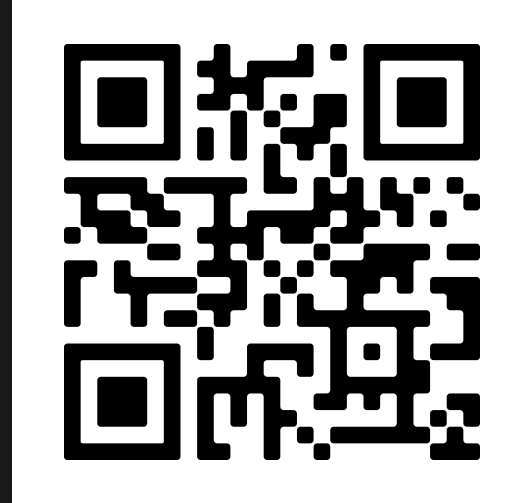




# Extraneous Load Events Correlate with Cognitive Burden Amongst Multidisciplinary Providers during Intensive Care Unit Rounds



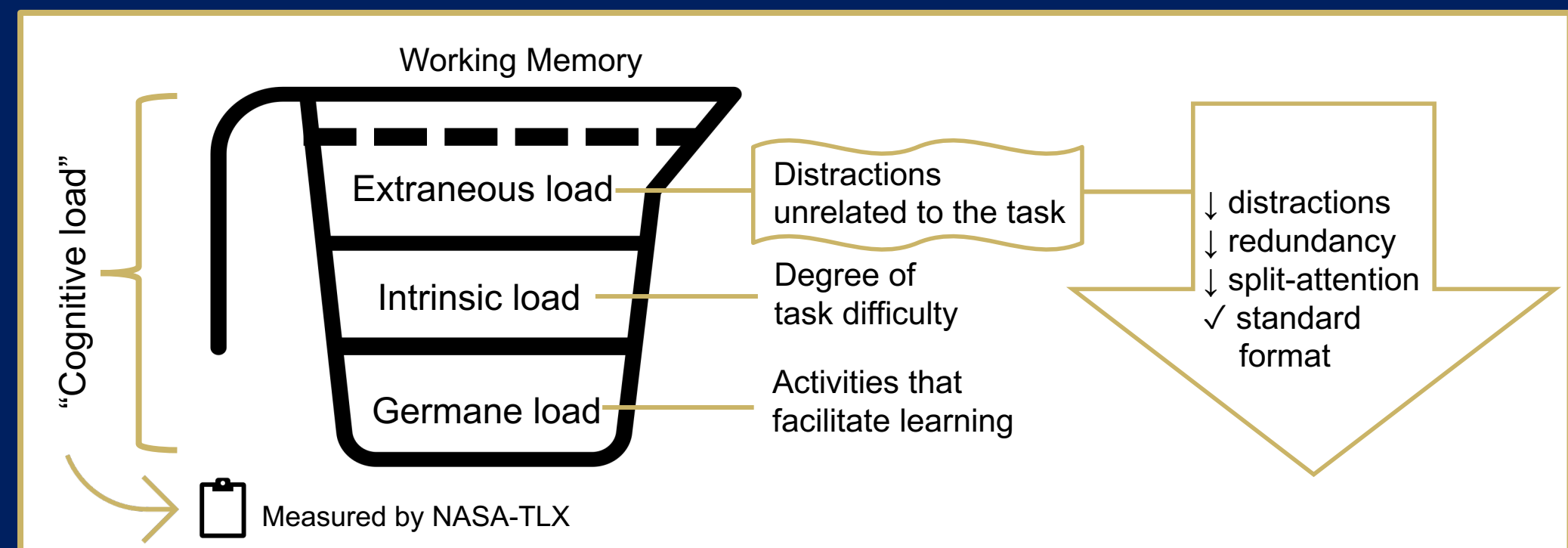
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## Background

- Inadequate ICU rounding practices have profound impact on the quality and safety of patient care, and on the effectiveness of trainee education
- Cognitive load theory (CLT), a leading model of educational psychology, suggests that learning and performance degrade when an individual's cognitive load exceeds their working memory capacity

Figure 1. Working memory is "filled" by the cognitive load imposed by a task.



