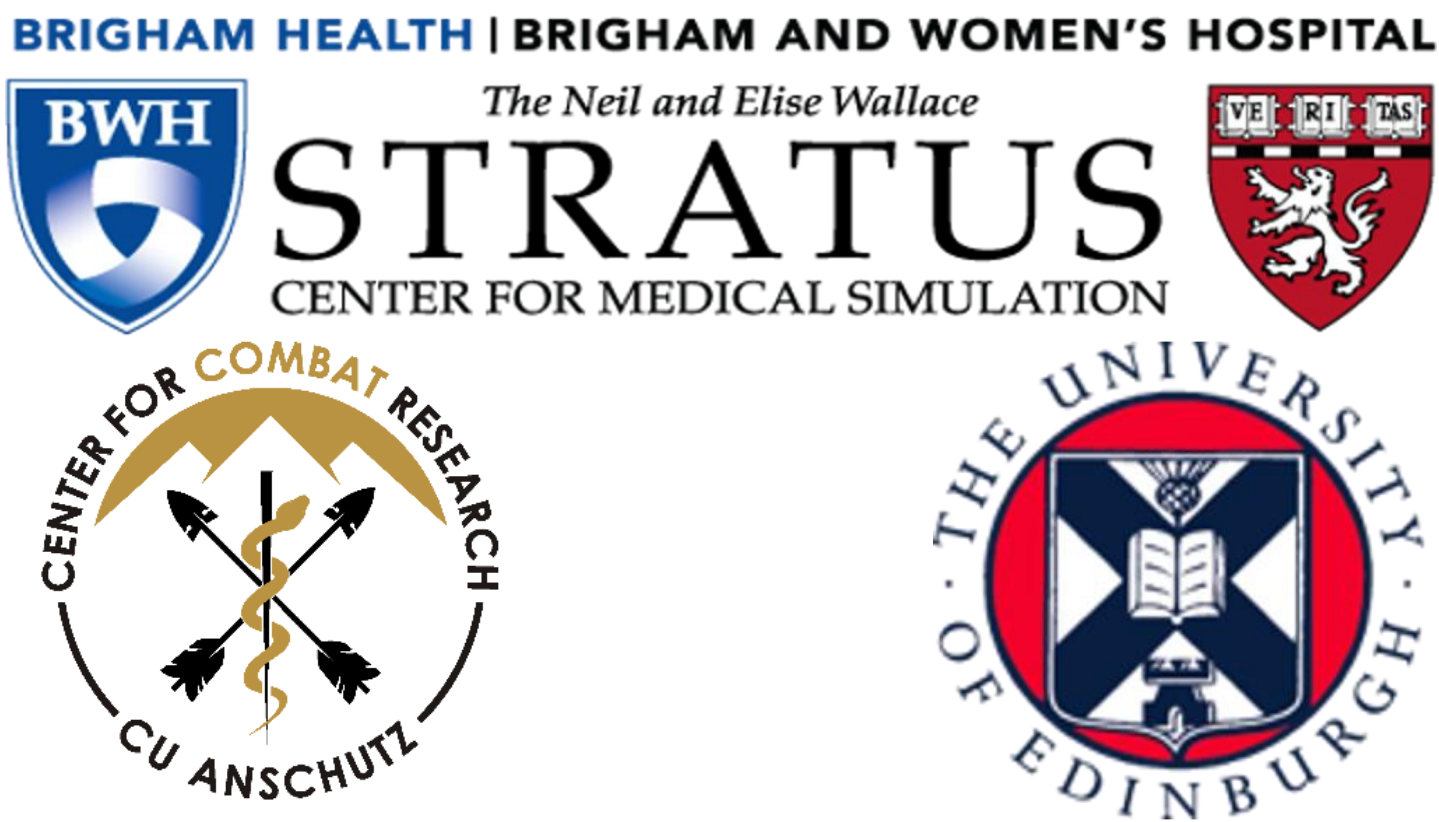


Reliability & Validity of the Assessment of Combat Casualty Nontechnical Skills in Teams Tool in Simulated En Route Critical Care

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Background

United States Air Force Critical Care Air Transport (CCAT) teams must demonstrate effective nontechnical skills (NTS) to optimize clinical outcomes. These are the cognitive and interpersonal behaviors that complement technical expertise to drive safe and efficient team performance. This study evaluated the reliability and validity of the Assessment of Combat Casualty Nontechnical Skills (AC²ENTS) team-level NTS assessment tool for evaluation and performance feedback in simulated ERCC missions. The AC²ENTS tool was developed by CSTARS Cincinnati.

