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Psychometric assessment of the Health Care Alliance Questionnaire with women in prenatal care

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Abstract

The current study assessed the reliability and validity of the Health Care Alliance Questionnaire (HCAQ), which was developed using a Delphi process and embedded in an on-going perinatal outcomes study. The HCAQ exhibited content and face validity, and high reliability. Results indicated concurrent validity in relation to satisfaction with practitioner, and discriminant validity in relation to interpersonal sensitivity and posttraumatic stress disorder. The HCAQ demonstrated predictive validity in relation to perceptions of practitioner's care during labor and postpartum depression. Overall, results suggest that alliance may be an important factor in maternity care processes and outcomes. Further psychometric work is warranted.

Keywords

alliance; factor analysis; posttraumatic stress disorder; prenatal care; psychometrics

“Alliance” is defined as the collaborative and affective bond between therapist and patient (Martin, Garske, & Davis, 2000). This relationship between patients and psychotherapy practitioners has been considered a critical component of mental health care for over forty years (Balint, 1964; Kaba & Sooriakumaran 2007). However, there is little consensus regarding the conceptualization and measurement of the alliance between patients and health care practitioners in health care settings (Epstien et al., 2005; Lewin, Skea, Entwistle, Zwarenstein, & Dick, 2001; Mead & Bower, 2000).

The concept of “therapeutic alliance” has been studied extensively in the psychotherapy literature (Horvath, Del Re, Fluckiger, & Symonds, 2011). Models of therapeutic alliance

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identify the importance of collaboration, affective relationship, and agreement between the client and therapist for positive outcomes (Martin et al., 2000). Bordin (1979) conceptualized these components as (1) *goals*, agreement on therapeutic goals; (2) *tasks*, consensus on the tasks or activities that makeup the therapeutic process; and (3) *bond*, between client and therapist. Research suggests that both client and therapist must value the goals and tasks of the intervention or therapy for successful behavioral change (Horvath, 1994). Meta-analyses of studies examining the linkage between therapeutic alliance and outcomes in psychotherapy have confirmed a reliable association between a good alliance and positive therapeutic outcomes (e.g., depression score; Martin et al., 2000; Shirk & Karver, 2003).

In parallel, alliance between patients and practitioners might have a substantial and positive impact in a wide variety of health care settings. Circumstances that require an ongoing relationship between patients and practitioners may particularly benefit from enhanced alliance, including primary care, chronic disease management, and maternity care. The management of chronic illness, such as diabetes, is one example in which alliance may greatly benefit patients. Similar to psychotherapy, quality diabetes management requires ongoing interactions and care, agreement on goals and tasks, and adherence to those tasks by both patient and practitioner. Therefore, the alliance between a patient and practitioner may play a particularly important role in proper management. Research finds that high-quality care for diabetes can be increased through enhanced patient-provider relationships (Correa-de-Araujo, McDermott, & Moy, 2006). Additionally, higher patient self-efficacy and self-management skills are associated with patient-practitioner agreement on diabetes management goals and strategies (Heisler et al., 2003). Recent research also suggests that an alliance between patients and practitioners is important for treating eating disorders (Allen & Dalton, 2011), and engaging patients in activities to reduce their risk of skin cancer (Heckman et al., 2013).

All patients may benefit from alliance with their practitioners, but prior research suggests that patient gender is an important factor to consider (Bertakis, 2009). Women tend to rate alliance with a psychotherapist as being important in treatment retention and progress. This is consistent with previous psychological research indicating that women identify with relational connections and interpersonal bonding more so than their male counterparts in a therapeutic relationship (Wintersteen, Mensinger, Diamond, 2005). Given the gender-specific nature of childbearing and the importance of receiving care over a one-year period, alliance may play a particularly important role in maternity care. This may be especially true for women with behavioral risk factors that are challenging to address, including mental health, domestic violence, or substance use problems (Wu et al., 2012).

