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There is no “I” in TEAM: Players, Leaders, and Team Performance in Public Health Emergency Response

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There is no “I” in TEAM: Players, Leaders, and Team Performance in Public Health Emergency Response

University of Minnesota: Simulations, Exercises and Effective Education (U-SEEE) Preparedness and Emergency Response Research Center(PERRC)

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Outline

- Research Objectives
- Data Sets & Sources
- Study Design
- Analysis
- Principal Findings
- Conclusions
- Implications



Research Objectives

- 1) Assess effect of controller-led in situ simulation on emergency response capacity of the state health department
- 2) Study effects of training on team function, dynamics, and communications among staff responsible for emergency operations
- 3) Train public health teams for high reliability



Data Sets & Sources

- Thirty (30) trials (1-hr functional exercises) conducted in state department operations center in a 16-mo period (May 2010-Sep 2011)
- Data gathered using *in situ* simulation methodology: recordings, live viewing, playback analysis
 - Behavioral markers data gathered using event set observational tool (24 recordings analyzed)
 - Decision-making data collected using decision taxonomy tool (22 recordings analyzed)

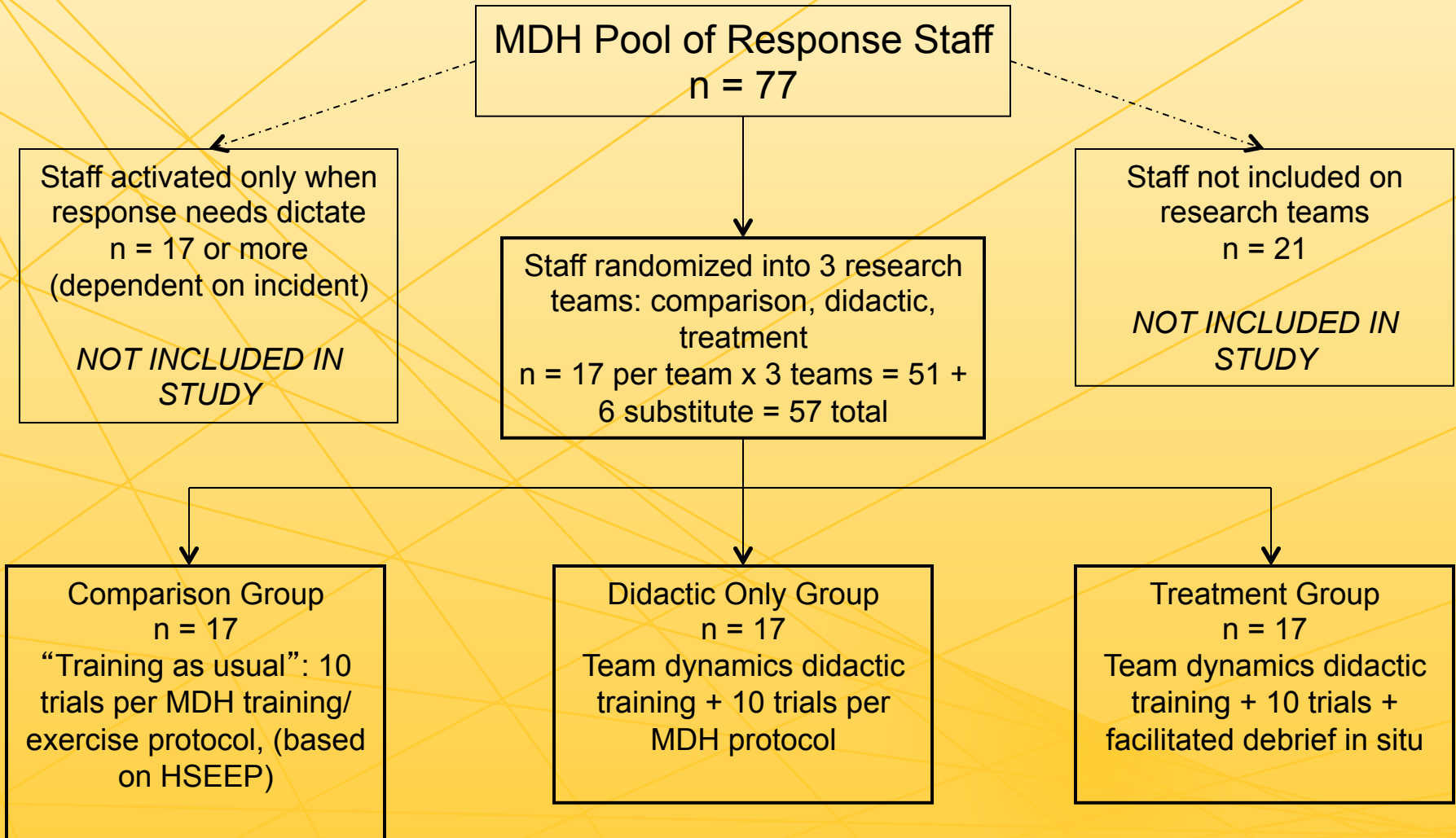


Study Design

- Quasi-experimental intervention with time-series analysis and comparison group
 - Measured team performance in public health preparedness context;
 - Examined impact of intervention to achieve high reliability in emergency operations center; and
 - Looked at relationship among behavioral markers, decision-making, and team performance



