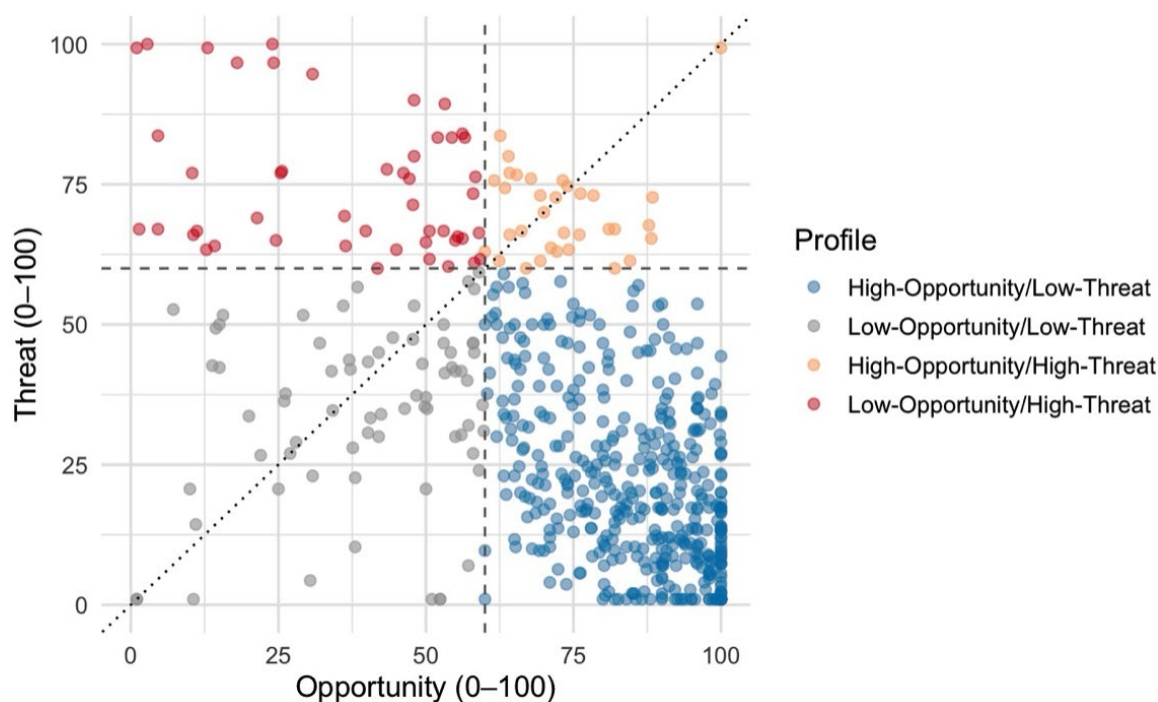


Figure 1A. Joint profiles of opportunity and threat scores - Individual attitudinal profiles.

Note. Scatterplot of Opportunity (x-axis) and Threat (y-axis) scores (0–100 VAS), color-coded by profile. Dashed lines mark the 60-point cutoff for “High” vs “Low” values; the dotted line ($y = x$) indicates parity between Opportunity and Threat. Each point represents one respondent (N = 590).

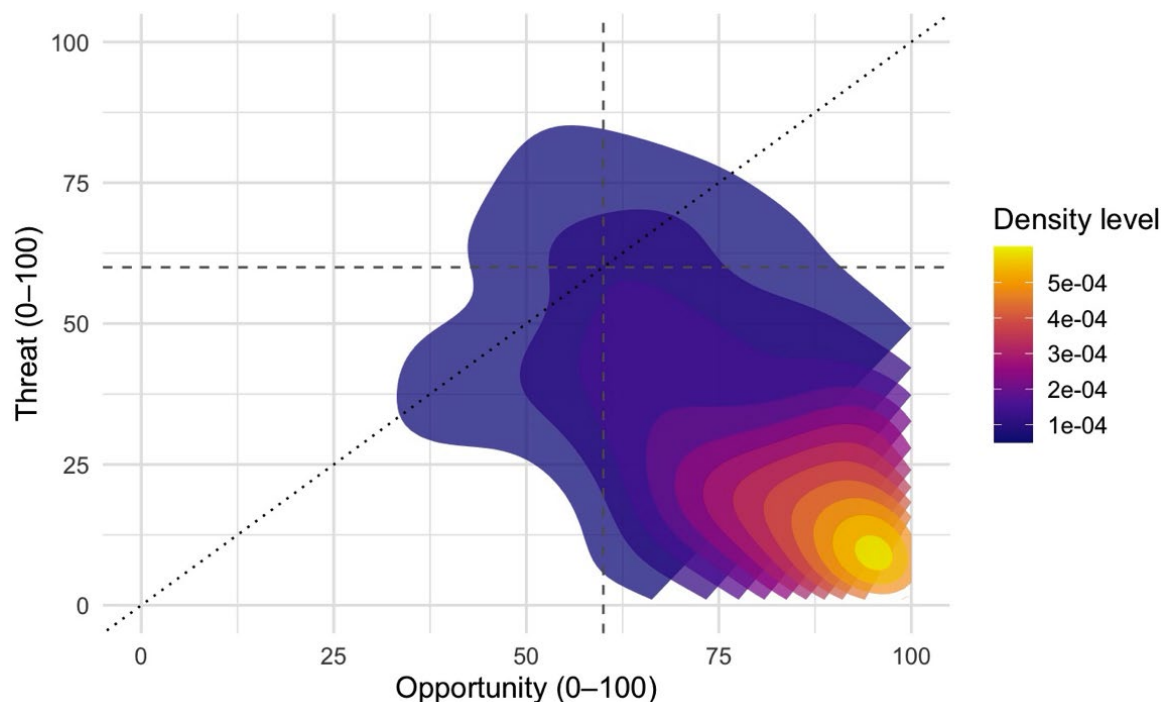


Figure 1B. Joint profiles of opportunity and threat scores - Density distribution.

Note. Kernel-density plot of the same data showing the distribution of Opportunity (x-axis) and Threat (y-axis) scores. Warmer colors represent higher response density, revealing a strong clustering in the high-Opportunity, low-Threat region consistent with the categorical profiles in Figure 1A.

Respondents with an academic degree represented 16.6% of the sample ($n = 98$). As shown in Table 3, they reported somewhat higher Opportunity scores (mean difference +5.1 points) and lower Threat scores (mean difference -7.6 points) than respondents without an academic degree, resulting in a higher Dominance Index (ΔD +12.7 points; $d = 0.3$). Consistent with the 99% CIs, differences in Threat and Dominance excluded zero, whereas the Opportunity difference did not, indicating greater uncertainty around the Opportunity difference. Figure 2 shows that respondents with an academic degree clustered at somewhat higher Opportunity and Dominance values and showed lower density of high Threat scores than their non-academic peers. Within-group correlations indicated that Opportunity and Threat were inversely related in both subgroups, more strongly among respondents without an academic degree ($r = -0.6$) than among respondents with an academic degree ($r = -0.4$).

Dominance classifications showed the same pattern. Among respondents with an academic degree, 86.7% (85/98) were Opportunity-leaning and 5.1% (5/98) Threat-leaning, compared with 77.8% (383/492) and 11.8% (58/492), respectively, among respondents without an academic degree. Respondents with an academic degree were more often in the High-Opportunity/Low-Threat profile (80.6% vs. 72.8%) and less often in the Low-Opportunity/High-Threat profile (2.0% vs. 9.4%). The remaining profiles (High-Opportunity/High-Threat and Low-Opportunity/Low-Threat) were similarly distributed between groups, and the overall association between academic degree status and profile membership was small ($\chi^2(3) = 6.63$, $p = 0.085$; Cramér's $V = 0.08$). Broader definitions of academic degree status and alternative Dominance thresholds (± 5 , ± 15) produced substantively unchanged distributions and effect estimates, as detailed in Appendix C.