Alliance with a maternity care practitioner is so important that a phenomenological study described the structure of women's experiences with midwives during labor as "presence," which included three themes: to be seen as an individual, to have a trusting relationship, and to be supported/guided on one's own terms (Berg, Lundren, Hermansson, & Wahlberg, 1996). All three of these themes related back to the level of alliance between the woman and her practitioner (Berg et al., 1996). This relationship and sense of support has a positive influence on birth confidence, responsiveness to newborn babies, postpartum depression

symptoms, and breastfeeding outcomes (Hodnett, Gates, Hofmery, & Sakala, 2003). Understanding and measuring women's satisfaction with their maternity care is complex and multifactorial, yet is increasingly recognized as an important outcome of pregnancy and childbirth care. Satisfaction with maternity care has profound implications for a woman's own future well-being, that of her child, and the mother-baby relationship (Tinkler & Quinney, 1998). However, alliance extends beyond satisfaction with one's provider. Alliance incorporates the dyadic relationship between a patient and her practitioner. In other words, patients become an active and equitable participant in their healthcare rather than a passive recipient of care (Kim et al., 2001; Wilson & Hobbs, 1995). A woman may be satisfied with the information that her maternity care provider offers, but desire a stronger connection with her provider and/or greater role in the clinical decision making process. Howarth and her colleagues' (2011) study of first time mothers found that feeling excluded from the birth decision making process was detrimental for well-being and satisfaction. These collaborative, relational components are crucial to positive outcomes in psychotherapy (e.g., Martin et al., 2000; Shirk & Karver, 2003) and may be equally vital in healthcare settings (e.g., Berg et al., 1996). The implications of alliance for physical health outcomes are less established, but some research indicates its importance. For example, a patient empowerment intervention, which incorporated participative decision making, improved blood glucose control among diabetes patients (Anderson et al., 1995).

To our knowledge, there is only one measure of alliance designed specifically for use in health care relationships: the Kim Alliance Scale (KAS; Kim, Boren, & Solem, 2001). The KAS has four subscales (i.e., collaboration, communication, integration, and empowerment), and assesses the process of communication and distribution of power between patients and practitioners (Kim et al., 2001). This measure has been used in military health care settings and intensive care units and has a reported Cronbach's alpha of 0.94 (Kim, Kim, & Boren, 2008; Kim, Yates, Graham, & Brown, 2011). The KAS has been established as a reliable and valid measure of alliance (Kim et al., 2001; Kim et al., 2008), but its relationship to health outcomes is less understood.

The measure proposed in the current study differs from the KAS in two important ways. It was developed with the intention of replicating, as closely as possible, the operationalization of "alliance" as it has evolved in psychotherapy research. Moreover, this measure includes items that capture unique components of the patient-practitioner relationship in health care settings: being physically touched (i.e., examined) and feeling included in medical decision making (Kayes & McPherson, 2012). The purpose of this study is to begin to establish the psychometric properties of this new health care alliance questionnaire. While the study was completed in the maternity care context, the instrument was written in order to be applicable to all patient-practitioner relationships and would be a useful measure of alliance in all fields of health care.

Method

Summary of Scale Development Steps

The Health Care Alliance Questionnaire (HCAQ) was written by Seng and Hiser (2004) with the context of maternity care in mind, but with the goal of making an instrument that

could be used in other health care relationships (Hiser, unpublished thesis). Three widely used psychotherapy alliance measures were used as a basis for the instrument. Items appropriate to health care relationships were adapted from the Penn Helping Alliance Questionnaire (Luborsky, Crits-Christoph, Alexander, Margolis, & Cohen, 1983), the Working Alliance Inventory (Horvath & Greenberg, 1986), and the California Psychotherapy Alliance Scales (Gaston, 1991). In an effort to stay close to the psychotherapy-specific measures, we adopted the format of a list of statements with level of agreement on a Likert scale. Some of the items themselves were closely adapted; for example, there is an item about liking the midwife/obstetrician as a person that mirrors the HAQ-II items “I like the therapist as a person.” Whereas other items were newly created to suit our purpose of being more specific to healthcare, such as “You feel you have a say in what procedures you should have.”

Next, a group of graduate nurse-midwifery students and experienced nurse midwives served as a Delphi panel, providing input to optimize language and ease of use, and to increase content validity by examining the adequacy with which the items covered the intended conceptual domain (Pallant, 2007; Waltz, Strickland, & Lenz, 2010), while keeping the items and their wording as close to that of the psychotherapy measures as possible.

