Behavioral health providers' beliefs about health information exchange: a statewide survey

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ABSTRACT

Objective To assess behavioral health providers' beliefs about the benefits and barriers of health information exchange (HIE).

Methods Survey of a total of 2010 behavioral health providers in a Midwestern state (33% response rate), with questions based on previously reported open-ended beliefs elicitation interviews.

Results Factor analysis resulted in four groupings: beliefs that HIE would improve care and communication, add cost and time burdens, present access and vulnerability concerns, and impact workflow and control (positively and negatively). A regression model including all four factors parsimoniously predicted attitudes toward HIE. Providers clustered into two groups based on their beliefs: a majority (67%) were positive about the impact of HIE, and the remainder (33%) were negative. There were some professional/demographic differences between the two clusters of providers.

Discussion Most behavioral health providers are supportive of HIE; however, their adoption and use of it may continue to lag behind that of medical providers due to perceived cost and time burdens and concerns about access to and vulnerability of information.

BACKGROUND AND SIGNIFICANCE

The adoption and meaningful use of electronic health records (EHRs) and health information exchange (HIE) is a central strategy to reduce healthcare costs and improve quality of care in the USA.[1] Healthcare providers, because they are often organizational leaders as well as prospective users, impact implementation success.[2–4] Medical providers' beliefs about EHRs and HIE have been the subject of much research, but there has been little examination of the beliefs of behavioral health providers,[4–13] whose adoption is trailing that of medical providers.[14–16] The lack of research about behavioral health providers' beliefs is surprising given that behavioral health information is an important component of a health record, particularly for persons with chronic mental health conditions, and given there have been repeated calls for improved communication between behavioral and medical health providers.[17–25]

The high failure rate of technological innovations due to non-acceptance has resulted in examination of prospective users' beliefs.[3 26] The technology acceptance model (TAM) was derived from two influential theories based on beliefs: the theory of reasoned action (TRA) and innovation diffusion theory.[27 28] TRA posits that beliefs form attitudes about an object, attitudes inform behavioral intentions, and behavioral intentions relate to actual use of the object.[29] Beliefs play a key role in these relationships as the determinant of attitudes (ie, an individual's affective response toward an object). Innovation diffusion theory focuses on users' beliefs about a technology's relative advantage, compatibility, complexity, trialability, and observability.[30] TAM adapts TRA's model and uses innovation diffusion's relative advantage and complexity (renamed *perceived usefulness* and *perceived ease of use*) as the primary predictors of attitude.[31] In numerous studies TAM reliably predicts acceptance and use, and it has been confirmed as applicable for health information technology.[32–35] Although the term *acceptance* was originally meant by TAM theorists to denote use of the technology,[31] this paper follows subsequent theorists who have used acceptance interchangeably with behavioral intention, as a measure of motivation or willingness to exert effort to perform the target behavior.[33] The term *use*, then, refers to user interaction with the technology through measurement of frequency, duration, or intensity.[31 36] Adoption, the purchase and installation of technology, is a prerequisite to use.[33] Success of implementation is typically seen as a multi-dimensional concept that may include use and user satisfaction, systems quality, information quality, and organizational impacts.[37]

Resistance researchers have criticized acceptance theorists for focusing only on positive beliefs.[38–40] Resistance is a force whose manifested behaviors (eg, postponement of decision-making, opposition) may be a source of disruption and failure.[3 38 41 42] Venkatesh and Brown assert that the underlying decision-making processes that lead to non-acceptance or acceptance 'do not lie on opposite ends of the same continuum.'[43] Indeed, since individuals may simultaneously hold beliefs about benefits and barriers within a belief construct, it may be expected that benefits, such as TAM's perceived usefulness and ease of use, may be accompanied by perceived barriers as well.[44–47]

Three peer-reviewed articles were located that examined behavioral health providers' beliefs about HIE, EHRs, or electronic medical records (EMRs). In the first study, behavioral health providers were interviewed about the benefits and barriers of HIE.[46] Three themes were identified: (1) quality of care, (2) privacy and security, and (3) delivery of services. All providers perceived that HIE would result in improvements in the quality of care, but all providers also expressed concerns that HIE would negatively impact the privacy and confidentiality of client information. Providers expressed

some ambivalence about the impact HIE would have on their practice operations: all providers voiced concerns, but two-thirds also discussed benefits.