Measure / Profile	<i>n</i>	Mean (SD) / %	99% CI
Descriptive statistics (mean (SD))			
Opportunity	590	75.5 (23.0)	73.1, 78.0
Threat	590	29.9 (23.1)	27.4, 32.4
Dominance (D = Opp - Threat)	590	45.6 (30.7)	41.3, 49.9
Dominance classifications (%)			
Opportunity-leaning (D $\geq$ +10)	468	79.3	74.7, 83.3
Neutral (10 < D < +10)	59	10.0	7.3, 13.6
Threat-leaning (D $\leq$ -10)	63	10.7	7.8, 14.4
Joint Opportunity x Threat profiles (%)			
High-Opportunity / Low-Threat	437	74.1	69.2, 78.4
High-Opportunity / High-Threat	33	5.6	3.6, 8.6
Low-Opportunity / High-Threat	48	8.1	5.7, 11.5
Low-Opportunity / Low-Threat	72	12.2	9.2, 16.1
Note. SD = standard deviation; CI = 99% confidence interval. <i>n</i> indicates the number of respondents included in each estimate. Continuous measures (Opportunity, Threat, Dominance) are shown as mean (SD) with 99% CIs; categorical measures are shown as percentages with 99% CIs. The Dominance Index is defined as Opportunity minus Threat, with positive values indicating greater relative endorsement of Opportunity than Threat. Joint profiles classify respondents based on their combined Opportunity and Threat positions across the two scales.			

Table 2. Opportunity, threat, dominance, and joint opportunity x threat profiles among Swiss EMS professionals ($n = 590$).

Variable	With Academic Degree, Mean (SD)	Without Academic Degree, Mean (SD)	Mean Δ (Yes-No)	99% CI	<i>p</i>	<i>d</i>
Opportunity	79.8 (21.6)	74.7 (23.2)	+5.1	[-1.2, +11.4]	0.037	0.23
Threat	23.5 (18.8)	31.2 (23.7)	-7.6	[-13.3, -1.9]	<0.001	0.36
Dominance (D)	56.2 (33.5)	43.5 (41.7)	+12.7	[+2.6, +22.8]	0.001	0.34
Note. SD = standard deviation; CI = 99% confidence intervals; Mean Δ (Yes-No) = difference between respondents with and without an academic degree; <i>p</i> = <i>p</i> -value from Welch's <i>t</i> -test; <i>d</i> = Cohen's <i>d</i> effect size. Scores reflect 0–100 VAS values for Opportunity and Threat and the Dominance Index (-100 to +100). Because no academic degrees specific to EMS currently exist in Switzerland, academic degrees refer to degrees obtained outside paramedicine.						

Table 3. Comparison of opportunity, threat, and dominance scores by academic degree status ($n = 590$).

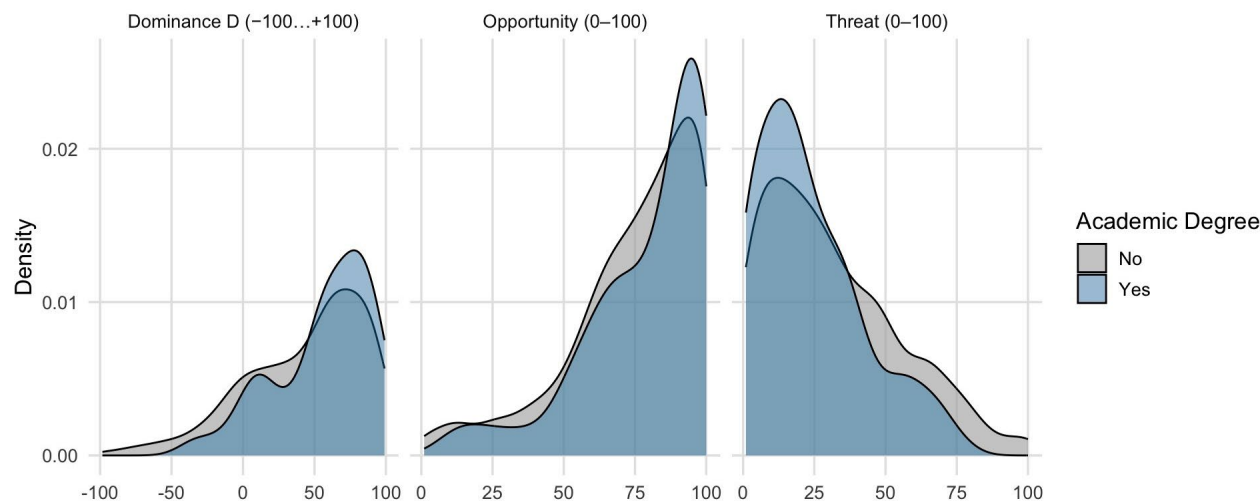


Figure 2. Score distributions for opportunity, threat, and dominance by academic degree status.

Note. Kernel-density plots showing the distribution of Opportunity and Threat scores (0-100 VAS) and Dominance Index scores (-100 to +100; Dominance = Opportunity - Threat), stratified by academic degree status. Shaded curves represent smoothed density estimates; vertical dashed lines indicate group means (blue = academic degree; gray = non-academic degree).

APPLICABILITY OF PRIOR ACADEMIC TRAINING

Among respondents with an academic degree, 92/98 (93.9%) answered the applicability question. Of these, 69.6% (64/92; 99% CI [56.2, 80.3]) reported that their degrees were applicable in daily practice. The remaining six respondents with an academic degree had missing applicability information. The correlation between applicability (yes/no) and the Dominance Index was -0.16 (99% CI [-0.41, 0.12]), with the CI spanning zero. The proportion classified as Opportunity-leaning was 84.4% (54/64) among those who considered their degree applicable and 89.3% (25/28) among those who did not (difference = -4.9 percentage points).

ASSOCIATIONS WITH OPPORTUNITY-LEANING CLASSIFICATION

Logistic regression results are summarized in Table 4. Academic degree status and Opportunity-leaning classification were available for all respondents; the reduced sample size reflects the six missing applicability responses among respondents with an academic degree. Respondents without an academic degree served as the reference category. Respondents with an academic degree not applicable in practice had an OR of 2.37 (99% CI [0.61, 18.07], *p* = 0.16), and those with an academic degree applicable in practice had an OR of 1.54 (99% CI [0.65, 4.30], *p* = 0.23). In the academic-only model (*n* = 92), the OR

Model	Predictor Contrast	OR	99% CI	<i>p</i>
Full sample (<i>n</i> = 584)	Academic degree not applicable vs no academic degree	2.37	0.61, 18.07	0.16
	Academic degree applicable vs no academic degree	1.54	0.65, 4.30	0.23
Academic subgroup (<i>n</i> = 92)	Applicable vs not applicable	0.65	0.08, 3.43	0.54

Note. OR = odds ratio; CI = 99% confidence intervals. In the full-sample model, predictors are contrasted against the reference category of no academic degree. In the academic-subgroup model, the predictor compares respondents reporting their academic degree as applicable versus not applicable in current practice. Academic degree status and the Opportunity-leaning outcome were available for all respondents. Applicability was assessed only among respondents with an academic degree; six of 98 respondents had missing applicability information and were excluded from models involving applicability.

Table 4. Logistic regression predicting opportunity-leaning attitudes (*D* ≥ +10).

comparing respondents who reported their academic studies as applicable versus not applicable was 0.65 (99% CI [0.08, 3.43], $p = 0.54$).

DISCUSSION

SUMMARY OF KEY FINDINGS

SWISS PEAK examined questionnaire-based attitudes toward academic development in Swiss EMS within a system where paramedic education remains vocational and no discipline-specific academic pathway in paramedicine currently exists. Attitudes were structured along two related but distinct questionnaire-defined dimensions, capturing Opportunity and Threat as defined in the survey instrument.