The final measure contains 16 items with Likert-scale fixed responses (1=*strongly disagree* to 5=*strongly agree*). The instrument can either be read aloud to a patient or give in paper form to be self-administered. Patients are instructed to think back about their relationship with their midwife/doctor that they saw at their last visit and asked to agree or disagree with each of the 16 statements listed in Table 1. The self-administered version was tested in a cognitive interview “think aloud” process, during which no substantial needs for change emerged. The “think-aloud” respondents provided support for face validity by indicating that it seemed the purpose of the questionnaire was to ask about their relationship with their doctor or midwife, although none used the term “alliance” specifically. Although a formal psychometric study would have been the ideal next step, the opportunity arose to include the measure in a large perinatal outcomes research project. Validation testing used other variables already being measured in this study.

Psychometric Analysis: Recruitment and Participants

The HCAQ was incorporated into a longitudinal outcomes study, Psychobiology of PTSD & Adverse Outcomes of Childbearing (NIH NR008767; common name the STACY Project). Details of the study design, recruitment, and procedures have been previously described (Seng, Low, Sperlich, Ronis, & Liberzon, 2009). The STACY Project was a three cohort, perinatal outcomes study to test the hypothesis that posttraumatic stress disorder (PTSD) is associated with adverse childbearing outcomes. Recruitment took place over three years at three health systems in the Midwestern United States. Eligible participants were English-speaking women, aged 18 years or older, expecting a first infant, and less than 28 weeks of gestation. The three cohorts were non-exposed controls (32.3%, n=208), trauma-exposed, PTSD-negative (resilient) controls (39.7%, n=256), and trauma-exposed, PTSD-positive cases (28.1%, n=181). Most of the psychometric analyses below were conducted with the 645 women with complete data on the HCAQ measure. The regression model used to assess

predictive validity included the 541 women who had both 35-week and 6 week postpartum data.

In order to have power for race-specific outcome modeling after expected attrition, the researchers over-sampled African American women. At the time of the late-gestation interview, which includes the HCAQ items, there were 214 African American participants (33.2%). Other participants described their race/ethnicity as European American (44.8%, n=289), American Indian (1.4%, n=9), Arab American (2.9%, n=19), Asian (8.1%, n=52), Latina (5.0%, n=32), or Native Hawaiian or Pacific Islander (0.6%, n=4). This sample is generalizable to women expecting their first infant across private and public sector prenatal care clinics.

Psychometric Analysis: Measures

This psychometric analysis below used data from six measures. Concurrent validity was assessed with a single-item from the late pregnancy interview that assessed satisfaction with the maternity care provider on a Likert scale from (1) *very dissatisfied* to (5) *very satisfied*. Discriminant validity was assessed in relation to both the study cohorts and interpersonal sensitivity. Cohort assignment was based on history of a traumatic event per the Life Stressor Checklist which is considered to be highly sensitive to exposures experienced by women (Wolfe & Kimerling, 1997) and lifetime PTSD diagnosis per the National Women's Study PTSD Module (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). The PTSD module was used in the largest epidemiological study of trauma in women and had a sensitivity of .99 and specificity of .79 compared with structured clinical diagnostic interview. Interpersonal sensitivity symptoms were measured with a 10-item subscale of the Symptom Checklist 90 (SCL-90; Derogatis, 1983). Predictive validity was assessed using the Perception of Care Questionnaire (PCQ; Fisher, 1994) and the Postpartum Depression Screening Scale (PDSS; Beck & Gamble, 2002). The PCQ assesses the woman's appraisal of the quality of care in relation to her labor experience. The items appraise professional/technical competence (e.g., "made the right decisions") and relational/affective care (e.g., "asked how I felt"). The PCQ demonstrated reliability equal to and greater than .90 (Creedy, 1999). The PDSS is a 35-item screening scale for major depressive disorder, with a positive predictive value of 93% in its clinical validation study.