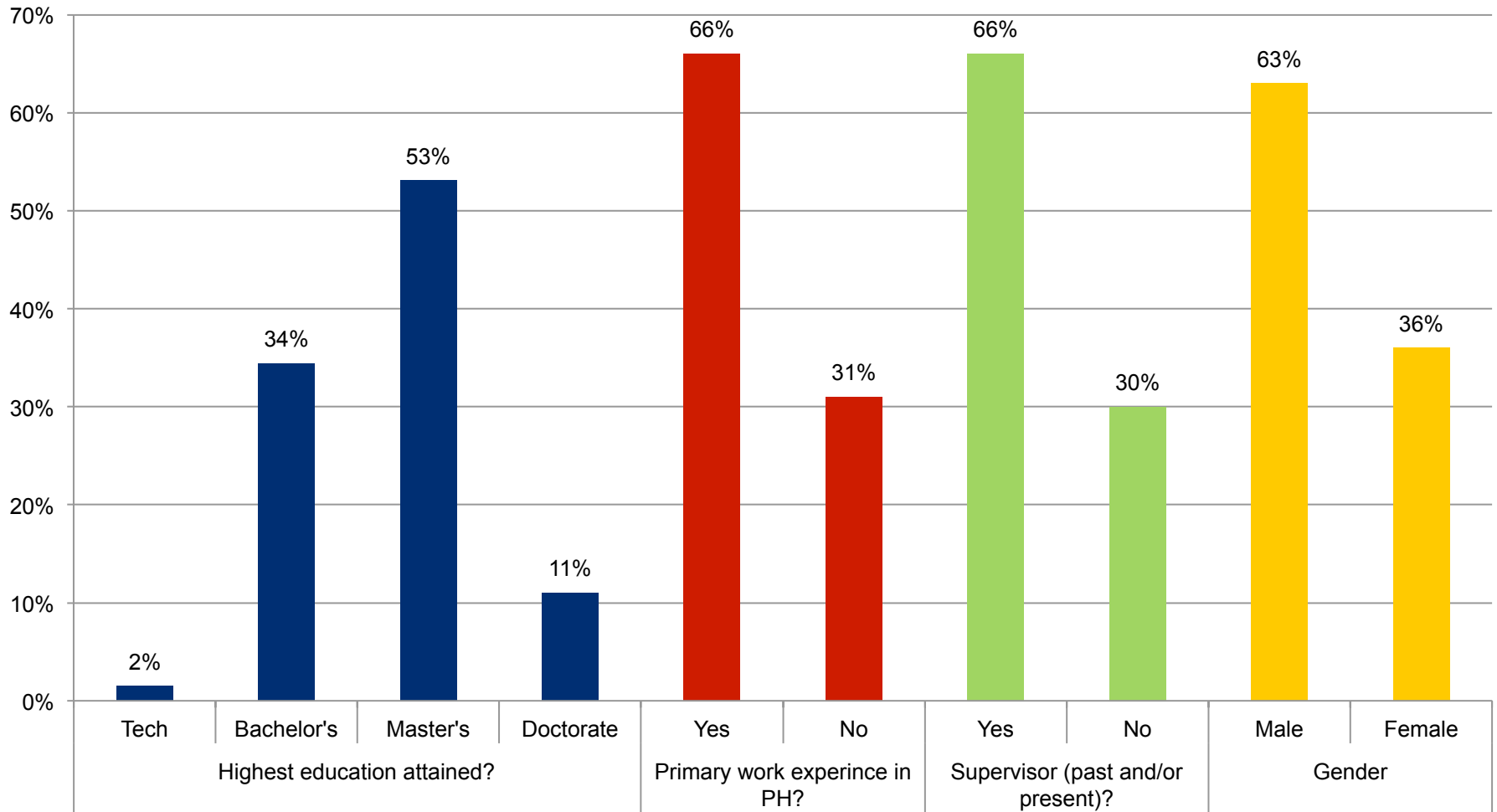
Study Design



** All trials (n=30) performed in real work setting (*in situ*); all trials recorded for live viewing and playback analysis