Overall, respondents scored higher on Opportunity than on Threat, and most were classified as Opportunity-leaning according to the predefined Dominance threshold. Respondents with an academic degree showed somewhat higher Opportunity and lower Threat scores than respondents without an academic degree, although these differences were modest. Among respondents with an academic degree, perceived applicability of prior academic training to daily work was not clearly associated with attitudinal orientation; the slightly negative point estimate suggests that respondents who considered their degree applicable were, if anything, marginally less Opportunity-leaning, but the wide 99% CI argues against a strong interpretation. In this sample, the Opportunity-related items captured by the questionnaire were endorsed more strongly than the Threat-related items.

INTERPRETATION IN CONTEXT

The findings are most meaningful when interpreted in relation to what the Opportunity scale actually captured: academic qualifications as a means of making care quality visible, EMS-specific academic degrees, advanced or academic qualification options, educational progression after the HF diploma, and career development and workforce sustainability. The observed pattern therefore suggests that endorsement was directed less toward academization in the abstract than toward academic development linked to professional visibility, educational progression, and career development. The exclusion of Q11 adds an important nuance to this interpretation. Broad agreement that research improves prehospital care was not rejected; rather, it did not align closely enough with the retained Opportunity items to be treated as part of the same scale. This suggests that support for EMS research and support for formal academic pathways are related but not interchangeable dimensions of academic development.

That is especially notable in the Swiss context. Swiss paramedics carry substantial clinical responsibility, yet their educational pathway remains rooted in the higher vocational sector and formal academic progression remains limited (Brinkmann, 2024; Schmutz et al., 2022). At the same time, much of the evidence base, research production, and formal knowledge infrastructure relevant to paramedic work continues to be shaped outside the profession itself (Batt et al., 2019; Gonon & Bonoli, 2025; Makrides et al., 2022b; Olausson et al., 2021; Reed et al., 2019; Regener & Trede, 2024; Xu et al., 2021). Under these conditions, academic development concerns more than qualifications alone. It also concerns whether paramedicine can participate more actively in generating, interpreting, and applying knowledge related to its own field, as well as how the profession is positioned

within a multiprofessional healthcare system (Bueter & Jukola, 2025; Feyereisen et al., 2021). Seen in that light, the retained Opportunity scale should be read as capturing one specific part of this broader development: respondents' views on formal academic pathways, professional visibility, educational progression, and career-related opportunities. Stronger endorsement of these items may therefore reflect interest in academic development that is tied to recognizable professional functions rather than to academic status alone.

This interpretation fits reasonably well with developments described in paramedicine and other health professions internationally. In several Anglo-American systems, academic development has been linked to professionalization, degree-level entry to practice, dedicated research agendas, and greater professional autonomy (Batt et al., 2019; Givati et al., 2018; Hanson & Burton, 2025; Makrides et al., 2022b; Reed et al., 2019). At the European level, calls for bachelor-level education standards have likewise been framed as a response to increasingly complex patterns of care and expanding professional demands (Dúason et al., 2021; Gottschalk et al., 2024; Marung et al., 2025). Switzerland has not followed the same institutional path. Even so, the present findings suggest that some of the themes commonly associated with academic development already resonate within this sample, despite the more limited institutional structures currently available.

The subgroup results sharpen this interpretation. Respondents with an academic degree tended to show somewhat more favorable response patterns, but the differences were limited, and most respondents without an academic degree were also classified as Opportunity-leaning. The overall pattern is therefore difficult to attribute simply to a small subgroup of respondents with an academic degree. The opportunity-related themes captured here appear to have broader relevance across this sample of the Swiss EMS workforce.

IMPLICATIONS

Because the opportunity-related themes identified here have relevance beyond a narrowly academic subgroup, the main implication is not simply that respondents viewed academic development favorably. More importantly, discussion in Swiss EMS may now move beyond abstract endorsement or rejection alone. The questionnaire did not ask only whether academic development was desirable in general. It asked whether it was associated with concrete professional and practice-related functions. Since these themes were endorsed more strongly than the structural concerns represented in the Threat items, a more useful next step for professional and policy discussion may be to ask what kinds of development are seen as meaningful, for whom, and under what conditions they are considered appropriate within Swiss EMS.

This matters because the practical context of EMS work is changing. Swiss mission data, consistent with those from other high-income settings, show that prehospital care includes a substantial volume of non-urgent but complex cases rather than only rare high-acuity emergencies (Vuilleumier et al., 2021). As case mixes shift in this direction, greater importance is placed on clinical reasoning, chronic and psychiatric care, interprofessional collaboration, and system integration (Corman et al., 2025; Dúason et al., 2021). These are also the domains in which academically structured roles are often discussed as useful (Dúason et al., 2021; Gottschalk et al., 2024; Marung et al., 2025). The

present study cannot determine which reforms would best address those demands, but it does suggest that the professional functions commonly invoked in such discussions are not being rejected across the board within this sample.

Once the issue is framed in those terms, the next question becomes one of design. In Swiss EMS, limited progression opportunities and unfavorable shift models have been identified as contributors to attrition (Regener & Trede, 2024), while previous Swiss survey data indicate substantial interest in academically oriented continuing education and further qualification pathways (Brinkmann, 2024). These observations do not show that such pathways would improve workforce retention, but they do suggest that progression, qualification, and longer-term role development are already salient concerns within the profession. International work further suggests that such pathways are most meaningful when they are linked to clearly defined roles in education, research, leadership, or advanced practice, rather than added as credentials without corresponding function (Cordrey et al., 2024; Willis, 2024; Yalniz et al., 2024). In that sense, the significance of future development in Swiss EMS is likely to depend less on expansion than on whether pathways are tied to concrete responsibilities, visible functions, and practice-relevant career trajectories.

At the same time, the study leaves open questions it was not designed to answer. It does not identify which specific forms of development EMS professionals consider most useful, feasible, or concerning, and it may not capture concerns beyond the relatively narrow Threat scale used here. Further qualitative research would therefore be valuable to clarify how different groups within EMS understand the opportunities, trade-offs, and risks associated with academic development, and to inform more specific educational and policy discussions in Switzerland.

LIMITATIONS

Several limitations should be considered. The cross-sectional design does not allow causal inferences. Participation was voluntary and relied on the Swiss Paramedic Association mailing list and supplementary promotion at a national prehospital research conference, yielding a convenience sample that may have overrepresented professionals with greater interest in science, education, and professional development. Recruitment through a professional association may also have introduced social desirability bias if respondents perceived academic development as institutionally endorsed. Because no centralized national workforce registry is available, sample representativeness could not be formally assessed, and a true population response rate could not be calculated. Some drop-out also occurred between access and completion, which may have led to underrepresentation of less engaged respondents. The questionnaire was exploratory. Because no validated instrument existed and no prior work had established the full range of perceived opportunities and threats related to academic development in EMS, item generation was theory- and expert-informed. The Opportunity and Threat scales therefore reflect predefined survey items rather than the full attitudinal landscape of academic development in Swiss EMS. This is especially relevant for the Threat scale, which captured only a limited subset of possible concerns and was represented by fewer items than the Opportunity scale. Although the Dominance Index was calculated from mean scale scores and therefore did not numerically weight the Opportunity scale more heavily because it contained more items, the narrower content coverage of the Threat scale may have limit-

ed the range of concerns contributing to the Threat score. The Dominance Index should therefore be interpreted as the relative endorsement of the included Opportunity- and Threat-related item sets, not as evidence that all possible concerns about academic development were less strongly endorsed. In addition, the removal of Q11 indicates that general endorsement of research improving prehospital care did not align closely with the retained Opportunity scale. The final Opportunity scale should therefore be interpreted as capturing selected attitudes toward academic pathways, qualifications, professional visibility, and career development, rather than general attitudes toward EMS research. Finally, the findings reflect the specific structures of the Swiss and Liechtenstein EMS and education systems and may not generalize directly to other jurisdictions.