Plan of Analysis

SPSS Version 19.0 was used for all data analysis procedures. After examining missing data and the suitability of the data for the planned analysis, an initial reliability analysis was conducted to examine the distributions of the items and their inter-correlations. A factor analysis was then applied to determine the factor structure of the scale. Lastly, convergent, discriminant, and predictive validity were examined. Because alliance is a relational concept, validation was done in relation to variables that measure other relational concepts: satisfaction with the practitioner (concurrent validity) and interpersonal sensitivity (discriminant validity). PTSD is also associated with interpersonal impairments reflected in three diagnostic criteria symptoms (APA, 1994): emotional numbing which creates feelings of detachment from others, hypervigilance, and anger or irritability. Thus, PTSD cohort status was used as an additional assessment of discriminant validity. Stepwise linear

regression models were used to assess predictive validity. First, the HCAQ score was used to predict the woman's perception of the care she received from the practitioner in labor. Then a model was created with the HCAQ score predicting postpartum depression symptoms, taking the perception of care in labor into account. Change in variance explained, standardized beta coefficients, and tolerance statistics were analyzed to verify that the alliance score was not redundant or collinear with the other "relational" variables (i.e., satisfaction and interpersonal sensitivity scores). Some analytic decision-making was data-driven and is therefore explicated in the results below.

Results

Preliminary Considerations

Of the 645 respondents, 26 women did not have responses to all questions. It was determined *a priori* that those women who had omitted questions on the HCAQ would be excluded from the reliability analysis which uses item scores, but included without imputation in the other tests using HCAQ total scores. As a result, 619 women's questionnaires were included in this analysis. The sample size exceeded the general rule of thumb that a factor analysis requires a minimum of 300 cases (Tabachnick & Fidell, 2007), and that there are 10 cases per item in the instrument (Nunnally, 1978). According to the Kolmogorov-Smirnov and Shapiro-Wilk Tests of Normality, the HCAQ scale scores followed a normal distribution, meeting assumptions for parametric statistical analyses. HCAQ scores range from 16 to 80. In our sample, the range was 24 to 80, with a mean of 67.08 and standard deviation of 9.89. Examination of the standardized residuals in the linear regressions below indicated that the error variance was normally distributed, meeting assumptions for parametric testing.

Inter-item Correlations

Inter-item correlations were examined for conceptual redundancy, lack of fit, and values lower than .30 (Pallant, 2007). The minimum value was .192 and the maximum value was .736. All items that fell below .30 were in relation to Question 5, "She/He likes you as a person" (minimum=.192, maximum=.736). This particular item measures a sense of affinity or bond to their health care practitioner, which is conceptually important to the overall construct of alliance. Therefore, this item was retained despite some statistical evidence for its elimination. The rest of the correlation matrix showed a range of correlations suggesting a factor analysis including all items would be appropriate.

Internal Consistency Reliability

Next, the internal consistency reliability was examined to verify that the reliability would not improve by eliminating an item (Table 1, Column 5). The overall Cronbach's alpha was .933, which is considered to be excellent (Waltz et al., 2010). The range of scale alpha coefficients that would result if any single item were deleted ranged from a low of .925 to a high of .935, suggesting that all 16 items were worthy of retaining.

Construct Validity

Construct validity was considered via exploratory factor analysis. Bartlett's Test of Sphericity was significant, $\chi^2 = 6274.515$, $p < .001$, indicating variance of responses (Tabachnick & Fidell, 2007). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also evaluated. The KMO was .956, indicating a strong pattern of relationships among observed and partial correlations (Tabachnick & Fidell, 2007). These results confirmed the sample to be suitable for factor analysis.

Principal Component Analysis (PCA) was chosen in order to consider all of the available variance, including both common and unique variance. PCA with varimax and oblimin rotations were tested in order to find the best factor solution. The criteria used to determine the number of factors, and the numbers of items within a factor, were the point of discontinuity of the scree plot, an eigenvalue of greater than 1, and item factor loading greater than .40.

Initial analysis allowed, but did not dictate, a two-factor solution. The first factor had an eigenvalue of 8.578 and explained 53.61% of variance. The second factor's eigenvalue was marginal, at 1.107, and added 6.9% of variance explained. Examination of the two factors showed that the smaller factor collected all of the negatively worded items, but these did not appear to have any other thematic coherence. Consequently, the two-factor solution was considered to reflect a linguistic artifact rather than a meaningful subscale structure. A one-factor solution had an eigenvalue of greater than one, and was consistent with the elbow displayed in the scree plot. The PCA was therefore repeated, forcing a one-factor solution. The component matrix for the HCAQ as a single factor is depicted in Table 1, Column 6 (Pallant, 2007). The single-factor solution was chosen as the basis for the rest of the analyses.