## Study Aim

- To characterize the cognitive load providers experience during rounds. We hypothesize that increased extraneous load during ICU rounds is associated with increased perceived workload

## Methods

- Study Design:** A mixed-methods study of multidisciplinary providers at medical ICU rounds at University of Colorado and Denver Health Hospitals
- Part 1: Observational cohort study**
  - Primary independent variable:** Hourly extraneous cognitive load events during rounds
  - Outcome variable:** mean post-rounds NASA-TLX score
- Part 2: Qualitative study**
  - Semi-structured interviews to assess perspectives on the extraneous cognitive load burden during rounds

## Results

Figure 2. Mean post-rounds perceived cognitive load vs a) hourly extraneous load, b) length of rounds, and c) rounding census

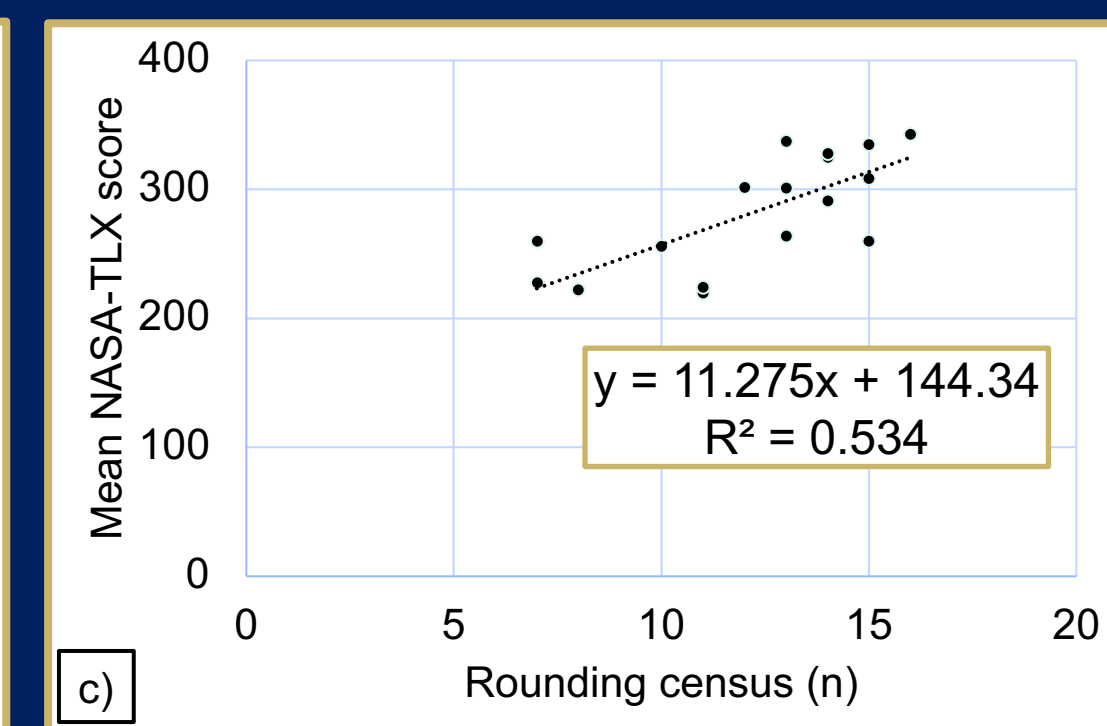
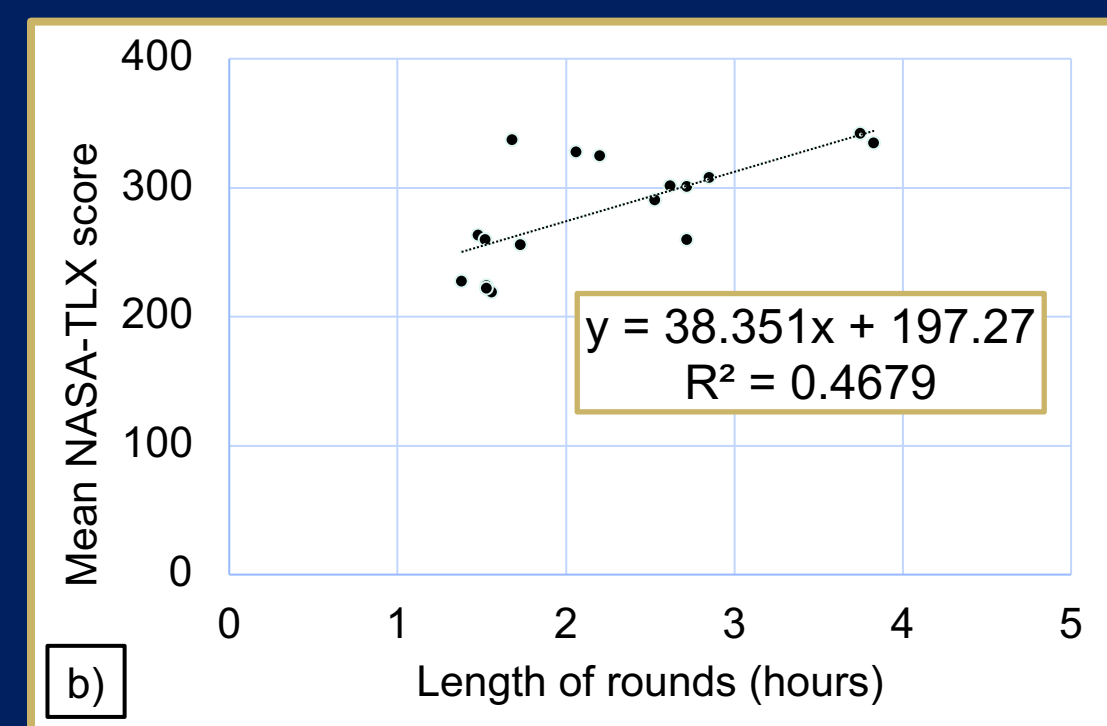
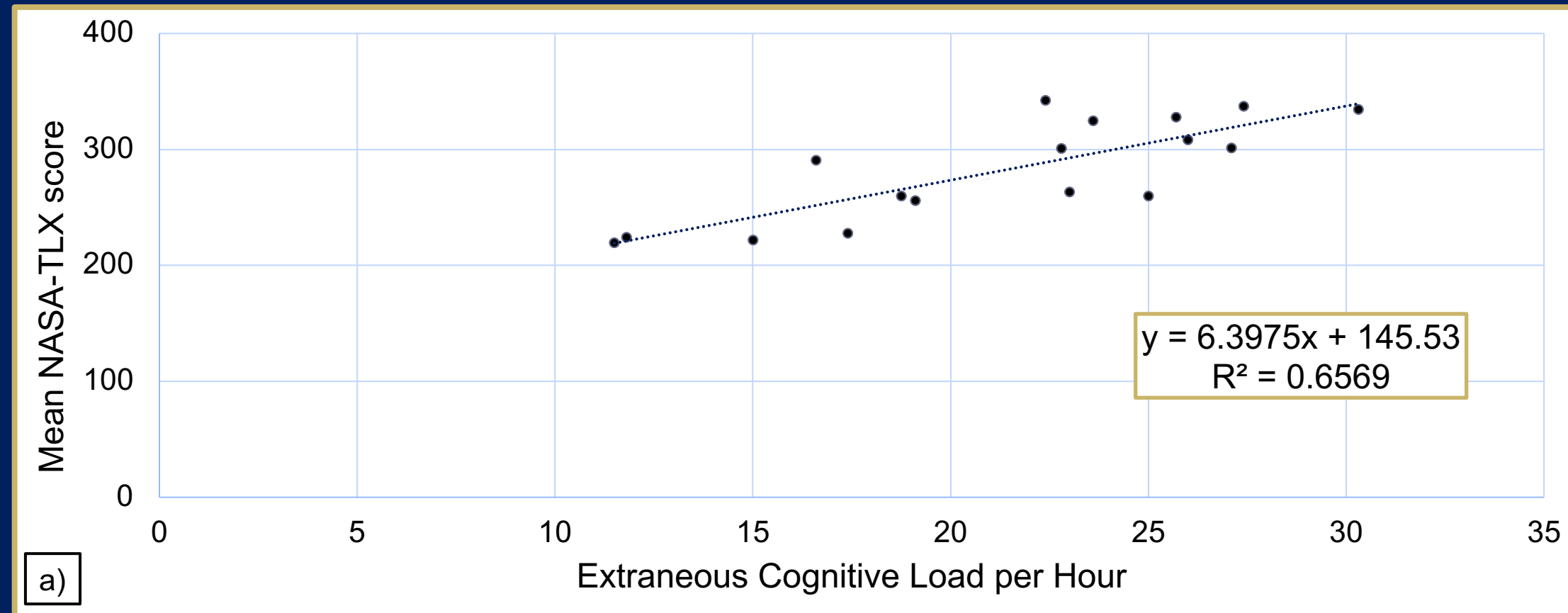
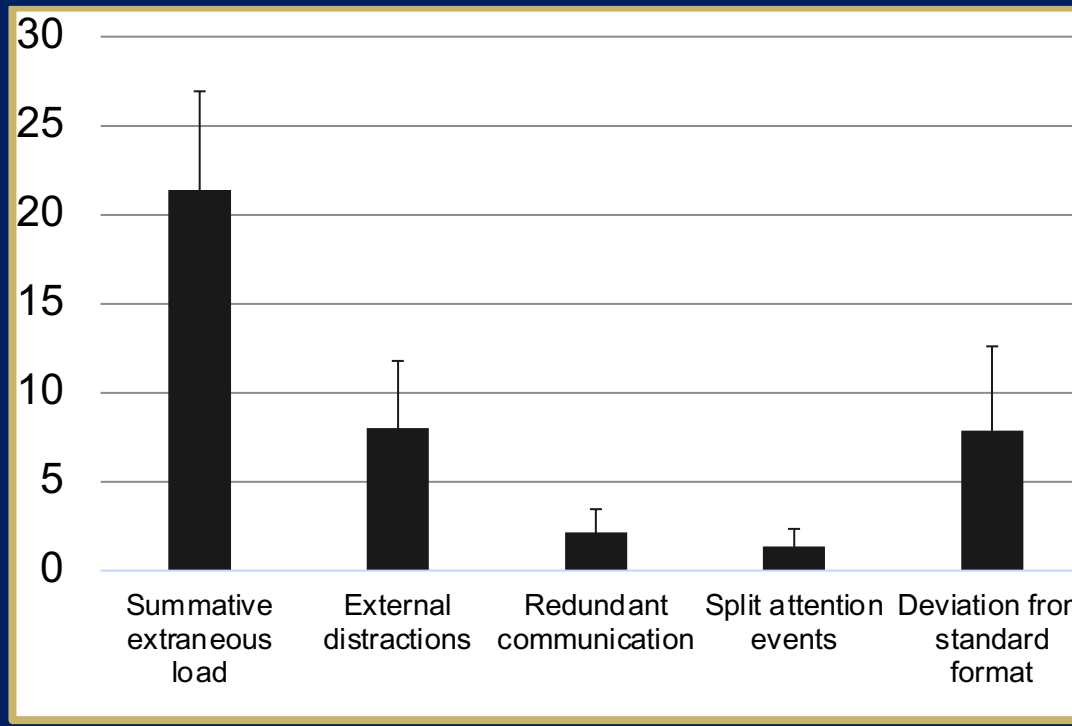