Several features strengthen the interpretation of these findings, including the nationwide scope, broad linguistic and occupational coverage, and transparent questionnaire documentation. SWISS PEAK was conceived within and for the paramedic community, which strengthens contextual validity, while independent methodological oversight outside operational EMS supports analytical independence.

CONCLUSIONS

In this national sample of Swiss EMS professionals, the Opportunity-related items captured by the questionnaire were endorsed more strongly than the Threat-related items. Differences by academic degree status were modest, and perceived applicability of prior academic training showed no clear association with attitudinal orientation. These findings suggest that themes linked to academic qualifications, professional visibility, career development, and educational progression have relevance within Swiss EMS and can inform ongoing discussion of how academic development should be framed and linked to professional roles and practice needs.

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APPENDIX A: SWISS EMERGENCY MEDICAL SERVICES – SYSTEM, EDUCATION AND ROLES

SYSTEM CONTEXT AND ORGANIZATION

Switzerland is a federal state composed of 26 cantons and four national languages (German, French, Italian and Romansh) (Federal Statistical Office, 2025). The three main language regions in Switzerland are German-speaking (~63%), French-speaking (~22%) and Italian-speaking (~8%). Romansh speakers represent approximately 0.5% of the population (Federal Statistical Office, 2025). Emergency medical services (EMS) are decentralized and regulated at the cantonal level, resulting in regional variation in EMS organization, staffing models, deployment of advanced providers, and integration with hospital systems (Brinkmann, 2024).

EMS systems are coordinated through regional emergency call centers and typically operate within a two-tiered response structure. Ambulance services are primarily staffed by paramedics, while emergency physicians are deployed depending on case severity and regional protocols. Although federal regulations define education pathways and certification standards, operational implementation is determined locally. The Swiss EMS system therefore represents a hybrid model combining paramedic-based and physician-supported approaches (State Secretariat for Education, Research and Innovation, 2025).

PROFESSIONAL ROLES

EMERGENCY MEDICAL TECHNICIANS (EMTs)

Emergency Medical Technicians (EMTs) complete a federally regulated vocational training program and represent an entry-level role within Swiss EMS. Their responsibilities include patient transport, basic life support, and assistance during advanced interventions. EMTs typically work under the supervision of paramedics (Forum Berufsbildung Rettungswesen, 2022a). Holders obtain a Federal Diploma of Higher Education after passing a national professional examination. The qualification is classified at NQF/EQF level 5, placing it at post-secondary level and not as an academic degree (State Secretariat for Education, Research and Innovation, 2025). The structured preparatory program typically lasts one year and comprises about 1,800 hours of learning, combining school-based teaching with supervised practice in EMS and transport services (Forum Berufsbildung Rettungswesen, 2022a).

Official title in German (D), French (F), Italian (I) and English (E) (State Secretariat for Education, Research and Innovation & Federal Department of Economic Affairs, Education and Research, 2017):

- Transportsanitäterin mit eidg. Fachausweis / Transportsanitäter mit eidg. Fachausweis (D)
- Technicienne ambulancière avec brevet federal / Technicien ambulancier avec brevet federal (F)
- Soccorritrice ausiliaria d'ambulanza con attestato professionale federale (I)
- Emergency Medical Technician, Federal Diploma of Higher Education (E)

REGISTERED PARAMEDICS

Registered paramedics are the core clinical workforce in Swiss EMS. They are trained to provide autonomous prehospital emergency care, including patient assessment, initiation of life-saving interventions, and safe transport within defined protocols or in collaboration with emergency physicians (Forum Berufsbildung Rettungswesen, 2022b). They obtain an Advanced Federal Diploma of Higher Education after completing an accredited program and passing the national diploma examination. This qualification is classified at NQF/EQF level 6, corresponding to the level of a bachelor's degree in terms of competencies, but situated in Swiss tertiary level B (higher vocational education) rather than the university sector (State Secretariat for Education, Research and Innovation, 2025). It is therefore not an academic degree. Training comprises approximately 5,400 hours over three years, combining school-based instruction, supervised EMS practice, and clinical placements (Forum Berufsbildung Rettungswesen, 2022b).

Practical training in an EMS takes place in organizations that meet defined accreditation criteria. It includes working under educational supervision with a progressive increase in autonomy, as well as structured reflection on missions. This component is designed to ensure the acquisition and consolidation of all practical competencies, the integration of school-based training into real-world practice and the development of extensive operational experience.

Official title in German (D), French (F), Italian (I) and English (E) (State Secretariat for Education, Research and Innovation & Federal Department of Economic Affairs, Education and Research, 2017):

- Diplomierte Rettungssanitäterin HF / Diplomierter Rettungssanitäter HF (D)
- Ambulancière diplômée ES / Ambulancier diplômé ES (F)
- Soccorritrice diplomata SS / Soccorritore diplomato SS (I)
- Registered Paramedic, Advanced Federal Diploma of Higher Education (E)

EMERGENCY PHYSICIANS

Emergency physicians (EPs) are medically qualified doctors who provide advanced prehospital care in high-acuity cases (Hirslanden Group, 2025). They obtain a Certificate of Competence in Prehospital Emergency Medicine (SGNOR/SSMUS) following postgraduate clinical training and completion of required prehospital case experience (Schweizerisches Institut für ärztliche Weiter- und Fortbildung, 2018). The SGNOR curriculum requires 50 documented missions ($NACA \geq 4$), including at least five missions with direct on-scene supervision, while other cases may be supervised retrospectively (Schweizerisches Institut für ärztliche Weiter- und Fortbildung, 2018). In practice, many EPs are still in postgraduate training and may act as the sole physician on scene, resulting in variation in experience across regions. Some EMS systems employ exclusively board-certified physicians, leading to more standardized expertise.

Official title in German (D), French (F), Italian (I) and English (E) (State Secretariat for Education, Research and Innovation & Federal Department of Economic Affairs, Education and Research, 2017):

- German (D): Fähigkeitsausweis Präklinische Notfallmedizin / Notarzt (SGNOR)
- French (F): Attestation de formation complémentaire en médecine d'urgence préhospitalière / médecin d'urgence (SSMUS)
- Italian (I): Attestato di capacità in medicina d'urgenza preospedaliera / medico d'urgenza (SSMUS)
- English (E): Certificate of Competence in Prehospital Emergency Medicine (SGNOR)

CRITICAL CARE PARAMEDICS

Critical care paramedics (CCPs) are registered paramedics with additional postgraduate training, most commonly an Advanced Federal Diploma of Higher Education in Anesthesia Care (NQF/EQF level 7) (OdASanté & Verband Bildungszentren Gesundheit Schweiz, 2022). Training lasts approximately two years and includes anesthesia and intensive care placements. CCP roles involve extended competencies under medical delegation and are implemented in selected cantons. National standardization is lacking, and CCP and physician-based models coexist.

PRACTICE TRAINER, EDUCATOR AND LECTURER

Ambulance services act as primary training sites for paramedic education and must meet requirements defined in the Vocational Education and Training Ordinance (BBV, Art. 10(3)). Trainees are supervised by qualified paramedics who serve as practice trainers. Practice trainers and educators require additional pedagogical qualifications in accordance with BBV (Art. 44 lit. a–c), typically obtained through the Swiss Association for Adult Learning (SVEB) framework. SVEB training is structured across four levels. Level I (approx. 405 hours) is sufficient for supervision of trainees in ambulance services, while higher levels lead to advanced teaching qualifications, including the Federal Certificate for educators (Brinkmann, 2024). In practice, qualification requirements vary by role. Practice trainers typically hold SVEB Level I, whereas lecturer or class teacher roles in ambulance service schools often require higher-level certification (e.g. SVEB IV) or equivalent qualifications. In some EMS organizations, educators are also integrated into leadership structures.