Reliability Across Cultural Subgroups

Attention to the therapeutic relationship and the working alliance with patients of color may require special considerations. Minority populations are known to underutilize psychotherapy as well as health care services. Multiple reasons are likely to account for these findings, but one possibility may be that many minority patients do not experience alliance with their providers in the same way (Vasquez, 2007). Measuring the reliability of the HCAQ across cultural groups is an important first step in ensuring that the measure has wide spread use across cultural identities, so we took the opportunity our diverse sample offered to assess reliability across several groups.

Using the entire sample, the scale reliability was .933. The large, diverse sample also provided the opportunity to assess differences in HCAQ scores and scale reliability across several racial/ethnic groups. Cronbach's alpha was greater than .90 in both the European- and African-American groups. The alpha coefficients within the smaller groups (48 Asians, 31 Latinas, 19 Middle Easterners, 8 American Indians/Alaska Natives, and 4 Native Hawaiian/Pacific Islanders) were greater than .90 as well, but these sample sizes may be too small to produce stable results.

Concurrent Validity

Concurrent validity was assessed by testing for differences in the HCAQ score means based on the level of “satisfaction” with the practitioner. The satisfaction item was transformed into a dichotomous variable of “very satisfied” ($n = 504$) versus all other responses from “somewhat satisfied” to “very *dissatisfied*” ($n = 115$). An independent samples t-test indicated there was a significant 13-point difference in HCAQ scores for those “very satisfied” with their care ($M = 69.92$, $SD = 7.39$) and all other levels of satisfaction ($M = 56.57$, $SD = 10.37$), $t(617) = -13.058$, $p < .001$ (equal variances not assumed). This finding is supportive of concurrent validity, as measured by agreement between the HCAQ and a standard item assessing general satisfaction with a practitioner.

Discriminant Validity

Discriminant validity was first assessed by comparing scores across the parent study’s three cohorts. A one-way ANOVA indicated that HCAQ scores significantly differed across the three groups, $F(2, 642) = 8.1$, $p < .001$ in the expected directions. PTSD cases had the lowest scores ($M = 64.7$, $SD = 11.9$). Trauma-exposed, resilient controls had the highest scores ($M = 68.5$, $SD = 8.4$). Non-exposed controls had scores in the middle ($M = 67.4$, $SD = 9.4$). Post hoc Scheffe tests confirmed that the contrasts between trauma-exposed, resilient controls and PTSD cases and between non exposed controls and PTSD cases both were statistically significant ($p < .05$). A second assessment of discriminant validity involved correlating the SCL-90 interpersonal sensitivity score with the HCAQ score. Interpersonal sensitivity was weakly but significantly correlated with HCAQ score in the expected negative direction ($r(643) = -.149$, $p < .001$).

Predictive Validity

To measure predictive validity, a linear regression was used to determine the extent to which HCAQ score at 35 weeks gestation would predict the perception of care by the midwife or obstetrician during labor (i.e., the Perception of Care Questionnaire; PCQ; Fisher, 1994). It was presumed that women who reported strong alliance with their health care practitioner would also report positive perceptions of the care they received in labor. This regression model was estimated on the subset of women ($n = 564$) who had both the late-pregnancy HCAQ data and a (postpartum) score on the PCQ (Table 2). In the first step, HCAQ score alone significantly predicted PCQ scores, ($\beta = .347$, $p < .001$), and explained 12% of the variance. In step 2, the (prenatal) satisfaction rating and interpersonal sensitivity scores added only 1.5% additional variance explained ($p = .009$). The satisfaction rating was not independently predictive of perception of care score after HCAQ score had been taken into account, but the interpersonal sensitivity score was independently associated in an additive manner ($\beta = -.111$, $p = .005$). Examination of the tolerance statistic indicates that the HCAQ and satisfaction rating share variance, but are not collinear. The interpersonal sensitivity variable shares much less variance. This model indicates that the HCAQ is a good predictor of the PCQ score, a proxy for women’s appraisal of the technical and relational care they received from the practitioner in labor.