Participant Characteristics



Average years in public health = 15.6 yrs; Average years at MDH = 12 yrs

Analysis

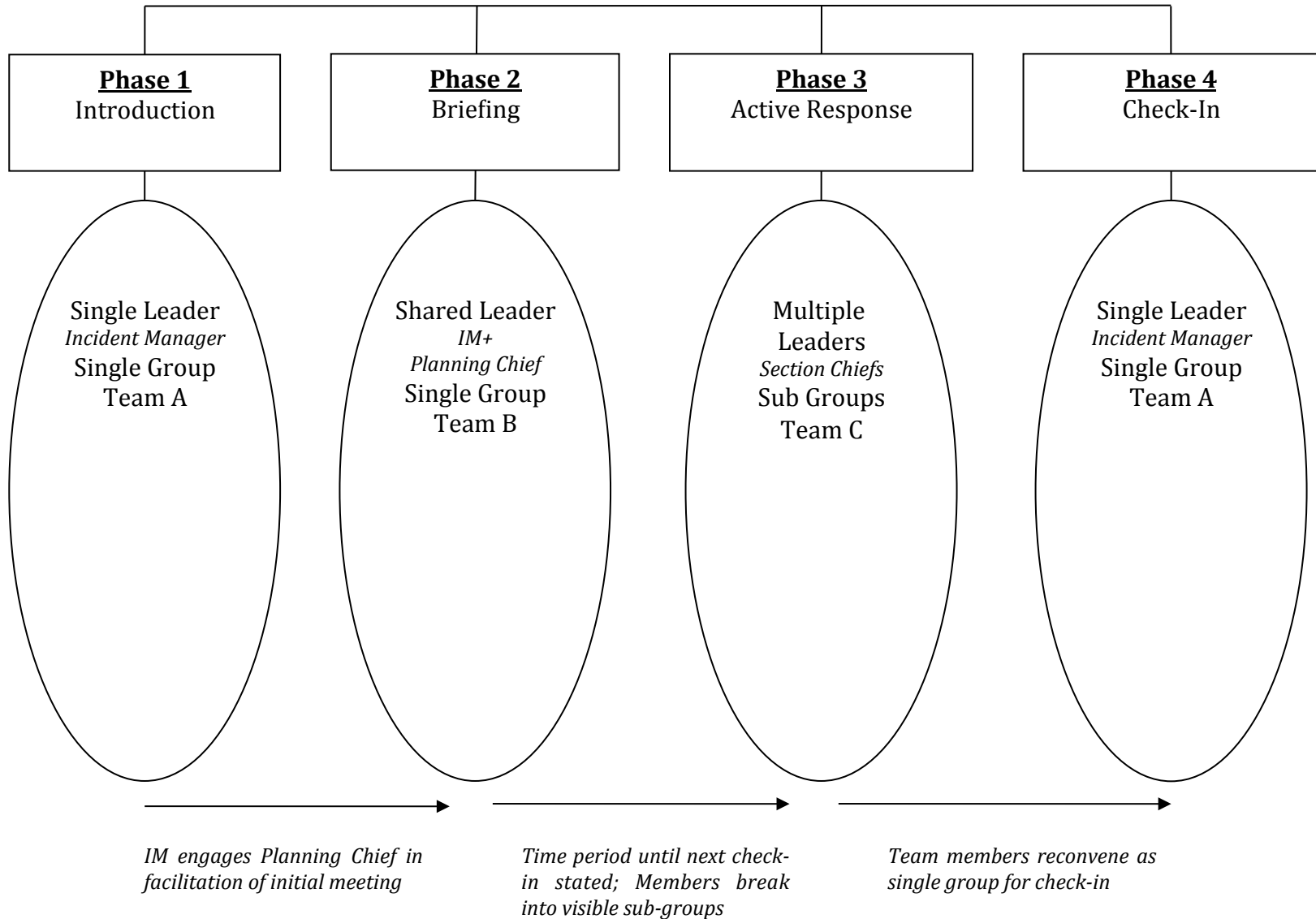
- Examined frequency and distribution of behavioral markers (non-technical skills) to identify and describe relationship among behavioral markers, leaders, and team effectiveness/performance
- **Statistical analyses:**
 - Scatterplot to show association
 - Analysis of Variance (to compare means)
 - Correlation– Spearman's Rho (to show bivariate association between behavioral performance components)
 - Chi-square





PRINCIPAL FINDINGS

Phases of Team (Re)-Formation



What is the association b/t Exercise Participation & Team Performance?

- Team participation score (independent variable) a composite measure of individual position scores; scored on 0-3 scale:
 - 3 Filled by assigned player
 - 2 Filled by re-assigned player
 - 1 Filled by player with multiple (>1) positions
 - 0 Empty
- Performance (dependent variable) is the total team score for each phase
 - Phase score is a composite of the scores for each of the behavioral categories: Situational Awareness, Shared Mental Model, Standardized Communication, Leadership
- Hypothesis: higher scores for participation associated with better performance



Figure 1. Scatter plot of participation score and average performance Phase 1 all teams