LIMITATIONS AND SCOPE OF THIS APPENDIX

This appendix focuses on core roles and training pathways relevant to operational EMS practice. Additional certifications and role-specific qualifications (e.g., incident command or HEMS crew functions) exist but are often short, locally defined, or limited in scope and are therefore not described in detail. Given Switzerland's federal structure and regional variation in EMS organization, this description is not exhaustive but reflects common structures and practices across the system.

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APPENDIX B: SURVEY INSTRUMENT

This appendix reproduces the exact survey items as presented to respondents and provides additional information on questionnaire development, administration, and scale construction. Items are numbered sequentially (Q1-Q30) for reference throughout the manuscript. The survey was administered in German, French, and Italian. Items are reproduced here in their original wording. The English version is an unofficial translation.

QUESTIONNAIRE DEVELOPMENT

The questionnaire was developed specifically for the SWISS PEAK project, as no validated Swiss instrument assessing attitudes toward academic development in Emergency Medical Services (EMS) was available.

Item development was informed by literature on professionalization, academic development, and research engagement in paramedicine and related health professions (Bowles et al., 2024; Hofmann, 2022; Runacres et al., 2024; Zünd et al., 2025), as well as prior academic development processes in Swiss health professions such as nursing and midwifery (Cignacco et al., 2024; Toffel, 2020). Based on this, the attitudinal framework was structured around two exploratory questionnaire-defined dimensions, labelled Opportunity and Threat.

Initial item pools were developed by the SWISS PEAK research team through iterative discussion and review. The team included members with clinical EMS backgrounds, academic researchers, and individuals with varying levels of academic training and differing perspectives on academic development. Members represented multiple language regions of Switzerland and contributed experience from prior survey-based research and EMS system analysis. This composition was intended to incorporate varied perspectives during questionnaire development.

Several rounds of internal review were conducted to refine wording, remove redundancies, and ensure interpretability within the Swiss EMS context. Attention was given to item clarity, relevance and interpretability. External input from experienced EMS stakeholders was incorporated during the development phase. These reviewers evaluated item clarity, relevance to current professional debates, and practical plausibility.

Item wording was designed to capture selected themes related to academic development. The initial Opportunity-oriented item pool addressed research improving care quality, professional visibility of care quality, EMS-specific academic degree programs, advanced or academic qualification options, educational progression after the HF diploma, and career development and workforce sustainability. Threat-oriented items addressed concerns related to team cohesion, job security, and the perceived necessity of additional formal qualifications. Because no prior qualitative work had established the full range of perceived opportunities and concerns related to academic development in Swiss EMS, these questionnaire-defined dimensions should be understood as exploratory and theory-informed rather than exhaustive.

All attitudinal items were measured using visual analog scales (VAS) ranging from 0 to 100 (0 = strongly disagree, 100 = strongly agree). The continuous response format was

chosen to capture nuanced attitudes and reduce information loss associated with categorical scales.

Cognitive pretesting was conducted with EMS professionals from different language regions ($n = 17$). Participants assessed clarity, interpretation, and response difficulty. Particular attention was given to consistent understanding of terms such as “academic qualification”, “research”, and “scientific evidence.” Minor wording adjustments were made based on this feedback. Internal consistency estimates during pretesting ranged from Cronbach’s $\alpha = 0.88$ to 0.99 across preliminary scales. In accordance with the approved ethics protocol, no items were removed at this stage to preserve conceptual coverage prior to formal psychometric evaluation.

The questionnaire was translated into German, French, and Italian by native speakers and reviewed to ensure conceptual equivalence across language versions.

SURVEY ADMINISTRATION

The survey was administered online using Findmind between September 4 and September 25, 2025. Recruitment was conducted via the Swiss Paramedic Association mailing list (one initial invitation and one reminder) and was supplemented by a QR-code invitation at a national EMS research conference (Journée romande de recherche clinique pré-hospitalière 2025). Participation was voluntary and self-administered.

Findmind recorded 758 unique landing-page visitors. Of these, 736 proceeded to the consent page, 613 provided consent, and 590 completed the questionnaire. This corresponds to a completion rate of 77.8% among visitors. Relative to the association mailing list ($n = 1,900$), the sample represents 31.1% of reachable members. Based on an estimated EMS workforce of 3,669 professionals in Switzerland and Liechtenstein, the sample represents 16.1% of the target population. Because no complete national registry of EMS professionals with standardized role and qualification information is available, these figures should not be interpreted as a true population response rate or as evidence of sample representativeness.

Duplicate submissions were prevented using cookie-based controls, and manual checks did not indicate repeat participation. Data collection was anonymous; no direct identifiers were stored, and all data were transmitted via encrypted HTTPS connections. Access to the dataset was restricted to authorized team members.

FINAL SCALE COMPOSITION

Following item screening using corrected item-total correlations (threshold 0.30) and internal consistency criteria, the Opportunity and Threat scales were refined. The initial Opportunity dimension included six items (Q11 and Q13-Q17). Item Q11, “Research in EMS improves the quality of prehospital care,” showed a weak corrected item-total correlation with the initial Opportunity dimension ($r = 0.19$) and was excluded. Internal consistency improved from $\alpha = 0.83$ in the initial six-item Opportunity dimension to $\alpha = 0.90$ in the final five-item Opportunity scale after removal of Q11.

This finding was not interpreted as evidence that respondents rejected research in EMS. On the contrary, Q11 was strongly endorsed overall (mean = 73.4, $SD = 33.8$; median = 86), with 62.9% of respondents scoring the item at 80 or higher. However, the item

showed greater dispersion than most retained Opportunity items and was only weakly associated with the remaining scale. This suggests that general agreement that research improves prehospital care formed a related but distinct attitude from endorsement of academic pathways, qualifications, professional visibility, and career development.

The final Opportunity scale therefore comprised five items (Q13-Q17), reflecting selected themes related to professional visibility of care quality, career development and workforce sustainability, EMS-specific academic degree programs, advanced or academic qualification options, and educational progression after the HF diploma. The final Threat scale comprised three items (Q18-Q20), reflecting a narrower set of concerns related to team cohesion, job security, and the perceived necessity of additional formal qualifications. Standardized factor loadings and corrected item-total correlations for the final retained items are presented in Table B1.

Domain	Item (Short Wording)	Conceptual Theme	Standardized Loading	Corrected Item-Total r
Opportunity	Academic qualifications make care quality visible	Professional visibility and legitimacy	0.74	0.70
Opportunity	Academic pathways reduce early career attrition	Career development and workforce sustainability	0.78	0.74
Opportunity	Dedicated academic degree programs could advance the Swiss EMS profession	Academic development of the profession	0.81	0.76
Opportunity	Support advanced or academic qualifications alongside existing EMS pathways	Additional qualification pathways	0.82	0.76
Opportunity	Support academic pathway after HF diploma	Educational progression opportunities	0.82	0.75
Threat	Higher education may negatively affect team cohesion	Workforce cohesion concerns	0.73	0.59
Threat	Academic expansion may threaten job security	Employment security concerns	0.67	0.60
Threat	No need for additional education in Swiss EMS	Perceived redundancy of academic training	0.70	0.53

Table B1. Final opportunity and threat scale items, conceptual themes, standardized factor loadings, and corrected item-total correlations.