To assess the HCAQ’s predictive validity in relation to a significant outcome of maternity care, the stepwise modeling was extended to predict postpartum depression symptoms

(Postpartum Depression Screening Scale score; PDSS; Beck, 2000). This model (Table 3) accounted for the satisfaction rating, interpersonal sensitivity score, and perception of care in labor. The last step adjusted for race, age, and education demographic variables. It was expected that both higher HCAQ scores and positive ratings would be protective against postpartum depression, as evidenced by lower PDSS scores. Both HCAQ score and perception of care were significantly negatively associated with PDSS score. In the first step, the HCAQ score alone explained 6.7% of variance ($\beta = -.257, p < .001$). In the second step, again, the HCAQ score ($\beta = -.184, p < .001$) and interpersonal sensitivity score ($\beta = .218, p < .001$) independently predicted postpartum depression score additively. The influence of interpersonal sensitivity on postpartum depression score was stronger than its influence on perception of care score, and the HCAQ score had a relatively weaker influence. Again in this model, satisfaction rating was not independently predictive of the postpartum depression score when considered along with the alliance and interpersonal sensitivity factors. This second step explained an additional 5% of variance in the postpartum depression score outcome ($p < .001$). In the third step, the perception of care score became the strongest predictor ($\beta = -.211, p < .001$) and added 4% more variance explained ($p < .001$). The demographic factors added in the final step increased the total variance explained to 16.6%, adding 1.2% but were not independently significantly predictive ($p = .051$).

Discussion

Alliance, broadly defined as a collaborative and affective bond, is an essential concept to consider in health care (Balint, 1964; Kaba & Sooriakumaran, 2007; Martin et al., 2000). While the importance of alliance between patients and practitioners is widely agreed upon, there is little consensus regarding its conceptualization and measurement (Epstien et al., 2005; Lewin et al., 2001; Mead & Bower, 2000). The 16-item HCAQ has two properties that make it particularly useful for health research. It is closely congruent with long-established measures of alliance in psychotherapy. Additionally, the HCAQ assesses physical touch and medical decision-making elements that are specific to health care relationships.

The “assessment-in-use” approach to examining the psychometric properties of this new measure provided several strengths. For instance, the large, diverse, clinical care sample was well-characterized on psychiatric factors that can impinge on ability to form an alliance. Furthermore, the HCAQ was created with maternity care in mind as a special instance when ongoing contact between patients and practitioners is required and where alliance may be especially beneficial. Prior research suggests the importance of alliance in the context of maternity care (Berg et al., 1996; Hodnett et al., 2003; Tinkler & Quinney, 1998). Embedding the HCAQ in this perinatal outcomes study provides what is, in effect, a natural experiment. Using this approach affirmed these associations, because it measured alliance prior to labor, where physical touch and medical decision-making were taking place under circumstances that would stress a practitioner-client relationship. This method also estimated the relative importance of alliance compared with other indicators of relationship (i.e., satisfaction and interpersonal sensitivity) and in relation to postpartum depression, which is known to affect the quality of woman’s relationships, including the relationship with a maternity care provider.

Nonetheless, there are limitations to assessing the psychometric properties of a new measure by embedding it in an on-going study. Some potentially valuable psychometric properties, notably test-retest stability reliability, were not assessed. Because the measure was embedded in a perinatal study, there is no information as to its reliability or validity in clinical samples of men, children, or older persons or in relation to health care relationships focused on disease processes. However, the HCAQ's applicability may extend to such other health care relationships, especially ones where touch and decision-making factor into the relationship. Future research should examine these possibilities.

Based on this first examination of the HCAQ, further research is warranted. The most obvious area for attention is the question of whether the scale could be improved with an alternative form. In order to decrease the risk of response-set, some items were written with a negative valence or negative wording (i.e., non-judgmental, not responsive, frustrates, changing to another practitioner). These items had lower factor loadings and could have been considered a second factor, but this factor had no thematic coherence beyond this linguistic artifact. An alternative form that rewords these items positively (e.g., accepting, responsive, facilitates, keep seeing this practitioner) could cover the same elements of alliance within a single, tighter factor. The cost of this change in terms of a more skewed scale score from a positive response set could then be empirically assessed.