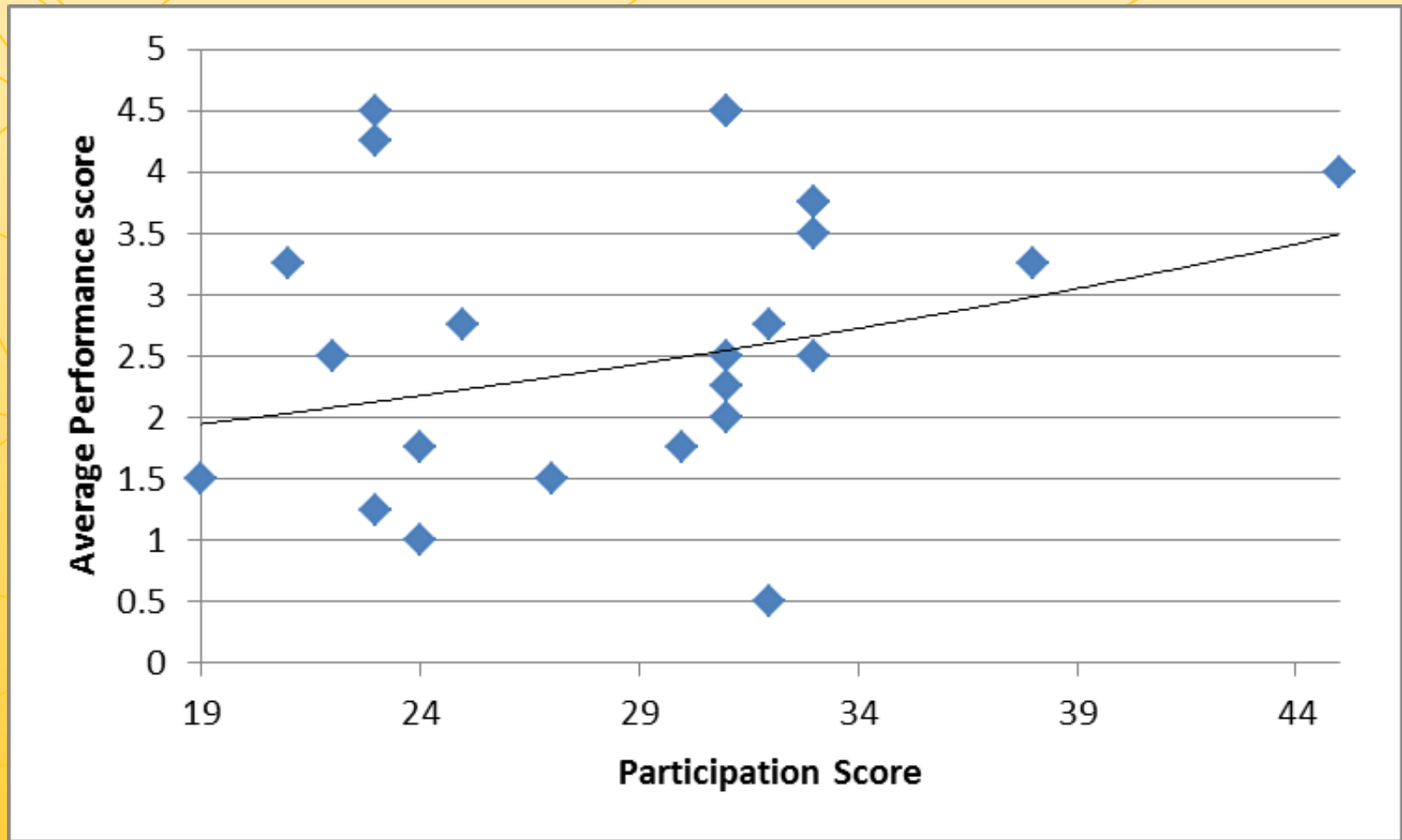


Figure 2. Scatter plot of participation score and average performance Phase 2 all teams