GERMAN

Einwilligung

1. Ich bin mindestens 18 Jahre alt und habe die Studieninformationen gelesen und verstanden. Ich stimme der Speicherung und Verarbeitung meiner anonymen Daten zu. Diese Einwilligungserklärung stellt klar, dass die Daten nach der Übermittlung nicht zurückgezogen werden können, um die vollständige Anonymität der teilnehmenden Personen zu gewährleisten. Antwortoptionen: Zustimmung / Ablehnen

Soziodemografie und beruflicher Hintergrund

2. Wie alt sind Sie? Antwortformat: Drop-down (18–70 Jahre)
3. Welchem Geschlecht fühlen Sie sich zugehörig? Antwortoptionen: Weiblich; Männlich; Divers
4. Über wie viel Jahre Berufserfahrung im Rettungsdienst verfügen Sie? Antwortformat: Drop-down (0–40 Jahre)

5. Was ist Ihre aktuelle Funktion im Rettungsdienst? Antwortoptionen: Diplomierte/r Rettungssanitäter/in HF/NHF, Transportsanitäter/in eidg. FA, In Ausbildung (Diplomierte/r Rettungssanitäter/in HF/NHF), In Ausbildung (Transportsanitäter/in eidg. FA), Berufsbildner/in, Dozent/in an einer höheren Fachschule, Leitstellendisponent/in, Kader/Leitung, Andere, bitte angeben
6. Was ist Ihre höchste abgeschlossene Berufsausbildung? Antwortoptionen: Eidgenössisches Fähigkeitszeugnis/-ausweis (EFZ/FA), Höhere Fachschule (HF), Fachhochschulabschluss Bachelor, Fachhochschulabschluss Master, Universitätsabschluss Bachelor, Universitätsabschluss Master, Promotion/Doktorgrad, Andere, bitte angeben
7. Bitte geben Sie Ihren Abschluss an. Antwortformat: Freitext
8. Können Sie die im Studium erlernten Kenntnisse und Fähigkeiten in Ihrem Berufsalltag anwenden? Antwortoptionen: Ja / Nein
9. In welchen Bereichen setzen Sie die Kenntnisse aus Ihrem Studium im Rettungsdienst ein? Antwortoptionen: Forschung und Wissenschaft, Qualitätsmanagement, Aus-, Fort- und Weiterbildung, Statistik, Managementaufgaben, Andere, bitte angeben
10. In welchem Kanton gehen Sie hauptsächlich Ihrer Arbeit nach? Antwortformat: Drop-down (alle Kantone + Liechtenstein)

Einstellungssitems (VAS 0–100, 0 = stimme überhaupt nicht zu, 100 = stimme voll zu).

11. Forschung im Rettungsdienst erhöht die Qualität der prähospitalen Versorgung.
12. Ich denke, dass wissenschaftliche Daten, die von Rettungskräften selbst erhoben und analysiert werden, objektivere Ergebnisse liefern können, die bei Entscheidungen im Rettungsdienstmanagement berücksichtigt werden sollten.
13. Qualifikationen (z.B. Certificates of Advanced Studies, Bachelor, Master) könnten dazu beitragen, die hohe Versorgungsqualität von Rettungsfachpersonal sichtbar und belegbar zu machen.
14. Ich denke, dass rettungsdienstspezifische akademische Zertifikate und Abschlüsse bessere Möglichkeiten zur Weiterbildung und beruflichen Weiterentwicklung bieten können, wodurch ein frühzeitiger Ausstieg aus dem Beruf verringert werden kann.
15. Eigene Studiengänge für Rettungsfachpersonal könnten Schweizer Rettungsfachpersonal voranbringen.
16. Ich würde es befürworten, neben den etablierten Ausbildungswegen im Rettungsdienst die Möglichkeit zu haben, weiterführende oder akademische Qualifikationen zu erwerben.
17. Ich würde es befürworten, nach dem HF-Abschluss auch noch einen akademischen Weg einschlagen zu können, wie es zum Beispiel in der Pflege möglich ist.
18. Die Einführung höherer Bildungswege (z.B. Bachelor- und Masterabschlüsse) könnten den Teamzusammenhalt im Rettungsdienst negativ beeinflussen.
19. Die Etablierung akademischer Qualifikationen im Rettungsdienst könnte die Arbeitsplatzsicherheit gefährden.
20. Für mich besteht kein Bedarf an zusätzlicher Ausbildung oder weiterführenden Qualifikationen im Schweizer Rettungsdienst.
21. Ich finde es sinnvoll, Entscheidungen im Rettungsdienst auf wissenschaftlicher Grundlage zu treffen.

22. Praktische Erfahrungen sind wichtiger als wissenschaftliche Erkenntnisse. (Reverse-coded)
23. Ich würde mir wünschen, dass in Schweizer Rettungsdiensten mehr wissenschaftlich geforscht wird.
24. Ich würde gerne selber an Forschung teilnehmen und so zur Evidenzbasierung beitragen.
25. Ich habe während des Dienstes Zugang zu wissenschaftlichen Quellen (zum Beispiel Fachzeitschriften, Leitlinien usw.).
26. Ich finde es ausreichend, dass die Arbeitsqualität von Rettungskräften von anderen Berufsgruppen (Ärztinnen, Ärzte, Pflegefachpersonen etc.) erhoben, analysiert, bewertet und publiziert wird. (Reverse-coded)
27. Es stört mich, wenn andere Berufsgruppen Rettungsfachpersonal als Forschungsobjekt betrachten und bewerten.
28. Ich bin der Meinung, dass Rettungsfachpersonal gemeinsam mit Pflegefachpersonen, Ärztinnen und Ärzten als gleichberechtigte Partner gemeinsam Forschung betreiben sollten.
29. Es kann für den Schweizer Rettungsdienst von Vorteil sein, wenn wissenschaftliche Studien von Rettungsfachpersonal für Rettungsfachpersonal durchgeführt werden.

Offene Frage

30. Was ist Ihrer Meinung nach der wichtigste Vorteil oder das grösste Risiko von mehr Wissenschaft im Rettungsdienst? Antwortformat: Freitext

FRENCH

Déclaration de consentement

1. Je suis âgé(e) d'au moins 18 ans et j'ai lu et compris les informations relatives à l'étude. Je consens à la conservation et au traitement de mes données anonymes. Cette déclaration de consentement clarifie que les données ne peuvent pas être retirées après soumission, afin de garantir l'anonymat complet des participants. Options de réponse: Accepter / Refuser

Sociodémographie et parcours professionnel

2. Âge Format de réponse: Liste déroulante (18–70 ans)
3. Sexe Options de réponse: Féminin; Masculin; Divers; Non spécifié
4. Expérience professionnelle dans les services d'urgence préhospitaliers (formation incluse) Format de réponse: Entrée numérique (années)
5. Fonction actuelle Options de réponse: Ambulancier/ère diplômé/e ES ou équivalent, Technicien/ne ambulancier/ère avec BF ou équivalent, Étudiant/Étudiante ambulancier/ère, Technicien/ne ambulancier/ère en formation, Practicien/ne formateur/rice, Enseignant/e dans une haute école supérieure, Régulateur/rice sanitaire, Cadre / Direction / Responsable de service de secours, Autre (veuillez préciser)
6. Niveau de formation Options de réponse: Certificat fédéral de capacité (CFC) / Brevet fédéral EP, École supérieure (ES), Bachelor d'une Haute école spécialisée (HES), Master d'une Haute école spécialisée (HES), Bachelor universitaire, Master universitaire, Doctorat (PhD), Autre, veuillez préciser

7. Veuillez préciser votre titre (p. ex. BSc en gestion d'événements, BA en marketing international). Format de réponse: Champ libre
8. Utilisez-vous vos qualifications académiques dans votre travail quotidien? Options de réponse: Oui / Non
9. Dans quels domaines utilisez-vous vos connaissances académiques? (Afficher uniquement si « Oui ») Options de réponse: Recherche, Gestion de la qualité, Formation professionnelle et continue, Statistiques, Tâches managériales, Autre (veuillez préciser)
10. Votre lieu de travail se situe dans le canton suivant: Format de réponse: Liste déroulante (tous les cantons suisses + FL)