Finally, it seems important consider the dyadic nature of alliance. It is very rare in health outcomes research for practitioners' interpersonal skill level or "bedside manner" to be taken into account. Results indicated that the HCAQ score is not particularly collinear with the patient's interpersonal sensitivity score, an indicator of relational impairment. This suggests that the alliance measure may indeed be implicitly capturing variance in both the patient and the practitioner contributions to the relationship. Future studies could verify this by including a separate variable to characterize the practitioner's interpersonal skill, by experimentally manipulating the interaction that forms the basis for the patient's ratings, or by using multi-level modeling with individual practitioners as a unit of analysis to better determine the extent to which the alliance score is an efficient, reliable and valid reflection of the relational contributions—for better or for worse—of both parties to the work.

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Table 1

Alliance Scale reliability analysis and factor loading

Item wording	Reliability Analysis				Factor Loading
	M	SD	Item-to-total correlation	α if item deleted	
1. [She/He] seems non-judgmental.	4.22	1.04	.53	.93	.58
2. You feel that you work well together.	4.32	.83	.82	.93	.85
3. You think that [she/he] is getting to know your individual needs."	4.07	.97	.76	.93	.81
4. You like [her/him] as a person.	4.29	.74	.76	.93	.81
5. [She/He] likes you as a person.	4.08	.72	.61	.93	.69
6. [She/He] relates to you in ways that frustrates you.	4.16	.89	.46	.94	.50
7. You feel you have a say in what procedures you should have.	4.34	.71	.54	.93	.58
8. You trust [her/him]."	4.34	.64	.81	.93	.85
9. [She/He] respects you."	4.42	.70	.76	.93	.81
10. You two manage to talk about your particular questions and concerns."	4.35	.77	.74	.93	.79
11. [She/He] helps you feel at ease when [she/he] examines you.	4.02	.88	.78	.93	.82
12. You worry that [she/he] may not be responsive to your needs."	4.18	.84	.61	.93	.65
13. You have formed a good relationship with [her/him]."	4.34	.71	.75	.93	.80
14. You feel free to tell [her/him] the truth about very private matters."	4.01	1.02	.57	.93	.62
15. You feel that [she/he] provides expert care.	4.12	.97	.77	.93	.82
16. You think about changing to a different health care practitioner.	4.21	.97	.57	.93	.61
Total	67.08	9.89			

Table 2

Stepwise linear regression model with HCAQ score predicting Perception of Care in Labor Score.

	Standardized Coefficients Beta	Sig.	Collinearity Statistics Tolerance
Step 1 R ² =.120, $p<.001$			
HCAQ score	.347	<.001	1.000
Step 2 R ² =.135, change=.015, $p=.009$			
HCAQ score	.366	<.001	.628
Satisfaction with provider rating	-.057	.251	.638
Interpersonal sensitivity score	-.111	.005	.980
Step 3 R ² =.138, change=.003, $p=.531$			
HCAQ score	.352	<.001	.603
Satisfaction with provider rating	-.050	.310	.631
Interpersonal sensitivity score	-.098	.017	.926
Age	.024	.644	.563
African American race	-.012	.813	.559
Education level	.034	.554	.481

Table 3

Stepwise linear regression model with HCAQ score predicting PDSS Score.

	Standardized Coefficients Beta	Sig.	Collinearity Statistics Tolerance
Step 1 R ² =.066, $p<.001$			
HCAQ score	-.257	<.001	1.000
Step 2 R ² =.115, change=.050, $p<.001$			
HCAQ score	-.261	<.001	.628
Satisfaction with provider rating	.056	.261	.638
Interpersonal sensitivity score	.218	<.001	.980
Step 3 R ² =.154, change=.038, $p<.001$			
HCAQ score	-.184	<.001	.572
Satisfaction with provider rating	.044	.367	.636
Interpersonal sensitivity score	.195	<.001	.967
PCQ score	-.211	<.001	.865
Step 4 R ² =.166, change=.012, $p=.051$			
HCAQ score	-.195	<.001	.555
Satisfaction with provider rating	.049	.316	.630
Interpersonal sensitivity score	.215	<.001	.916
PCQ score	-.217	<.001	.862
Age	.064	.214	.563
African American race	.067	.195	.559
Education level	.094	.093	.481