The second study asked behavioral health and medical providers for post-implementation beliefs about the EMR's impact on quality of healthcare and quality and content of interactions with patients.[10] The majority of providers believed the EMR had improved quality. Just over half of respondents believed the EMR had no impact on quality and content of interactions with patients, but 45% felt the EMR improved both aspects of patient interaction. Behavioral health providers' responses were not reported separately from those of other providers.

The third study was also a post-implementation survey within an organization.[48] The study examined psychiatric clinicians' beliefs about EHRs using five a priori constructs: (1) confidentiality and the stigma of mental illness, (2) quality and clarity of the record, (3) reporting behaviors, (4) perceptions of patients' responses, and (5) release of information. A factor analyses returned nine factors: (1) data security, (2) data sensitivity, (3) data erosion, (4) data enrichment, (5) xenophobia, (6) recording precautions, (7) personal acceptability, (8) data efficiency, and (9) personal importance of confidentiality.

Behavioral health providers' beliefs about HIE may not be confidently asserted based on the studies for a number of reasons. Although the first study was focused on HIE, the small sample size (n=32) limits generalizability of the findings. The second study did not separate results for behavioral health providers, making it impossible to determine whether behavioral health providers' beliefs diverged from those of other providers. The second and third studies focused on sharing within a single organization. Research suggests that workers are more willing to share knowledge with those within their organization[49 50]; therefore, it is reasonable to believe that providers may have different views about sharing information within their organization than they do about sharing information with those in other organizations. The second and third studies focused on post-implementation beliefs, with questions not relevant to providers who have not yet used HIE (eg, '*Based on your experience, current levels of electronic safeguards make me [sic] comfortable recommending Vanderbilt Psychiatric services for close acquaintances*'). The second and third studies used a priori constructs that were not intended to capture overall beliefs, the second focusing on the impact of EMRs on overall quality of healthcare provided and the third on five post-implementation belief constructs.

No studies were found that examined how behavioral health providers, in a variety of settings and roles, balance the competing interests of perceived benefits and barriers when forming attitudes toward HIE. Overall perceptions of a broad range of providers allows insight into what factors shape providers' attitudes toward HIE, and could lead to a better practical and theoretical understanding of the role perceived benefits of HIE play in relation to perceived barriers.[45]

OBJECTIVE

The aim of this study was to examine behavioral health providers' beliefs about the benefits and barriers of HIE. Results may shed light on why behavioral health providers have been slower to adopt electronic sharing than have medical providers.[14 15 51] A further goal of this research was to increase understanding about how providers weigh countervailing beliefs about benefits and barriers.

MATERIALS AND METHODS

Survey instrument

Likert-scaled statements were developed from previous research that elicited beliefs about the benefits and barriers of HIE from 32 behavioral health providers.[44] The previous study's results were difficult to generalize given the small sample size, but were valuable for identifying salient beliefs. Elicitation through open-ended questions is the recommended method to identify salient beliefs and has been used to identify technology benefits and barriers.[33 43 52 53] Rather than use the themes gleaned from the previous study, this study returned to the initial 68 beliefs codes and their grouping into 44 categories as conducted by the study's four senior researchers.[52 54] Of the 44 categories, 27 were mentioned by more than two providers, and were selected for representation by at least one question for the current study's survey.[52] The final survey included 38 belief statements, roughly split between those that were positively (n=18) and negatively (n=20) worded. The belief statements were preceded by the prompt to '*Imagine a system that enables you to electronically share client information with medical and behavioral health providers at other organizations, who have the appropriate release of information*' (ie, HIE). In addition to the belief statements, the survey contained: eight items from a computer self-efficacy beliefs scale[55]; two items assessing past experience and satisfaction with EHRs; one question asking current means of sharing client records with other providers; and a summative statement regarding attitude toward HIE (ie, degree of favor or disfavor toward HIE).[56] The survey was piloted with 10 behavioral health providers to ensure clarity. Data were matched with other practice and professional data (eg, practice setting, professional licensure, educational degree) available through a statewide health service.

