

# Examining the Dimensionality of Trust in the Inpatient Setting: Exploratory and Confirmatory Factor Analysis



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**BACKGROUND:** Trust in healthcare providers is associated with important outcomes, but has primarily been assessed in the outpatient setting. It is largely unknown how hospitalized patients conceptualize trust in their providers.

**OBJECTIVE:** To examine the dimensionality of a measure of trust in the inpatient setting.

**DESIGN:** Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

**PARTICIPANTS:** Hospitalized patients ( $N = 1756$ ; 76% response rate) across six hospitals in the midwestern USA. The sample was randomly split such that approximately one half was used in the EFA, and the other half in the CFA.

**MAIN MEASURES:** The Trust in Physician Scale, adapted for inpatient care.

**KEY RESULTS:** Based on the Kaiser-Guttman criterion and parallel analysis, EFAs were inconclusive, indicating that trust may be comprised of either one or two factors in this sample. In follow-up CFAs, a 2-factor model fit best based on a chi-squared difference test ( $\Delta\chi^2 = 151.48(1)$ ,  $p < .001$ ) and a Comparative Fit Index (CFI) difference test (CFI difference = .03). The overall fit for the 2-factor CFA model was good ( $\chi^2 = 293.56$ ,  $df = 43$ ,  $p < .01$ ; CFI = .95; RMSEA = .081 [90% confidence interval = .072–.090]; TLI = .93; SRMR = .04). Items loaded onto two factors related to cognitive (i.e., whether patients view providers as competent) and affective (i.e., whether patients view that providers care for them) dimensions of trust.

**CONCLUSIONS:** While measures of trust in the outpatient setting have been validated as unidimensional, in the inpatient setting, trust appears to be composed of two factors: cognitive and affective trust. This provides initial evidence that inpatient providers may need to work to ensure patients see them as both competent and caring in order to gain their trust.

**KEY WORDS:** trust; trust in physician scale; psychometrics.

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## INTRODUCTION

Trust between patients and healthcare professionals is critical to clinical practice to achieve positive outcomes for patients. A recent meta-analysis found that patients' trust in healthcare professionals—defined as a psychological state that is characterized by a trustor (i.e., patient) being vulnerable and having positive expectations about the trustee's (i.e., provider) intentions and behaviors<sup>1</sup>—has been shown to improve health-related behaviors, experiences, and outcomes.<sup>2</sup> More specifically, trust has been associated with improved treatment adherence,<sup>3</sup> patient satisfaction,<sup>2</sup> and quality of life.<sup>2</sup> Trust is also a major factor influencing patient satisfaction with the inpatient environment.<sup>4</sup> Low trust can lead to patients withholding medical information,<sup>5</sup> and distrust has been associated with some patients refusing medical recommendations.<sup>6</sup> Further, there are disparities in trust between minority and non-minority patients.<sup>7–9</sup> Among minority patients as compared to White patients, mistrust has been associated with a lower likelihood of engaging in advance care planning or discussing end-of-life matters,<sup>10</sup> and can contribute to lower medication adherence.<sup>7</sup> In the context of the coronavirus disease 2019 (COVID-19) pandemic, external factors have also been shown to impact some patients' trust in their physicians around information provided such as the benefits of vaccines,<sup>11</sup> potentially eroding patient-provider relationships and/or contributing to suboptimal patient outcomes.

While critical, improving trust first requires an understanding of how patients think about trust, i.e., the dimensionality of trust.<sup>12–14</sup> For instance, trust may be a unidimensional construct, such as patients globally trusting their doctors.<sup>13</sup> Or, it is possible for trust to be multidimensional, with trust high in some areas—such as patients believing doctors are competent, and simultaneously low in other areas—such as patients not believing doctors have their best interests in mind.<sup>15,16</sup> Most of the work examining trust has occurred in the outpatient setting. These studies have found that trust is unidimensional, such that patients view trust as a single trait, considering trust overall and not making distinctions among different areas in which healthcare professionals can or cannot be trusted.<sup>13</sup> However, given factors specific to the inpatient setting, there may be reason to call into question whether the prevailing

model for measuring trust in healthcare professionals holds as a unidimensional construct or whether it might be a multidimensional model.<sup>13,14,17</sup>