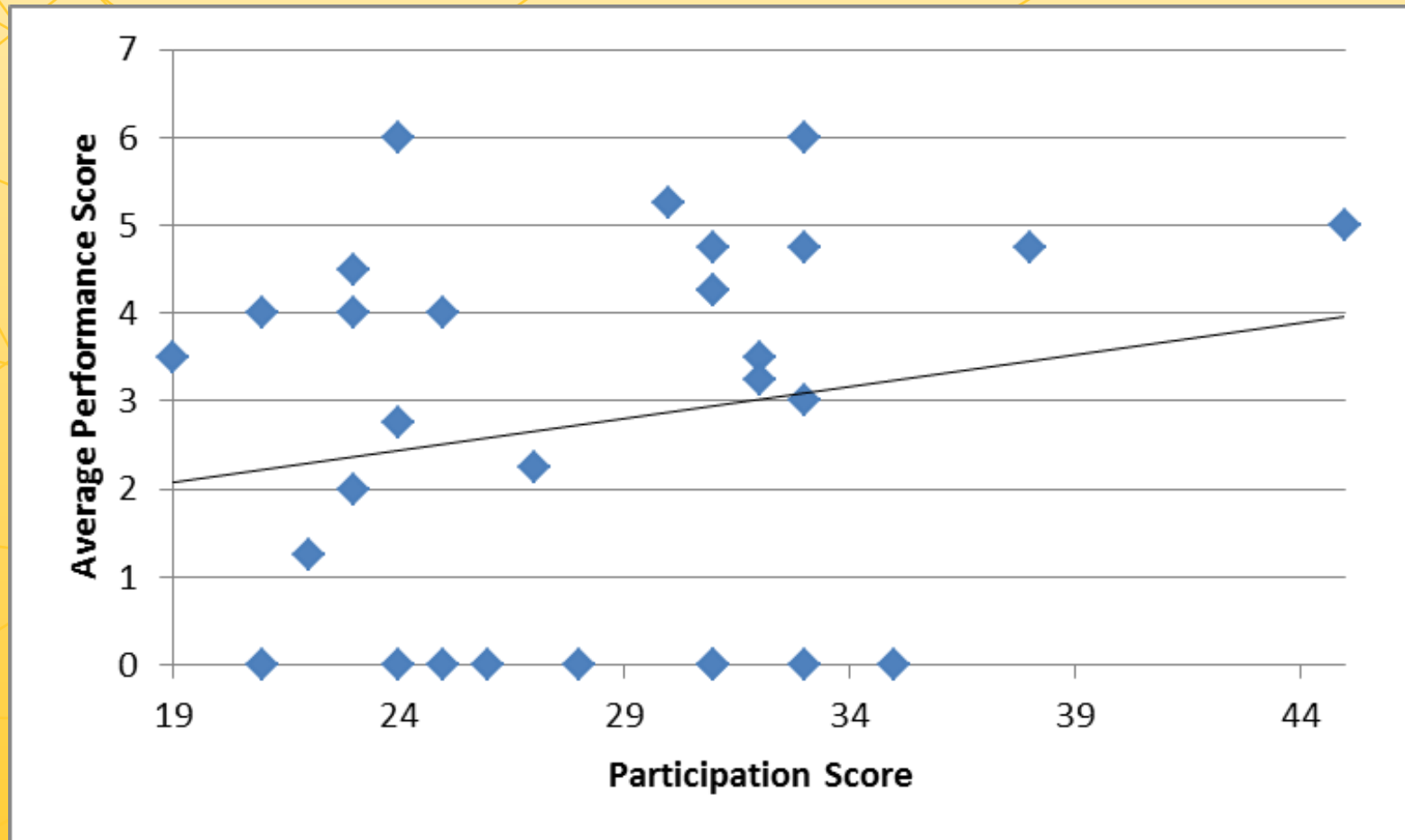


Figure 3. Scatter plot of participation score and average performance Phase 3 all teams