The survey instrument was approved by the University of Nebraska-Lincoln IRB prior to administration and is available upon request.

Sample and administration

All behavioral health providers (N=2010) in Nebraska were invited to participate, either through a website or mailed hard copy. The Dillman method of multiple contacts was used to maximize response.[57] Providers received a letter announcing the study and 4 days later a letter of invitation that included the online survey address. Providers who did not respond were sent additional emailed and mailed reminders, culminating in a mailed invitation that contained a copy of the survey.

Analysis

The three-phase analysis was conducted using SPSS V.18 for Windows. First, an exploratory factor analysis was conducted to detect latent constructs.[58] Exploratory factor analyses are preferred to confirmatory factor analyses when the researcher does not have a strong theoretical or empirical basis upon which assumptions could be made about the number of factors or the specific variables within the factors.[59] Exploratory factor analyses enable the data to drive the solution, rather than a priori assumptions about the data structure. A generalized (weighted) least squares (WLS) extraction method was used for the factor analysis. Since correlations among the belief statements were anticipated, an oblique rotation (Promax) was utilized.[60] Second, the roles of factors predicting attitude toward HIE were examined using a series of regressions, with attitude toward HIE as the dependent variable. Scores for the factors were generated for each respondent using an exact weighting process.[61] To obtain the scores, the least squares weights (factor score coefficients)

were multiplied by respondents' scores for each variable.[62] This resulted in the factor scores expanding beyond the Likert-scaled responses of 1 to 5. Third, to group providers based on beliefs, a two-step cluster was conducted.[63 64] The log-likelihood criterion distance proximity measure was used to assess the distance of an individual's scores across factors and the Schwarz Bayesian criterion was used to determine the optimal number of clusters. The importance of each factor in a cluster was determined by the χ^2 value comparing the observed distribution of values of the factor scores within the clusters to the overall distribution of factor values.

RESULTS

Data from 674 respondents were collected. Since the study focused on belief statements, individuals who did not respond to any of the belief statements (n=7) were deleted from the sample, resulting in a final sample of 667. The response rate, using the American Association for Public Opinion Research Response Rate #2 method, was 33%.[65] This compares favorably to recent organizational response rates (with a mean of 35%) in published management and behavioral science journals.[66]

Descriptive univariate data were inspected for missing values. Missing data were tested for mean differences by constructing a dummy variable with two groups: cases with and without missing belief statements.[67] No significant differences between responders and non-responders were found for most belief statements; however, differences were found for four of the 38 belief statements: *Improve your access to client medical/physical health records* ($F(1,654)=8.035$, p=0.005, MSE 1.818), *Lead to more complete client information* ($F(1,654)=4.494$, p=0.034, MSE 1.827), *Improve your practice's office work flow* ($F(1,654)=4.505$, p=0.034, MSE 1.827), and *Be resisted by staff at your practice* ($F(1,654)=21.928$, p<0.001, MSE 1.780). A regression equation was constructed to predict missing values. Attitude toward HIE was used as the criterion variable. Predictor variables for the regression included all the other belief statement scores.

The sample did not significantly diverge from the population on gender (X^2 (1)=0.012, p=0.912), age (X^2 (1)=0.012, p=0.912), educational attainment (X^2 (5)=7.097, p=0.214), or practice setting (X^2 (5)=0.011, p=1.000). Separate analyses were conducted for each license type since many behavioral health providers hold multiple licenses. Using a Bonferroni adjusted α level of 0.004 per test (ie, 0.05/12) resulted in the license type also not diverging significantly from the population.