In the hospital context, patients are typically much more dependent upon healthcare professionals (e.g., medications, toileting, ambulation)<sup>18</sup> compared to outpatient settings, and thus may seek stronger interpersonal bonds. Further, shared decision-making differs in inpatient and outpatient settings in three major ways that likely impact trust: First, hospitalized patients often must make swift decisions about care (e.g., surgeries, procedures) which may impact decision-making compared to the outpatient setting where decisions can typically be made more deliberately. Second, hospitalized patients are often much sicker than outpatients, which may impact decision-making (e.g., patients have less capacity to make informed decisions and require more reliance on—and trust in—providers' expertise).<sup>19</sup> Third, the unfamiliar and confusing environment of the hospital setting can make it challenging for patients to make decisions. This may be especially difficult for patients who have less experience in this setting.<sup>18</sup>

### Contributions of the Current Study

The goal of this study is to examine trust and its dimensionality in a sample of hospitalized patients. Findings can serve as a step to informing interventions to improve inpatient trust. To be effective, interventions for improving trust must be related to the way that patients think about trust in their healthcare professionals. For example, if patients distinguish between trust in providers' skills and their honesty, it is possible that a patient might not consent to a procedure because while they trust that the provider is skilled in the procedure and would do a good job, they feel that the provider is trying to sell them on something that is not actually needed. Being able to understand not only whether—but *how*—patients trust their hospital team is crucial to informing efforts to improve trust and, ultimately, outcomes. Notably, while trust can be bidirectional, trust in healthcare is much less reciprocal compared to other relationships due to the vulnerability that patients have toward providers.<sup>13</sup> Thus, the current study focuses on patients' trust in healthcare professionals as a unidirectional relationship.

### METHOD

This study was part of an IRB-approved larger study examining the use of patient portals in the inpatient setting. Using survey data collected in this study, we conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) of a trust measure that patients completed. EFA provides information about the dimensionality of a construct, using only the data itself, and without imposing the researcher's pre-determined structure onto the data. A follow-up CFA allows for testing the fit of this model in another group of participants and provides evidence of validity for the findings. Together, these analyses provide insight into how many

dimensions a construct has, and what those dimensions are, and indicate how participants think about and make distinctions about a construct.

### Participants

Participants were hospitalized patients. Patients were recruited during their inpatient stay if they were 18 years of age or older, were available in their room for recruitment (up to three attempts), and were capable of providing informed consent. Exclusion criteria included patients who were legally blind, had diminished decision-making capacity, could not speak or read English, and were involuntarily confined or detained. Participants provided informed consent and Health Insurance and Portability Accountability Act (HIPAA) authorization.

### Setting

The study setting was a large, academic medical center comprised of six hospitals, including a safety net community hospital, and located in a large metropolitan area in the mid-western USA. Across the six included hospitals, there are over 1,200 patient beds.

### Procedures

As part of hospital operations and the larger study, participants were provisioned tablets to provide access to some features of MyChart® Bedside (Epic Systems; Verona, WI), an inpatient portal allowing patients to do activities electronically such as receive education on their conditions and order meals. Tablets were provisioned after patient admission, typically no sooner than 6 h from admission, and up to 10 days or longer after admission. Research staff recruited eligible patients both on weekdays and on weekends. A survey was then activated on the portal and was available throughout their inpatient stay. This study took place from July 2017 to September 2018.

### Measures

**Trust in Healthcare Professionals.** We adapted the Trust in Physician scale,<sup>12</sup> which is an 11-item, validated, unidimensional measure of trust. Given the inpatient context, the scale was modified such that the targets of trust in the current study were many types of healthcare professionals (e.g., "If my doctor, nurse, or other healthcare professional tells me something is so, then it must be true"), rather than the original items which were designed for the outpatient setting and focused solely on relationships with physicians (e.g., "If my doctor tells me something is so, then it must be true"). Items were scaled on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

**Demographics.** Race, ethnicity, age, gender, and Charlson score were pulled from patient records. Participants were asked their marital status, level of education, employment

status, household income, and healthcare coverage status in the enrollment survey.

