

The relationship between task-technology fit and nurses' performance in the electronic health record

SCHOOL OF NURSING
UNIVERSITY OF MICHIGAN

Dante Anthony Tolentino, PhD, RN-BC¹; Kathleen Insel, PhD, RN²; Sheila M. Gephart, PhD, RN, FAAN²

1 University of Michigan National Clinician Scholars Program at the Institute for Healthcare Policy and Innovation; Postdoctoral Fellow at School of Nursing

2 University of Arizona School of Nursing

BACKGROUND & SIGNIFICANCE

- As we continue to progress with the use of Electronic Health Records (EHR), there is a need to improve nurses' user experience with the EHR (UX).
- Task-technology fit (TTF; Figure 1) theory helps us examine the impact of the EHR on nurses' performance by measuring how certain systems fit certain task, technology, and individual characteristics.
- As organizations continue to focus on optimizing their EHRs with an emphasis on UX, an understanding of nurses' TTF in the EHR is warranted.

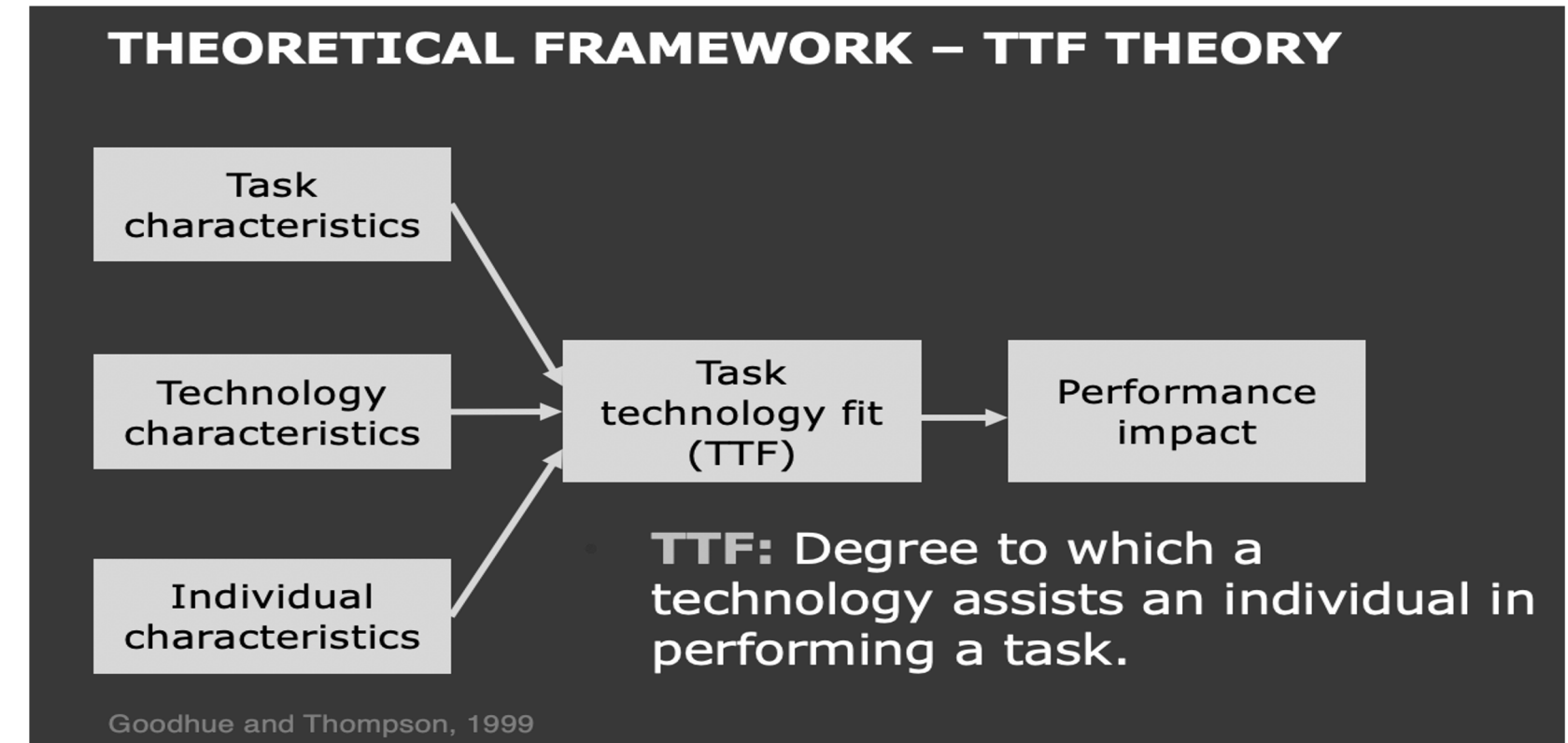


Figure 1: TTF framework

PURPOSE

- To quantify nurses' task-technology fit in relationship to subjective workload, time in the EHR, and composite performance in the EHR.