Demographics

The final sample was mostly female (70%), in midlife (71% between 29 and 59 years of age), highly educated (95% having attained at least a master's degree), and licensed as a mental health practitioner (69%) at an outpatient facility (69%). Most providers (70%) were located in areas with populations exceeding 250 000. The most popular means of sharing client information were non-electronic: fax (91%), phone (84%), and mail (82%). Over one-third of respondents (241 of the 630 who answered the question) reported using electronic sharing (ie, email and/or EHRs). Providers saw clients an average of 26.85 h per week (SD 15.47). Descriptive statistics of the sample are presented in table 1.

Provider beliefs

The factor analysis resulted in a four factor solution accounting for 57% of the variance when observing pattern matrix loadings of greater than or equal to |40| (table 2). The factors were

Table 1 Characteristics of respondents

Characteristic	Category	n	Valid %
Gender (n=666)	Male	198	30%
	Female	468	70%
Age, years (n=666)	29–39	122	18%
	40–49	124	19%
	50–59	228	34%
	60–69	162	24%
	69+	30	5%
Highest educational degree (n=658)	Associate's	10	2%
	Bachelor's	21	3%
	Master's	449	68%
	Post master's	4	1%
	Doctorate	129	20%
	Medical doctor	45	7%
Professional licensure (n=666)*	Licensed mental health practitioner	457	69%
	Licensed professional counselor	212	32%
	Licensed independent mental health practitioner	191	29%
	Licensed master social worker	127	19%
	Licensed alcohol and drug counselor	124	19%
	Psychologist	98	15%
	Doctor of medicine/doctor of osteopathic medicine	45	7%
	Advanced practice registered nurse	21	3%
	Licensed marriage and family therapist	20	3%
	Compulsive gambling counselor	11	2%
	Physician assistant	5	1%
	Certified master social worker	1	0%
Practice setting (n=648)	Outpatient	447	69%
	Educational	60	9%
	Inpatient/residential	51	8%
	Correctional	33	5%
	Federal facility	22	3%
	Other	35	5%
Urban to rural continuum (n=666)	Counties in metro areas of 250 000–1 million population	467	70%
	Counties in metro areas of fewer than 250 000 population	2	0%
	Urban population of 20 000 or more, adjacent to a metro area	7	1%
	Urban population of 20 000 or more, not adjacent to a metro area	122	18%
	Urban population of 2500–19 999, adjacent to a metro area	14	2%
	Urban population of 2500–19 999, not adjacent to a metro area	38	6%
	Completely rural or <2500 urban population, not adjacent to a metro area	16	2%
Current sharing method (n=630)†	Fax	570	91%
	Phone	527	84%
	Mail	518	82%
	Email	214	34%
	Electronic behavioral health records system	63	10%
	Rely on others to do it for me	89	14%
	Other	37	6%
Hours per week seeing patients at primary practice site (n=595)	1–10	91	15%
	11–20	155	26%
	21–30	175	29%
	31–40	115	19%
	40+	59	10%

*The total number of license types reported exceeds the sample size because most behavioral health professionals maintain more than one license type.
†The total current means of sharing client behavioral health information exceeds sample size because most behavioral health professionals reported using multiple means of sharing information.

interpreted as beliefs that HIE would: (1) Improve care and communication, (2) Add cost and time burdens, (3) Present access and vulnerability concerns, and (4) Impact workflow and control (positively and negatively). Because the purpose of the study was to identify practical benefits and barriers, the factors were named using applied terminology, rather than superimposing theoretical constructs, such as those in TAM. The Improve care and communication factor included only positively worded statements with which most providers agreed. The Add cost and time burdens and Present access and vulnerability concerns factors included mostly negatively worded statements with which respondents agreed. Since most responses agreed with the negative statements, both factor names were negatively named. The fourth factor, Impact workflow and control, included only positively worded statements, four of which had slight mean disagreement and three of which had slight mean agreement. Because of the mix of disagreement and agreement with the statements, the factor has a value neutral name.