## Analyses

Analyses were conducted in Stata (v. 16).<sup>20</sup> Missing data were dropped listwise. Items were reverse coded when necessary. The sample was randomly split in half by generating uniformly distributed random values over the interval 0 to 1 using Stata's `runiform` command, assigning a value to each observation and splitting at the midpoint of these values. Randomization was performed on patients with a valid survey response. We conducted an EFA on one half, followed by a CFA on the second half.

**EFA.** EFA was performed on the data using principal axis factoring and oblique promax rotation, which accounts for correlation between factors. To determine the number of dimensions, we examined eigenvalues (following the Kaiser-Guttman criterion, retaining factors with eigenvalues >1.0),<sup>21</sup> parallel analysis diagrams,<sup>22</sup> and factor loadings (retaining items that loaded  $\geq .30$ ).

**CFA.** CFA using maximum likelihood estimation was subsequently conducted. We examined fit indices (chi-squared, Comparative Fit Index [CFI], root mean square error of approximation [RMSEA], Tucker Lewis Index [TLI], and standardized root mean squared residual [SRMR]) to assess model fit in accordance with commonly used fit index cutoff criteria<sup>23</sup> and reviewed item loadings to ensure that all items loaded  $\geq .30$ .

**Additional Scale Properties.** Internal consistency reliability was computed using Cronbach's alpha.

## RESULTS

### Demographics

Overall, 2,310 patients met inclusion criteria for the current study. One thousand seven hundred fifty-six patients completed the full list of trust items in the enrollment survey (response rate = 76.0%). Participants were largely white ( $N = 1,417$ , 80.69%), and non-Hispanic ( $N = 1,556$ , 88.61%). Participants were 39.64% ( $N = 696$ ) male and 60.36% ( $N = 1,060$ ) female, and aged between 18 and 91 years ( $M = 45.79$ ,  $SD = 14.69$ ). Most (62.87%) had at least some college education. The average Charlson score was 1.63. Patients were most frequently married, were employed, unemployed, and retired, tended to have incomes below \$50,000, and most had health insurance. The median length of stay was 6 days and the mean was 8.24 days ( $SD = 8.30$ ). See Table 1 for more detailed demographics.

**Table 1 Demographics (N = 1,756)**

Variable	Level of variable	Statistics (n, % or M, SD)
Race	White	1417 (80.69%)
	Black	275 (15.66%)
	Asian	7 (0.40%)
	American Indian/Alaska Native	8 (0.46%)
	More than one race	16 (0.91%)
	Other or unknown to patient (Missing)	28 (1.59%) 5 (0.28%)
Gender	Female	1,060 (60.36%)
	Male	696 (39.64%)
Age	18–34	471 (26.82%)
	35–49	542 (30.87%)
	50–64	551 (31.38%)
	65–74	160 (9.11%)
	75+	32 (1.82%)
Household income	\$0–\$19,999	512 (29.16%)
	\$20,000–\$34,999	220 (12.53%)
	\$35,000–\$49,999	161 (9.17%)
	\$50,000–\$74,999	228 (12.98%)
	\$75,000–\$99,999	145 (8.26%)
	\$100,000 or more (Missing)	242 (13.78%) 248 (14.12%)
Charlson score	Mean (SD)	1.63 (2.08)
Marital status	Married or living as married	835 (47.55%)
	Widowed	237 (13.50%)
	Divorced or separated	117 (6.66%)
	Single, never married (Missing)	415 (23.63%) 152 (8.66%)
Employment status	Employed	744 (42.37%)
	Unemployed	671 (38.21%)
	Retired (Missing)	187 (10.65%) 154 (8.77%)
Education	Less than high school	83 (4.73%)
	High school	418 (23.80%)
	Some college	481 (27.39%)
	College graduate	411 (23.41%)
	Graduate or beyond (Missing)	212 (12.07%) 151 (8.60%)
Healthcare coverage	Yes	1,455 (82.86%)
	No	135 (7.69%)
	(Missing)	166 (9.45%)
Length of Stay	Mdn = 6 days; M = 8.24 days (SD = 8.30)	