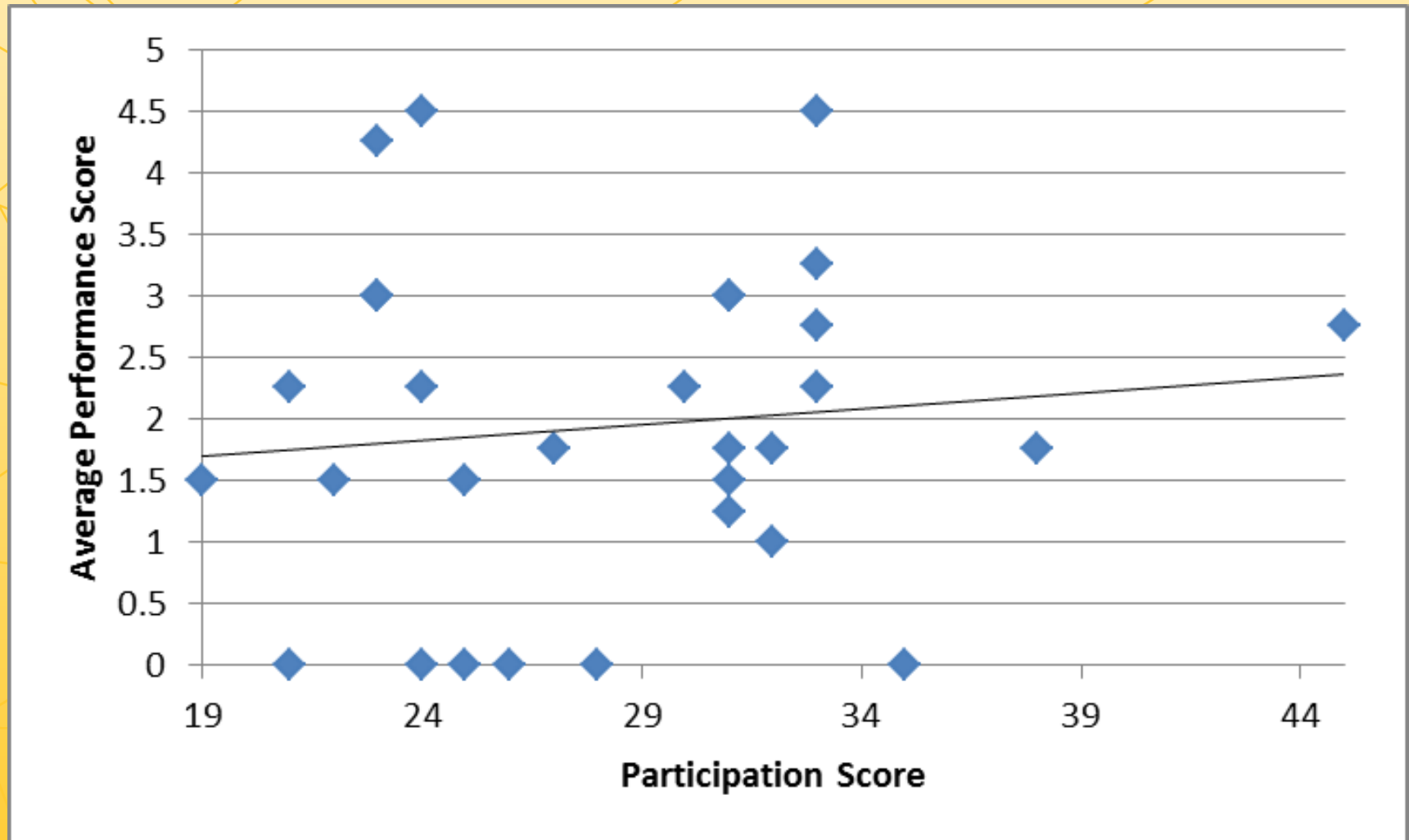
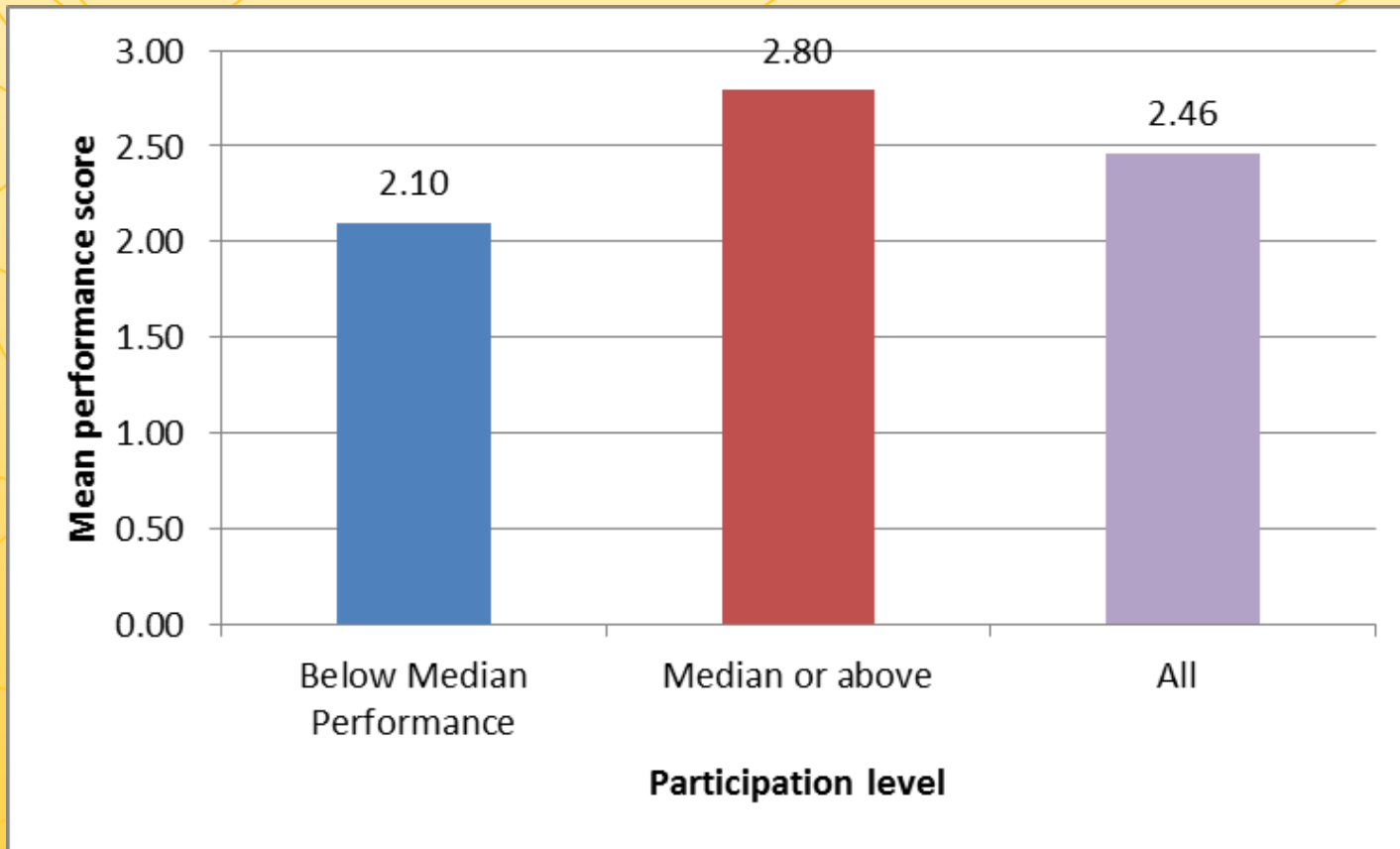


Figure 4. Mean Performance Scores by Level of Participation, All Phases, All Teams



Note: Based on ANOVA test, differences in average performance score are statistically Significant at $p=0.05$



What is the association between Leadership & Team Performance?