RESEARCH QUESTIONS

- What is the relationship between nurses' individual characteristics and TTF?
- What is the relationship between TTF and performance impact?

METHODS

- Design: Using a cross-sectional quantitative design.
- Setting: multisite healthcare organization in Northern CA (three hospitals)
- Recruitment: June to September 2019
- Measurements:
 - Individual characteristics were measured using age, years of nursing practice, EHR proficiency, and computer proficiency.
 - TTF was measured using the TTF questionnaire with 8 dimensions such as ease of use/training, informatics staff relationship, and system reliability.
 - Performance was measured using three variables: 1) subjective workload (NASA-TLX), 2) time spent in the EHR, and 3) composite performance.

DATA ANALYSES

- Pearson's correlation test and multiple regression

RESULTS

Table 1: Sample characteristics (N = 95)

Characteristics	n (%)	Characteristics	n (%)
Gender		Hospital Location	
Female	84 (88)	Hospital A	60 (63)
Male	10 (11)	Hospital B	24 (25)
Ethnicity		Hospital C	10 (11)
White	50 (53)	Work Shift Hours	
African American	1 (1)	Day shift	51 (54)
Hispanic or Latino	8 (8)	Night shift	20 (21)
Asian	23 (24)	Swing shift	13 (14)
Native Hawaiian	2 (2)	Rotating shift	8 (8)
Two or more races	7 (7)	Practice setting	
Other	3 (3)	Medical/Surgical	32 (34)
Education		Critical Care	17 (18)
Associate degree	12 (13)	Perinatal	15 (16)
Bachelor's degree	68 (72)	Step-down/Telemetry	15 (16)
Master's degree	12 (13)	Other	10 (11)
Doctoral degree	2 (2)	Emergency	2 (2)
		Float Pool	1 (1)

Correlations (see Figure 2)

- Age** was negatively correlated to **ease of use or training of the EHR** ($r = -.29, p = .006$), to **relationship with informatics staff** ($r = -.23, p = 0.39$), and to **quality of data** ($r = -.30, p = .006$).
- Age** was also negatively correlated to **TTF** ($r = -.32, p = .006$).
- TTF** was also negatively correlated to **years of practice** ($r = -.34, p = 0.003$).
- Ease of use/training** and **relationship with informatics staff** had the most significant correlations with **workload**.
- TTF** was negatively correlated to the **overall subjective workload** ($r = -.28, p = .016$).