*M* mean, *SD* standard deviation, *Mdn* median

We compared our sample to the overall sample of hospitalized patients during the study period on the basis of gender, race, and age. Gender did not differ significantly between our sample and overall hospitalized patients. However, race differed significantly ( $\chi^2 = 1,148.60$ ,  $p < .0001$ ), particularly in the proportion of patients who were listed as other/multiple races who made up a larger proportion of the study population as compared to the hospital population (2.51% vs 0.04%). There was also a smaller proportion of Asian patients in our study (0.40% vs 1.40%), and a smaller proportion of patients who had missing data on race in our study (0.28% vs 5.37%). Age also differed significantly ( $\chi^2 = 412.55$ ,  $p < .0001$ ), such that our sample contained a greater proportion of younger patients and a smaller proportion of older patients as compared to overall hospitalized patients.

### Exploratory Factor Analysis

An EFA was conducted on subsample 1 ( $N = 869$ ) without restricting the number of factors. The KMO was .93. Five factors were retained, and parallel analysis suggested a multi-factor solution. While the parallel analysis indicated four factors were technically above the cutoff line, visual inspection of the plot strongly suggested a 2-factor solution was more appropriate (see Fig. 1). Yet, examination of eigenvalues (i.e., retaining factors with eigenvalues  $>1$ ) suggested a 1-factor solution (top two eigenvalues were 5.09 followed by 0.49). As a result, we subsequently re-ran the EFA twice, restricting the number of factors to one and two. In the 2-factor model, the factors were correlated at .70. Table 2 provides rotated factor loadings for both the 1- and 2-factor models. All items loaded adequately ( $>.30$ ) on factors; thus, all items were retained. Upon examination of the item loadings in the 2-factor model, a factor structure seemingly aligned with Webber’s<sup>16</sup> conceptualization of affective and cognitive trust emerged, with items about trusting the reliability and competence of healthcare professionals generally loading onto factor 1, and items more related to interpersonal care and concern loading onto factor 2. One exception is item 3, which loaded almost equally onto both factors; upon examination, the underlying concept of this item (distrusting a healthcare professional’s knowledge and desiring a second opinion) was conceptually more aligned with cognitive trust. We thus assigned it to the cognitive dimension for the subsequent CFA.

### Confirmatory Factor Analysis

We conducted CFAs with a second subsample of 887 participants. Based on the results of the EFA, we tested both 1- and 2-factor CFA models. The 1-factor model (see Fig. 2) fit adequately ( $\chi^2 = 445.04$ ,  $df = 44$ ,  $p < .01$ ; CFI = .92; RMSEA = .101 [90% confidence interval = .093–.110]; TLI = .90; SRMR = .05) and all items loaded strongly onto the general trust factor. The 2-factor model (see Fig. 3) fit well ( $\chi^2 = 293.56$ ,  $df = 43$ ,  $p < .01$ ; CFI = .95; RMSEA = .081 [90%

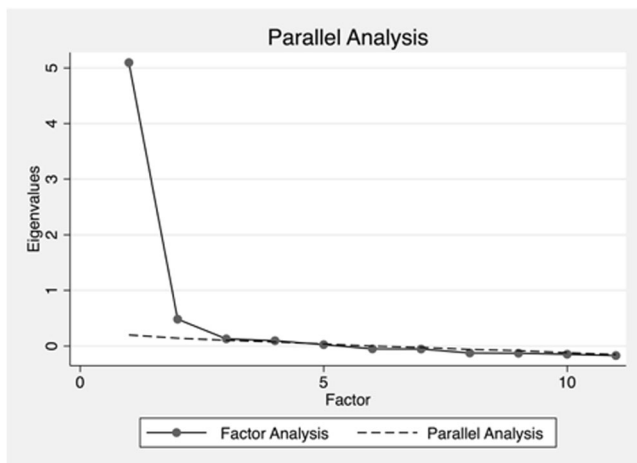


Figure 1 Parallel analysis results of inpatient trust in healthcare professionals EFA.