Objective

To evaluate the reliability and validity of the AC²ENTS-TEAM assessment tool for evaluating team-level nontechnical skills and providing performance feedback during simulated En Route Critical Care (ERCC) missions.

Methods

- **Assessment Tool:** The AC²ENTS-TEAM tool was used, which comprises 10 items mapped to four NTS domains (decision making, situational awareness, task management, teamworking). Performance is assessed using a 0-100 scale.
- **Data Pooling:** Existing data from two separate studies were pooled for a combined analysis.
 - Study A: Included 14 CCAT teams completing a single 10-minute ERCC simulation with two patients.
 - Study B: Included six CCAT teams, each completing two 30-minute simulations involving five patients.
- **Data Analysis:**
 - Trained raters independently reviewed simulation recordings to assign team-level item scores and a global NTS score.
 - Reliability: Internal consistency was assessed using Cronbach’s alpha (α).
 - Validity: Construct validity was evaluated using Confirmatory Factor Analysis (CFA).

Results

Table 1. Internal Consistency

AC ² ENTS-TEAM domain/element	Cronbach's α	Cronbach's α*
Cognitive Skills	0.92	
Situational Awareness	0.85	
Gathering Information		0.93
Integrating Information		0.93
Anticipating		0.93
Decision Making	0.90	
Problem Solving		0.93
Reviewing & Re-evaluating		0.94
Social Skills	0.90	
Task Management	0.90	
Planning & Preparing		0.93
Prioritizing		0.93
Teamworking	0.94	
Exchanging Information		0.94
Maintaining a Shared Understanding		0.94
Providing Leadership		0.94
* Cronbach's α when item removed		

Table 1. Internal Consistency: The AC²ENTS-TEAM tool demonstrated excellent overall internal consistency (α = 0.94), with strong reliability across both cognitive (α = 0.92) and social (α = 0.90) skill domains. However, Cronbach’s α increased or remained unchanged with the removal of individual items, suggesting potential item redundancy.

Table 2. Factor Analysis: Confirmatory Factor Analysis (CFA) supported a three-factor model (CFI = 0.92) as the most robust fit. This model combined the "situational awareness" and "task management" domains while retaining "decision making" and "teamworking" as distinct domains.