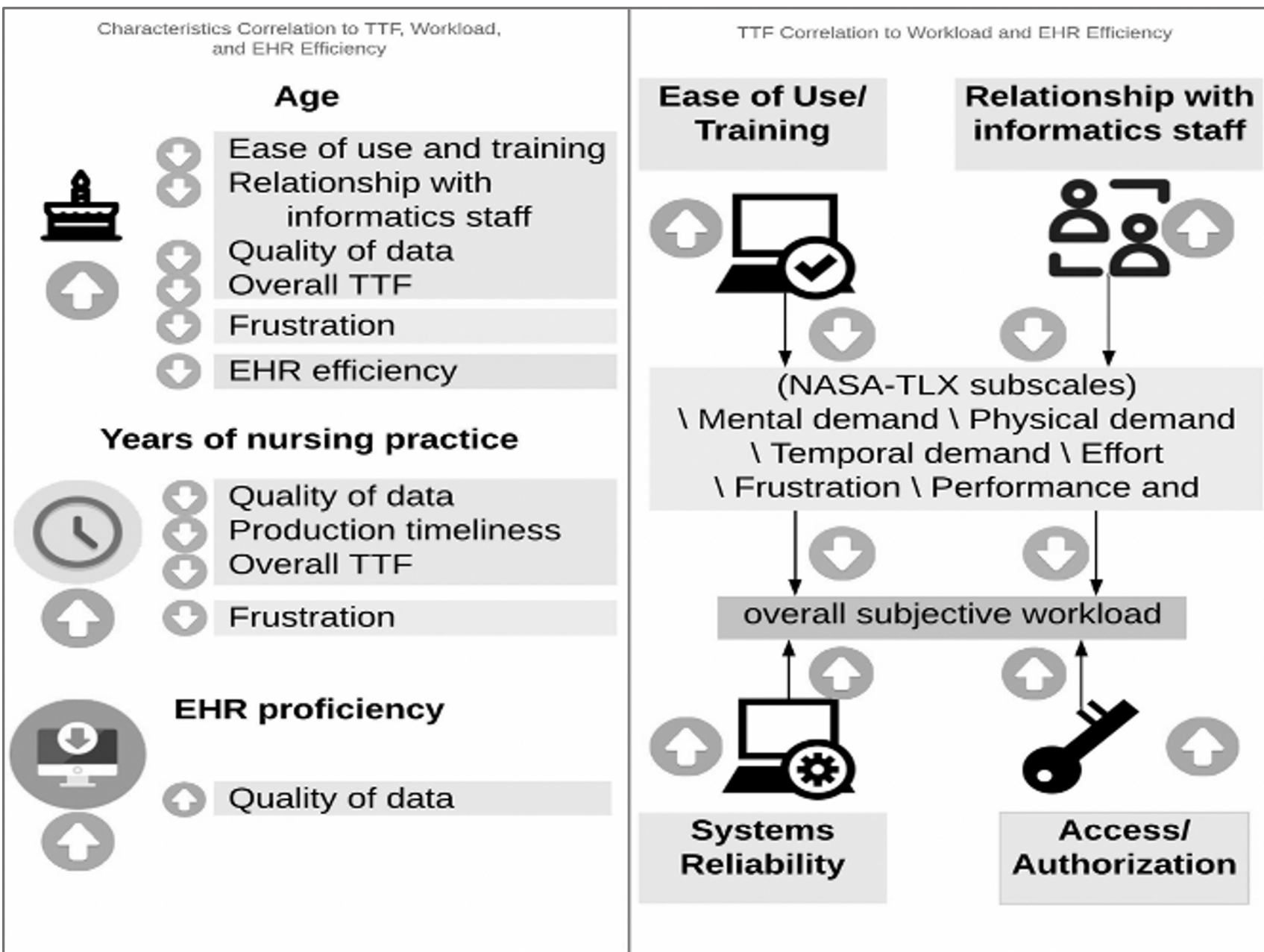


Figure 2: Correlations between individual characteristics to TTF, workload, EHR efficiency; Correlations between TTF to workload and EHR efficiency

Regression Models

- Model 1: Regression model of TTF to subjective workload
 - For every unit increase of TTF, an 11.61% decrease in nurses' workload can be predicted. This model accounted for 6.5% of the variability observed in nurses' subjective workload ($R^2 = .065, F(1, 72) = 6.09, p = .016$).
- Model 2: Regression model of TTF to composite performance.
 - Significant model. This model accounted for 44.9% of the variability observed in nurses' workload ($R^2 = .449, F(1, 68) = 57.18, p < .001$).
- Model 3: Regression model using 4 dimensions of TTF to composite performance (see Table 2)
 - Relationship with informatics staff ($\beta = .23, p = .003$) and compatibility of data ($\beta = .16, p = .008$) were significant predictors to nurses' performance within the EHR. This model accounted for 31.4% of the variability observed in nurses' performance ($R^2 = .314, F(4, 65) = 8.88, p < .001$).

Table 2: Regression model

Predictors (TTF subscales)	b	SE b	β	p
Relationship with informatics staff	.23	.10	.30*	.030
Compatibility of data	.16	.06	.29*	.008
Quality of data	.21	.13	.19	.115
Ease of use and training	.14	.10	.20	.166

CONCLUSIONS

- This study identified the different task-technology fit characteristics that may impact nurses' performance within the EHR. As healthcare organizations continue to strive to provide a frictionless UX, emphasis needs to be given on delivering a good fit between task, technology, and individual characteristics. We owe our nurses a more robust understanding of the different factors that impact their UX when we introduce technologies such as EHRs that disrupt existing clinical workflow. In turn, we can then develop action plans to support nurses so they can continue to provide quality care to our patients without the burden of technology interruptions.

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