Table 2 EFA Rotated Factor Loadings (Pattern Matrix) for 1- and 2-Factor Models

Item	Factor 1 (1-factor model)	Factor 1 (2-factor model)	Factor 2 (2-factor model)
Item 1. I trust my doctor, nurse, or other healthcare professional so much I always try to follow his/her advice.	0.73	0.56	–
Item 2. If my doctor, nurse, or other healthcare professional tells me something is so, then it must be true.	0.59	0.64	–
Item 3. I sometimes distrust my doctor, nurse, or other healthcare professional’s opinions and would like a second one. (RC)	0.69	0.38	0.37
Item 4. I trust my doctor, nurse, or other healthcare professional’s judgments about my medical care.	0.78	0.58	–
Item 5. I feel my doctor, nurse, or other healthcare professional does not do everything he/she should about my medical care. (RC)	0.70	–	0.75
Item 6. My doctor, nurse, or other healthcare professional is usually considerate of my needs and puts them first.	0.73	–	0.63
Item 7. I trust my doctor, nurse, or other healthcare professional to tell me if a mistake was made about my treatment.	0.69	0.77	–
Item 8. I sometimes worry that my doctor, nurse, or other healthcare professional may not keep the information we discuss totally private. (RC)	0.52	–	0.40
Item 9. My doctor, nurse, or other healthcare professional is well qualified to manage, diagnose and treat, or make an appropriate referral for medical problems like mine.	0.65	–	0.46
Item 10. I doubt that my doctor, nurse, or other healthcare professional really cares about me as a person. (RC)	0.63	–	0.74
Item 11. I trust my doctor, nurse, or other healthcare professional to put my medical needs above all other considerations when treating my medical problems.	0.75	0.76	–

– represents absolute value loadings of  $< .30$ . RC reverse coded

confidence interval = .072–.090]; TLI = .93; SRMR = .04) and all items loaded strongly onto their assigned factor. While the 2-factor model appeared to have better fit, we conducted chi-square and CFI difference tests to confirm. The results of the

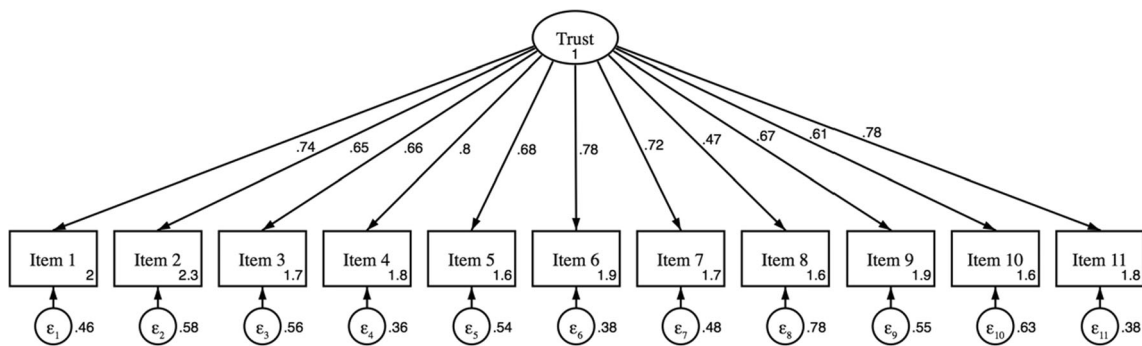


Figure 2 CFA 1-factor model of a unidimensional trust factor.

chi-square difference test ( $\Delta\chi^2 = 151.48(1), p < .001$ ) and the CFI difference test result of .03 indicated that the 2-factor model fit significantly better.

**Additional Scale Properties**

Cronbach’s alpha for the scale was  $\alpha = .90$  in the EFA subsample and  $\alpha = .90$  in the CFA subsample.