Each factor had multiple variables with moderate to high loadings (>0.50), indicating reliable definition. The pattern matrix generated one multi-vocal item (*Improve privacy and security of confidential client information*). Three beliefs statements failed to load into the solution: *Be resisted by some providers* (mean 4.12, SD 0.73), *Negatively influence treatment plans* (mean 2.56, SD 0.97), and *Save costs for your practice in the long run* (mean 3.11, SD 1.10).

Benefits and barriers

To assess the contribution of beliefs about benefits and barriers to attitude toward HIE, a series of nested and non-nested

Table 2 Belief factor and loadings

Factor	Item Mean (SD)	Loadings 1	2	3	4
Factor 1: Improve care and communication					
Improve your access to client medical/physical health records	4.01 (0.86)	0.926	0.062	0.015	−0.099
Improve coordination of care among all providers working with the same client	4.07 (0.92)	0.925	0.073	0.043	0.013
Provide more complete information to help with your diagnoses and treatment planning	3.89 (0.98)	0.916	0.114	0.023	0.024
Lead to more complete client information	3.85 (0.96)	0.854	0.102	−0.088	−0.036
Improve your ability to track medication history	3.93 (0.89)	0.797	−0.035	0.085	−0.001
Improve your communication with other providers	3.81 (0.96)	0.768	−0.046	0.026	0.058
Streamline your access to client information/records	3.80 (0.94)	0.740	−0.069	0.008	0.094
Reduce duplicating client evaluations, assessments, or tests that have already been conducted by other providers	3.83 (1.03)	0.609	0.097	−0.001	0.200
Improve the quality of care your clients receive	3.25 (1.09)	0.423	−0.093	−0.035	0.326
Improve your clients' safety	3.07 (1.07)	0.400	0.091	−0.211	0.266
Factor 2: Add cost and time burdens					
Be difficult because your practice lacks the technological expertise to implement and maintain	3.08 (1.24)	0.148	0.838	0.052	0.069
Be time consuming for your practice to implement	3.40 (1.13)	0.078	0.818	−0.014	−0.063
Result in extra work for you on a daily basis	3.15 (1.11)	0.015	0.681	0.012	−0.142
Cost your practice too much to implement	3.24 (1.06)	0.068	0.676	0.212	0.014
Disrupt your own work flow	2.88 (1.10)	−0.076	0.671	0.036	−0.101
Require more training than you have time for	2.95 (1.10)	−0.053	0.662	0.141	0.083
Be resisted by staff at your practice	3.56 (1.13)	0.082	0.488	0.215	−0.048
Be difficult for you due to your apprehensions about computer technology	2.47 (1.23)	−0.027	0.465	0.226	0.130
Increase the time your practice spends on transcriptions	3.09 (1.08)	−0.012	0.449	0.105	−0.110
Factor 3: Present access and vulnerability concerns					
Be misused by third party payers	3.48 (1.02)	0.160	0.014	0.727	−0.172
Increase your legal vulnerability	3.47 (1.04)	0.011	0.026	0.655	−0.133
Force you to use an overly templated behavioral health record	3.30 (1.02)	0.011	0.168	0.629	−0.011
Compromise your professional ethics	2.76 (1.15)	−0.271	0.076	0.581	0.061
Make you become too reliant on technology that could crash	3.32 (1.14)	−0.017	0.265	0.535	0.075
Be resisted by clients	3.13 (0.99)	−0.040	0.194	0.461	−0.050
Disrupt your relationships with your clients	2.58 (1.02)	−0.329	0.244	0.452	0.131
Be impractical because behavioral health information cannot be captured by checkboxes and dropdown lists	3.13 (1.15)	−0.103	0.261	0.441	0.020
Result in more data entry errors in client records	2.97 (0.93)	−0.069	0.309	0.408	0.039
Improve privacy and security of confidential client information	2.52 (1.10)	−0.036	0.175	−0.611	0.519
Factor 4: Impact workflow and control					
Improve your ability to control who has access to your clients' information	2.53 (1.15)	−0.109	0.224	−0.372	0.715
Improve your practice's office work flow	3.14 (1.06)	0.206	−0.277	0.156	0.575
Improve your practice's billing accuracy	3.02 (1.03)	0.188	0.132	−0.067	0.529
Create more time for client care	2.94 (1.10)	0.077	−0.319	0.161	0.523
Improve privacy and security of confidential client information	2.52 (1.10)	−0.036	0.175	−0.611	0.519
Improve your clients' satisfaction with the admissions process	3.06 (1.00)	0.225	−0.073	−0.030	0.490
Reduce the time you spend on paperwork	2.94 (1.15)	0.121	−0.331	0.092	0.474