A leader is physically present and performs three specific tasks:

1. prioritizes decisions,
2. coordinates activities, and
3. communicates a shared mental model

• Leadership score (independent variable) a measure of how frequently the Incident Manager exhibited specific “leader” behaviors; scored on 0-2 scale

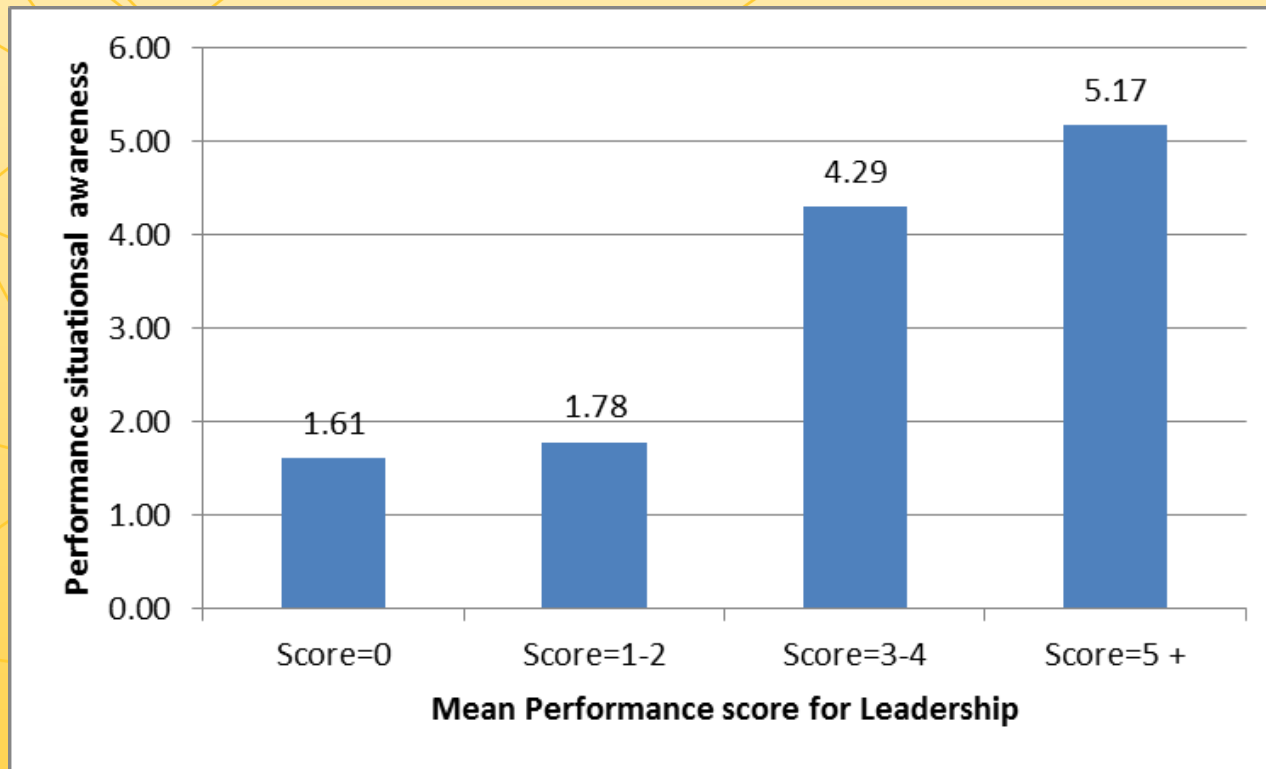
- | | |
|---|---|
| 2 | Behavior observed 91% to 100% of the time |
| 1 | Behavior observed 50% to 90% of the time |
| 0 | Behavior observed less than 50% of the time (0-49%) |

- “Percent of the time” = proportion of times the behavior was observed to occur in relation to the number of times the behavior should have occurred
- Behaviors that either did or did not happen were scored as either “0” for “no” or “2” for “yes”

• Performance (dependent variable) is the total team score for each of the behavioral categories: Situational Awareness, Shared Mental Model, Standardized Communication

• Hypothesis: a more highly-performing (“skilled”) leader associated with higher team performance

Figure 5: Mean performance score for situational awareness by leadership performance