**DISCUSSION**

Interestingly, our study shows that what we know about patients’ trust in their healthcare professionals—and potentially, other interpersonal relationship dynamics between patients and their healthcare professionals largely based on research in the outpatient setting—may not apply to the inpatient setting. Despite the fact that the Trust in Physician scale was validated as a *unidimensional* measure of trust adapted from Anderson and Dedrick,<sup>12</sup> and that prior work has suggested that trust seems to be unidimensional in context of healthcare,<sup>12,13</sup> we found that trust in the inpatient setting using an adapted version of Anderson and Dedrick’s<sup>12</sup> scale was *two-dimensional*. Specifically, our results were consistent with theories that suggest trust is composed of both a cognitive dimension (a positive belief regarding the trustee’s competence and ability)

and an affective dimension (concerned with emotional bond between the trustor and trustee<sup>16</sup>). This is despite a median length of stay of only 6 days for our sample and the fact that hospitalized patients are often being cared for by healthcare professionals they do not know. However, prior work suggests that patients form trust impressions quickly, and trust is not strongly associated with how well patients know their providers.<sup>13</sup> The conditions of the inpatient setting may facilitate development of more granular trust perceptions; furthermore, hospitalized patients may more closely scrutinize the providers with whom they did not choose nor knew in advance but must rely upon heavily, perhaps explaining why trust is multidimensional in this sample.

Notably, one prior study of Anderson and Dedrick’s<sup>12</sup> scale also found two dimensions of trust—albeit in the outpatient setting. Aloba and colleagues<sup>24</sup> administered the scale to Nigerian psychiatric outpatients. The results of a principal components analysis suggested there were two factors seemingly related to doubt and trustworthiness; yet, the doubt factor was comprised entirely of items that were reverse scored, whereas the trustworthiness factor was comprised entirely of non-reverse scored items. Thus, it is possible that their results are simply a methodological artifact. Further, Cronbach’s alpha of their scale was below .70, providing additional evidence of methodological issues. Moreover, previous work has examined inpatients’ trust in nurses, and found a similar

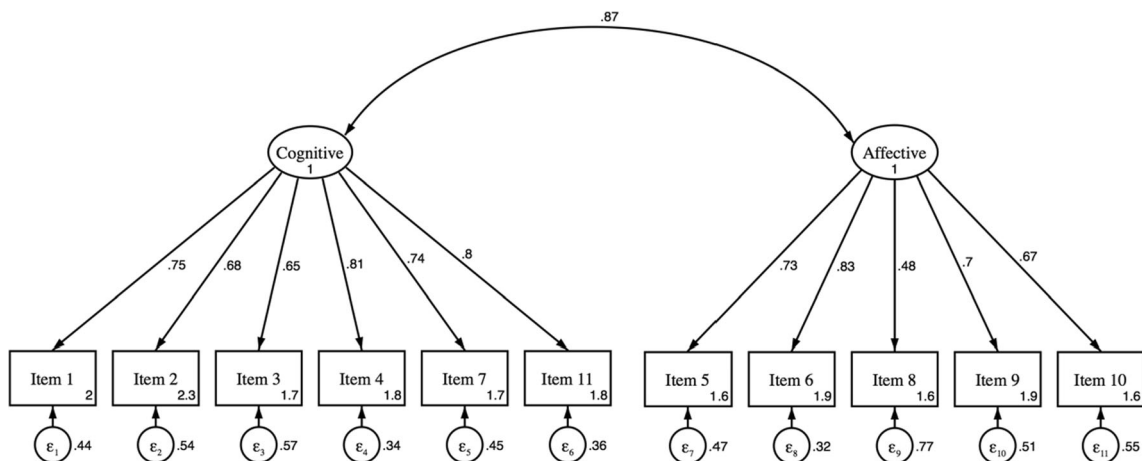


Figure 3 CFA 2-factor model of cognitive and affective trust.

pattern of findings as the current study. Specifically, Ozaras and Abaan<sup>25</sup> found that hospitalized patients considered both personal (e.g., being loving and respectful) and professional (e.g., doing tasks competently) characteristics when developing trust with nurses. These are similar to the concepts of affective and cognitive trust, and provide additional support for our findings. The current study supplements these findings by extending them to other types of healthcare professionals.