Figure 3. Subject (n=45) and rounding (n=17) data

Provider type (%)	
Physician	31 (68.9)
Pharmacist	12 (26.7)
Charge nurse	2 (4.4)
Length of rounds (h:m)	
	2:12 ± :48
ICU census, total	
	35.8 ± 4.1
Rounding census	
	12.2 ± 2.8
New admissions	1.9 ± 1.9
COVID+	3.5 ± 3.2
Mechanically ventilated	6.5 ± 2.0
On vasopressors	3.8 ± 2.0

Figure 4. Mean extraneous load events per hour



## Results (cont.)

Figure 5. Themes in provider perceptions on the cognitive load burden of ICU rounds

Increases cognitive load	Unstructured discussion	"When it's less structured...I feel like I'm actually spending more time...I find myself completely redoing and retooling the plan on top of something that we could've already communicated...it makes more work for me."
	Emotional distractions	"I think my emotions sometimes [affect my workload]. It was kind of a unique day because I was called by this [radiology] tech who just yelled at me...especially during COVID, everyone's kind of getting hot headed and...it makes it hard to focus on the rest of rounds."
	Interruptions	"I think we all lose our train of thought. If there's some form of disruption or even just getting interrupted in the middle of the presentation, I'll forget, or just skip over and not come back to exactly where I was. And some things that I meant to add and communicate to the team, get just forgotten or dropped."
Reduces cognitive load	High rounding census or duration	"Rounds when they go for a long period of time without a break...can be very detrimental." "I think the whole goal of medical education is to teach. And I think we're somewhat losing that right now because there's so much work to be done."
	Structured rounds	"Following the more traditional scripted model makes it a lot easier to comprehend what's going on and take in all that information because I know what I'm looking for when I'm going to hear it."
	Presentations that are individualized by patient complexity	"Patients who have been here awhile...and they have nothing going on with them...when you go through all this stuff all over again...then it just increases duration...depletes morale...I do think that sometimes you just need to make it a little quicker."
Repetition	"I actually find [repetition] at least somewhat helpful...if the intern's given the presentation then I repeat some of those things with my take on it, but it's usually in a slightly different way. And then hearing it again from the attending...I think it solidifies the plan for everyone."	

## Conclusions

- Extraneous load events on rounds had a *positive linear correlation* with the perceived workload by multidisciplinary providers
- CLT states that reducing these extraneous events may improve performance and learning. Our data suggests that this may be achieved by *reducing rounding census and duration, adhering to structured discussions, and reducing emotional distractions and interruptions*