Figure 1. SIM Setting

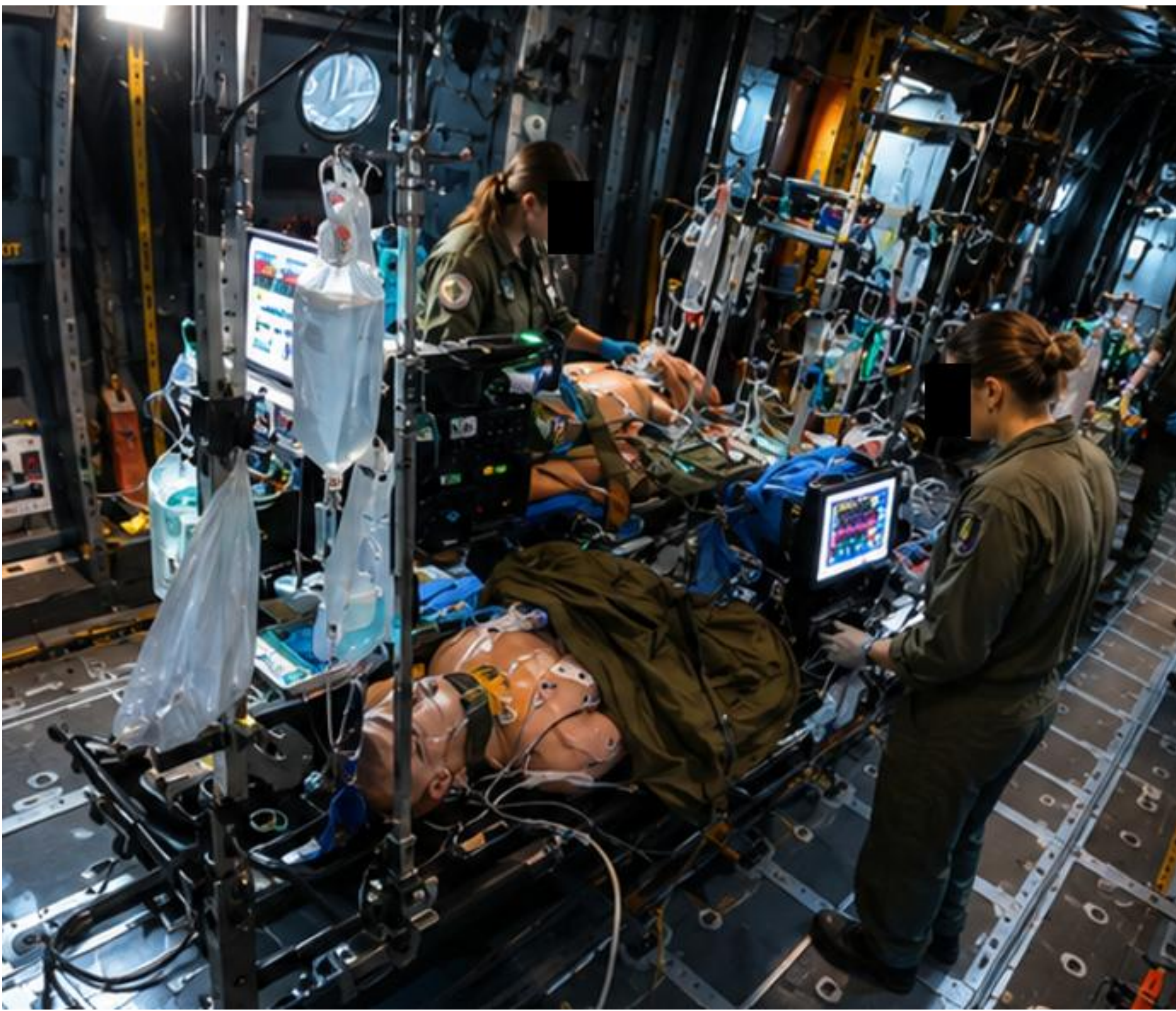


Table 2. Factor Analysis

Model #	Model (N = 40)	Parameters	χ ²	d.f.	χ ² / d.f.	CFI	RMSEA
1	1-factor	(1) 10 NTS elements	157.21	35.00	4.49	0.69	0.30 (0.34-0.25)
2	2-factor	(1) Cognitive Skills (a) Decision Making (b) Situational Awareness (2) Social Skills (a) Task Management (b) Teamworking	134.6	34.00	3.96	0.74	0.27 (0.32-0.23)
3	2-factor	(1) Combined NTS Domains (a) Decision Making (b) Situational Awareness (c) Task Management (2) Teamworking	80.99	32.00	2.38	0.88	0.19 (0.24-0.13)
4	3-factor	(1) Cognitive Skills (a) Decision Making (b) Situational Awareness (2) Task Management (3) Teamworking	73.62	32.00	2.3	0.89	0.18 (0.24-0.13)
5	3-factor	(1) Combined NTS Domains (a) Situational Awareness (b) Task Management (2) Decision Making (3) Teamworking	65.42	32.00	2.04	0.92	0.16 (0.22-0.11)
6	4-factor	(1) Decision Making (2) Situational Awareness (3) Task Management (4) Teamworking	48.18	29.00	1.66	0.95	0.13 (0.19-0.06)

Conclusion

These findings indicate that the AC²ENTS-TEAM tool can be simplified into a more parsimonious, three-domain structure while maintaining its psychometric rigor. The refined tool is well-suited to support future training and assessment for ERCC missions.

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