Our results provide important insights for healthcare delivery and future research on measures of patient trust and its dimensions as they indicate that healthcare professionals should foster both the cognitive trust and affective trust of their hospitalized patients (see Table 3 for evidence-based strategies).<sup>26-31</sup> These findings also have important implications for hospitalized patients in the context of the COVID-19 pandemic. For instance, many patients are distrusting of the new COVID-19 vaccines.<sup>11,32</sup> Healthcare professionals have also reported instances in which a hospitalized COVID-19-positive patient has denied having the disease,<sup>33</sup> despite their deteriorating condition.<sup>34</sup> Healthcare professionals faced with these circumstances who seek to increase trust can benefit from the results of this study by considering that hospitalized patients may not only be forming judgments about trust based on professionals' competence and expertise, but also through perceptions that their healthcare professionals have their best interests in mind and care for them as a person.

**Limitations**

We adapted the Trust in Physician scale from Anderson and Dedrick.<sup>12</sup> Thus, we cannot disentangle effects due to the inpatient sample as compared to the modifications we made to the wording of items. As our adaptations were minor, we do not expect that these played a significant role in the differing

factor structure, but future research should be conducted to confirm this. Additionally, we did not consider other dimensions or measures of trust and we were unable to identify the existence of potential other dimensions (e.g., Mechanic and Meyer<sup>35</sup>; Thom and Campbell<sup>36</sup>). However, as none of these measures were developed specifically for hospitalized patients, future work should seek to fully develop a measure for trust in the inpatient setting.

Moreover, as the current study was conducted as part of a larger study within six hospitals, the extent to which the results generalize to other hospital systems is unknown. Further, the proportion of older adults in our study was relatively low compared to that of the overall hospital population. This was likely due in part to our exclusion criteria, and to older adults choosing not to use the tablet on which the survey was deployed during their stay. It would be interesting for future research to examine inpatient trust specifically in the older adult population, and potentially to compare this to trust in other age groups. Additionally, the current study aggregated patients of all races together to provide as robust of a sample size as possible for an initial exploration into the dimensionality of trust in the inpatient setting; thus, we did not investigate measurement equivalence between races. Our sample was composed of 80% White patients, and included only patients who spoke English; thus, future work is needed to validate our findings in more diverse samples. Lastly, it is unknown to what extent patients' trust of the different healthcare professionals with whom they interacted varied. Future research should explore how and why patients may differentially trust members of various professions, as well as of different individuals involved in their inpatient care.

**Table 3 Practices to Increase Cognitive and Affective Trust of Healthcare Professionals in the Inpatient Setting**

Dimension	Strategies
Cognitive trust	<ul style="list-style-type: none"> <li>▪ Emphasize expertise and ability – introduce self and describe credentials upon first visit<sup>26, 31</sup></li> <li>▪ Tell patients they can ask questions<sup>30</sup></li> <li>▪ Show lab/test results and explain them<sup>30</sup></li> <li>▪ Provide training for healthcare professionals to increase their skills in this area</li> </ul>
Affective trust	<ul style="list-style-type: none"> <li>▪ Provide patients with emotional support<sup>26</sup></li> <li>▪ Ensure use of effective communication skills<sup>27, 28</sup></li> <li>▪ Make an effort to relate to patients (e.g., discuss mutual interests)<sup>29</sup></li> <li>▪ Provide reassurance<sup>30</sup></li> <li>▪ Ask patients about their preferences<sup>30</sup></li> <li>▪ Avoid judgmental language and behavior<sup>30</sup></li> <li>▪ Show the patient you respect them as a person<sup>31</sup></li> <li>▪ Respect patients' time (e.g., return when you say you will)<sup>31</sup></li> <li>▪ Spend time during initial visit to establish rapport (e.g., act like a guest)<sup>31</sup></li> <li>▪ Provide training for healthcare professionals to increase their skills in this area</li> <li>▪ Develop job aids (e.g., pocket cards) with tools and phrases for healthcare professionals to use to open up an effective, trusting dialogue</li> </ul>

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**Declarations:**

**Conflict of Interest:** The authors declare that they do not have a conflict of interest.

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