Énoncés d'attitude (VAS 0–100, 0 = pas du tout d'accord, 100 = tout à fait d'accord)

11. La recherche améliore la qualité des soins préhospitaliers.
12. Je pense que les données scientifiques obtenues et analysées par des ambulanciers-ères peuvent fournir des résultats objectifs et fiables, qui devraient être pris en compte dans les décisions de gestion des services préhospitaliers.
13. Les qualifications académiques (p. ex. certificats avancés et diplômes) pourraient contribuer à démontrer la haute qualité des soins préhospitaliers fournis par les ambulanciers-ères.
14. L'établissement de programmes de certificats et de titres académiques en paramédecine offre davantage d'opportunités d'acquisition de compétences et d'évolution de carrière, réduisant ainsi les départs précoces.
15. Je pense que des titres académiques spécifiquement dédiés aux ambulanciers-ères pourraient bénéficier à la profession en Suisse.
16. J'aimerais avoir la possibilité de suivre des formations avancées ou des diplômes académiques parallèlement aux parcours déjà existants.
17. Je suis favorable à la possibilité de suivre un parcours académique après l'obtention d'un diplôme de niveau ES, comme dans la profession infirmière.
18. L'introduction de parcours de formation supérieure pourrait nuire à la cohésion des équipes.
19. L'expansion des diplômes académiques ou tertiaires pourrait menacer ma sécurité d'emploi.
20. Il n'y a pas besoin d'éducation ou de qualifications avancées supplémentaires dans les services préhospitaliers suisses.
21. Je pense qu'il est pertinent de prendre des décisions dans les services préhospitaliers sur la base de données scientifiques.
22. L'expérience pratique est plus importante que les résultats scientifiques. (Reverse-coded)
23. J'aimerais voir davantage de recherche scientifique dans les services préhospitaliers suisses.
24. J'aimerais participer à des recherches et contribuer à établir une pratique fondée sur les données probantes.
25. J'ai accès à des ressources scientifiques (p. ex. revues, directives, etc.) pendant mes heures de service.
26. Je considère qu'il est suffisant que la qualité du travail soit évaluée par d'autres groupes professionnels (médecins, infirmiers, etc.). (Reverse-coded)
27. Cela me dérange d'être perçu et évalué comme sujet de recherche par d'autres groupes professionnels.

28. Je pense que les ambulanciers ères devraient mener des recherches en collaboration avec médecins et infirmiers ères en tant que partenaires égaux.
29. Il pourrait être plus bénéfique pour la profession que les études soient menées par des ambulanciers ères pour des ambulanciers ères.

Question ouverte

30. Selon vous, quel est le principal avantage ou risque d'une plus grande diffusion de la science dans les services d'urgence? Format de réponse: Champ libre

ITALIAN

Dichiarazione di consenso

1. Dichiaro di avere almeno 18 anni e di aver letto e compreso le informazioni relative allo studio. Acconsento alla conservazione e al trattamento dei miei dati anonimi. Questa dichiarazione chiarisce che i dati non possono essere ritirati dopo l'invio, garantendo l'assoluto anonimato dei partecipanti. Opzioni di risposta: Accettare / Rifiutare

Sociodemografia e percorso professionale

2. Età Formato di risposta: Menù a tendina (18–70 anni)
3. Genere Opzioni di risposta: Femmina; Maschile; Altro; Non specificato
4. Esperienza lavorativa nel soccorso (inclusa la formazione) Formato di risposta: Menù a tendina (0–40 anni)
5. Attuale funzione nel servizio di soccorso Opzioni di risposta: Soccorritore/Soccorritrice (SSS), Soccorritore/Soccorritrice ausiliario/a (APF), In formazione (Soccorritore/Soccorritrice SSS), In formazione (Soccorritore/Soccorritrice ausiliario/a APF), Formatore/Formatrice, Docente presso SSS, Operatore/Operatrice di centrale, Quadro/Dirigente, Altro, specificare
6. Titolo conseguito Opzioni di risposta: Attestato Professionale Federale (APF), Scuola Specializzata Superiore (SSS), Bachelor Scuola Universitaria Professionale, Master Scuola Universitaria Professionale, Bachelor Università, Master Università, Dottorato, Altro, specificare
7. P.F. specifichi il titolo ottenuto (es. BSc Statistics o BA International Marketing). Formato di risposta: Campo libero (Mostrato solo per titoli di livello terziario)
8. Ha modo di mettere in pratica le conoscenze e competenze apprese con il titolo di studio? Opzioni di risposta: Sì / No
9. In quale ambito mette in pratica le sue competenze accademiche? (Mostrato solo se risposta = Sì) Opzioni di risposta: Ricerca, Gestione della qualità, Formazione, Statistica, Attività manageriali, Altro (specificare)
10. Luogo di lavoro (Cantone) Formato di risposta: Menù a tendina (tutti i Cantoni + FL)

Affermazioni attitudinali (VAS 0–100, 0 = completo disaccordo, 100 = completo accordo).

11. La ricerca scientifica contribuisce a migliorare la qualità delle cure preospedaliere.
12. Sono dell'opinione che dati scientifici raccolti e analizzati dal personale paramedico possano fornire risultati oggettivi e affidabili, e dovrebbero essere inclusi nelle decisioni dei Servizi Ambulanza.
13. Offerte accademiche (es. CAS, programmi di Bachelor o Master) possono contribuire a evidenziare l'elevata qualità del soccorso preospedaliero.

14. Formazioni e certificati specifici per il personale di soccorso possono offrire possibilità di sviluppo professionale su misura, riducendo il rischio di abbandono precoce grazie a maggiori prospettive.
15. L'accademizzazione aiuterebbe a rendere visibile l'elevata qualità delle prestazioni erogate dal personale di soccorso.
16. Ritengo che formazioni accademiche destinate esclusivamente al personale di soccorso sarebbero un'opportunità di sviluppo della figura professionale.
17. Sarei favorevole a un percorso accademico dopo il diploma SSS, come per il personale infermieristico.
18. L'introduzione di nuovi percorsi di studio (es. CAS, SUP) potrebbe avere un impatto negativo sulla coesione del personale di soccorso.
19. L'estensione a titoli terziari o accademici potrebbe rappresentare una minaccia per la sicurezza del posto di lavoro.
20. Non vedo necessità di ulteriori percorsi di studio di livello avanzato nel soccorso preospedaliero.
21. Ritengo ragionevole che le decisioni nel soccorso siano basate su evidenza scientifica.
22. L'esperienza pratica è più importante delle conoscenze scientifiche. (Reverse-coded)
23. Desidero che venga svolta più ricerca nel soccorso in Svizzera.
24. Vorrei partecipare personalmente alla ricerca scientifica e contribuire alla base di evidenza.
25. Quando sono in servizio ho accesso a fonti scientifiche (es. riviste, linee guida).
26. Mi dà fastidio essere considerato e trattato come oggetto di studio da altri gruppi professionali. (Reverse-coded)
27. Mi dà fastidio essere considerato e trattato come oggetto di studio da altri soccorritori. (Reverse-coded, versione italiana specifica)
28. Ritengo che i soccorritori dovrebbero svolgere ricerca insieme a medici e infermieri in condizioni paritarie.
29. Ritengo che può essere più vantaggioso se gli studi scientifici vengono condotti dal personale paramedico per il personale paramedico.

