



Citation for published version:

Peek, R, Arnold, R & Moore, L 2022, 'Psychophysiological fidelity: A comparative study of stress responses to real and simulated clinical emergencies', Association for the Study of Medical Education, 4/07/22.

Publication date:
2022

[Link to publication](#)

Publisher Rights
CC BY

University of Bath

Alternative formats

If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Psychophysiological fidelity: A comparative study of stress responses to real and simulated clinical emergencies

Russell Peek, Lee Moore, Rachel Arnold
University of Bath

Clinicians experience stress in acute emergencies, reflected in psychophysiological responses measurable by self-report and cardiovascular monitoring. The biopsychosocial model of challenge and threat proposes that stress responses are modulated by cognitive appraisal of demands and resources, which may in turn affect performance.¹ Simulation training is used extensively to prepare clinicians to manage emergencies, with fidelity generally considered in terms of accurate representation of real-world cues and stimuli.² It is unknown whether simulation generates similar psychophysiological responses to normal clinical practice.

In this within-subjects study, challenge-threat appraisals, anxiety and heart rate variability (HRV) were recorded using validated tools in simulated and real neonatal emergencies. Linear mixed models were used to analyse parameters by time-point (baseline, anticipation, during the event, recovery) and setting (real, simulation). Twelve participants took part in 61 events. Significant differences were identified between settings. Simulation led to greater reported anxiety and increased likelihood of threat appraisal. High frequency power, a component of HRV associated with parasympathetic tone, reduced less and tended towards earlier recovery in simulation.

Withdrawal of parasympathetic tone is educationally and clinically significant, given associations with cognitive performance, social functioning and emotional and health regulation.³ Possible mechanisms for observed differences include learner expectations and the effect of debrief and feedback in simulation. While simulation may facilitate interventions to optimise stress responses, it will be important to confirm findings in real clinical settings.

REFERENCES

1. Hase A, O'Brien J, Moore LJ, Freeman P. The relationship between challenge and threat states and performance: A systematic review. *Sport Exerc Perform Psychol* 2019;8(2):123-144. <https://doi.org/10.1037/spy0000132>
2. Tun JK, Alinier G, Tang J, Kneebone RL. Redefining simulation fidelity for healthcare education. *Simul Gaming*. <https://doi.org/10.1177/1046878115576103>. 2015;46(2):159-174.
3. Forte G, Favieri F, Casagrande M. Heart rate variability and cognitive function: A systematic review. *Front Neurosci* 2019;13:710. <https://doi.org/10.3389/FNINS.2019.00710>