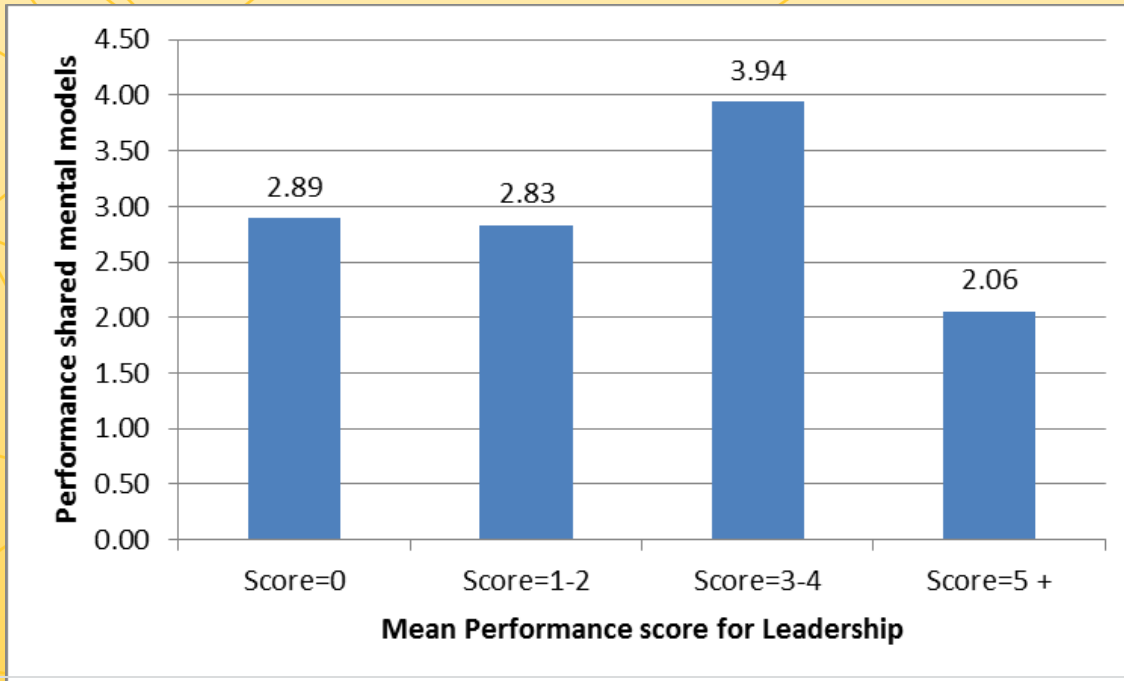
ANOVA
 $p < 0.000$; ;
 difference in mean
 performance
 is significant

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Situational Awareness * Leadership_grouped2	Between Groups	(Combined)	171.821	3	57.274	15.764	.000
	Within Groups		243.418	67	3.633		
	Total		415.239	70			



Figure 6: Mean performance score for shared mental model by leadership performance



ANOVA $p < 0.022$;
 difference in
 mean
 performance is
 significant

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Shared Mental Model * Leadership_grouped2	Between Groups	(Combined)	31.330	3	10.443	3.427	.022
	Within Groups		204.163	67	3.047		
	Total		235.493	70			

Association Between Behavioral Components

(Spearman's Rho Correlation Coefficient)

		Situational Awareness	Shared Mental Model	Standard Communication	Leadership
Situational Awareness	Correlation Coefficient	1.000	.179	.314**	.563**
	Sig. (2-tailed)		.135	.008	.000
	N	71	71	71	71
Shared Mental Model	Correlation Coefficient	.179	1.000	.248*	-.086
	Sig. (2-tailed)	.135		.037	.475
	N	71	71	71	71
Standard Communication	Correlation Coefficient	.314**	.248*	1.000	-.033
	Sig. (2-tailed)	.008	.037		.788
	N	71	71	71	71
Leadership	Correlation Coefficient	.563**	-.086	-.033	1.000
	Sig. (2-tailed)	.000	.475	.788	
	N	71	71	71	71

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed).



Conclusions

- Reassignment of players, encumbering players with multiple roles, or leaving roles empty brings down team performance scores
- Team performance dependent to a certain degree on who the leader is during the exercise
- Important to understand how non-technical skills, behavioral markers, and leadership interact with and impact performance and, thus high reliability



Implications for the Field

- Findings suggest that...
 - the intervention may be less important than who the leader is and the training, preparation, and experience that leader has going into the exercise/response.
- There has been no study of leaders at the micro-system level with respect to the essential behavioral markers necessary to achieve high reliability teams in crisis management settings. Our data and findings provide some insight into that process.



Thank you!

- Additional contributors to this research and presentation:
 - Jane Braun, MPH, CEM; Minnesota Department of Health
 - Samantha Morgan, MPH; NAACHO (former CDC Prevention Specialist)
 - Nilam Patel; Georgia Southern University
 - Julia Kleingarn, MPH; U of M School of Public Health

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