Domanda aperta

30. Qual è secondo lei il principale vantaggio oppure il maggiore rischio dell'accademizzazione nel soccorso preospedaliero? Formato di risposta: Campo libero

UNOFFICIAL ENGLISH TRANSLATION

Consent

1. I am at least 18 years old and have read and understood the study information. I consent to the storage and processing of my anonymous data. Response options: Accept / Decline

Sociodemographic and professional background

2. Age Response options: Drop-down (18–70 years)
3. Gender Response options: Female; Male; Diverse; Not specified
4. EMS work experience (years, including training) Response options: Drop-down (0–40 years)

5. Current function Response options: Registered Paramedic ES, Emergency Medical Technician (Federal Certificate), Student paramedic, Student EMT, Practice trainer, Instructor at a higher vocational school, EMS dispatcher, Management / leadership, Other (specify)
6. Highest qualification Response options: CFC / Federal Certificate, Professional College (ES), University of Applied Sciences Bachelor, University of Applied Sciences Master, University Bachelor, University Master, Doctorate, Other (specify)
7. Please specify your degree. Format: Free text
8. Do you apply the knowledge from your studies in daily practice? Response options: Yes / No
9. In which areas do you apply academic knowledge? Response options: Research, Quality management, Education, Statistics, Management, Other
10. In which canton do you work? Format: Drop-down (all cantons + FL)

Attitude Items (VAS 0–100, 0 = strongly disagree, 100 = strongly agree)

11. Research in EMS improves the quality of prehospital care.
12. I believe that scientific data collected and analyzed by EMS professionals themselves can provide more objective and reliable results that should be considered in EMS management decisions.
13. Academic qualifications (e.g., CAS, Bachelor, Master) could help make the high quality of care provided by EMS professionals visible and demonstrable.
14. I think that EMS-specific academic certificates and degrees can provide better opportunities for continuing education and career development, thereby reducing early career attrition.
15. Dedicated academic degree programs for EMS professionals could advance the Swiss EMS profession.
16. I would support having the option to pursue advanced or academic qualifications alongside the established EMS training pathways.
17. I would support the possibility of taking an academic route after completing the HF diploma, similar to what is possible in nursing.
18. The introduction of higher education pathways (e.g., Bachelor and Master degrees) could negatively affect team cohesion in EMS.
19. The establishment of academic qualifications in EMS could threaten job security.
20. In my view, there is no need for additional or more advanced education in Swiss EMS.
21. I think it is sensible for decisions in EMS to be based on scientific evidence.
22. Practical experience is more important than scientific evidence. (Reverse-coded)
23. I would like to see more scientific research conducted within Swiss EMS organizations.
24. I would personally like to participate in research and contribute to evidence-based practice.
25. I have access to scientific resources (e.g., journals, guidelines) during my work shifts.
26. I think it is sufficient for the quality of EMS work to be assessed, analyzed, evaluated and published by other professional groups (e.g., physicians, nurses). (Reverse-coded)
27. It bothers me when other professional groups treat EMS personnel as research subjects and evaluate them.

28. I believe that EMS professionals should conduct research together with nurses and physicians as equal partners.
29. It may be beneficial for Swiss EMS if scientific studies are conducted by EMS professionals for EMS professionals.

Open question

30. In your opinion, what is the main advantage or greatest risk of academization in EMS? Format: Free text

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APPENDIX C: SENSITIVITY ANALYSIS

This appendix summarizes predefined sensitivity analyses assessing the robustness of attitudinal classifications and educational-group comparisons. All analyses used the same complete-case datasets as the primary analyses ($n = 590$ for descriptive statistics; $n = 584$ for regression models).

DOMINANCE INDEX CUTOFF SENSITIVITY

The Dominance Index ($D = \text{Opportunity} - \text{Threat}$) was categorized using a ± 10 tie zone in the primary analysis. Two alternative thresholds (± 5 and ± 15) were examined.

Across both alternatives, the distribution of respondents classified as Opportunity-leaning, Neutral, or Threat-leaning changed only marginally. In all cases, Opportunity-leaning respondents remained the majority across all thresholds, and the relative ordering of the three categories was unchanged. No alternative threshold affected group differences or regression conclusions.

ATTITUDINAL PROFILE CUTOFF SENSITIVITY

Attitudinal profiles were derived using a 60-point cutoff on both the Opportunity and Threat scales ($\text{High} \geq 60$; $\text{Low} < 60$). Alternative cutoffs (55 and 65) were examined to assess stability.

Profile distributions remained substantively unchanged across all examined cutoffs. Under the primary cutoff, the High-Opportunity / Low-Threat profile accounted for 74.1% of respondents (99% CI [69.2, 78.4]). Alternative cutoffs produced near-identical patterns, with the same profile remaining dominant. No cutoff variation altered subgroup differences or the overall interpretation of attitudinal structure.

ACADEMIC DEGREE STATUS SENSITIVITY (NARROW VS BROAD DEFINITION)

A broad definition of academic degree status (including CAS, DAS, and MAS degrees) was used to evaluate whether results were sensitive to the coding scheme. This increased the number of respondents classified as having an academic degree from 98 (16.6%) under the narrow definition to 104 (17.6%) under the broad definition.

Under the broad definition, differences between respondents with and without an academic degree remained fully consistent with the primary analysis:

- Opportunity: +5.40 (99% CI [-0.70, 11.51])
- Threat: -8.21 (99% CI [-13.68, -2.73])
- Dominance: +13.61 (99% CI [3.83, 23.39])

LOGISTIC REGRESSION ROBUSTNESS

The full-sample model was re-estimated using the broad definition of academic degree status (including CAS, DAS, and MAS qualifications). Odds ratios, confidence intervals, and significance levels were consistent with the primary analysis based on the narrow definition. Results were consistent across all model specifications, with no changes in direction or magnitude of effects.

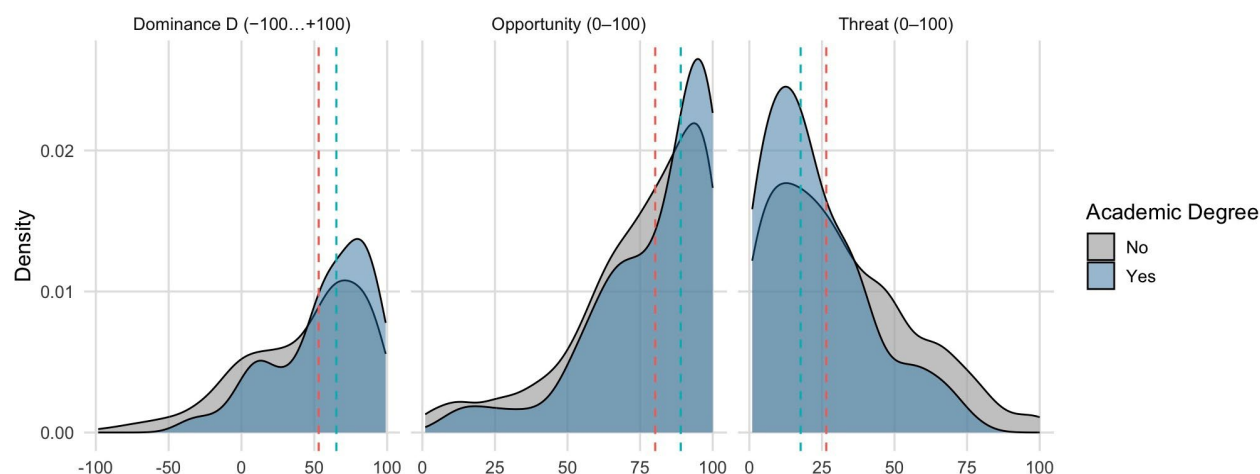


Figure C1. Kernel-density distributions of opportunity, threat, and dominance scores by academic degree status (broad definition).

Note. Kernel-density plots of Opportunity and Threat scores (0-100 VAS) and Dominance Index scores (-100 to +100; Dominance = Opportunity - Threat), stratified by academic degree status using the broad definition of academic degree status. The broad definition classifies respondents as having an academic degree if they hold a Bachelor, Master, Doctorate, EMBA, or postgraduate CAS/DAS/MAS degree. Shaded curves represent smoothed distributions; vertical dashed lines mark group means (blue = academic degree; grey = no academic degree). “Prefer not to answer” responses were excluded.