Likert scaled responses were: 1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree.

multiple linear regressions were conducted. A full model including all four belief factors accounted for 71% of the variance of scores of attitude toward HIE (R^2 of 0.71, $F(4,558)=347.23$, $p<0.001$) (table 3). All four belief factors were significant contributors to the model ($p<0.001$). When the full model was compared to a benefits model (factors 1 and 4) or a barriers model (factors 2, 3, and 4), neither performed as well (benefits model: R^2 of 0.63, $F(2,558)=77.17$, $p<0.001$; barriers model: R^2 of 0.67, $F(1,558)=85.75$, $p<0.001$) (table 3).

The benefits model was tested against the barriers model, using Hotelling's t test for non-independent correlations. The barriers model accounted for significantly more variance among support of HIE than did the benefits model (t (562)=2.47, $p<0.05$). The results suggest that accounting for providers' benefits and barriers beliefs results in the best model for predicting attitude, and that barriers may be particularly important. A regression of beliefs along with demographic/professional information (ie, age, computer self-efficacy, previous satisfaction with EHRs, and practice setting) performed no better than the beliefs only model: R^2 of 0.72, $F(12,278)=58.22$, $p<0.001$.

Provider clusters

The analysis resulted in a two cluster model (table 4). The largest cluster (67%) comprised respondents with positive beliefs about HIE. The most important belief factor for this cluster was: strong agreement that HIE would Improve care and communication, skepticism that HIE would Add cost and time burdens, belief that HIE would positively Impact workflow and control, and moderate concerns that HIE would Present access and vulnerability concerns. This group was named *Positives* because they were mostly positive about the impact of HIE. The smaller cluster (33%) had negative beliefs about HIE. For this group the most important belief was that HIE would Add cost and time burdens, followed by strong beliefs that HIE would Present access and vulnerability concerns, concern that HIE would negatively Impact workflow and control, and some skepticism that EHRs would Improve care and communication. This group was named *Negatives*.

The two clusters diverged significantly on age (Positives were younger (mean 50.36 years old) than Negatives (mean 54.85 years old), $F(1,562)=20.76$, $p<0.001$, MSE 120.33); confidence in computer skills (Positives were more confident (mean 28.58) than Negatives (mean 22.46), $F(1,553)=100.99$, $p<0.001$, MSE 44.90); and previous satisfaction with EHRs (Positives had better past experiences (mean 3.72) than Negatives (mean 2.50), $F(1,308)=99.89$, $p<0.001$, MSE 0.852). Providers who rated themselves as having a more positive attitude toward HIE (mean 4.23) were more likely to be in the Positives group than were providers having a more negative attitude (mean 2.02) ($F(1,561)=779.85$, $p<0.001$, MSE 0.78). Practice setting had a relationship to cluster membership (X^2 (5)=18.10, p=0.003); however, the only significant difference within the group were corrections providers, fewer of whom were in the Negatives group than was expected. Several variables did not have a significant relationship to the cluster membership: gender (X^2 (1)=0.79, p=0.43), professional license (X^2 (5)=2.78, p=0.734), and measures of rurality (Rural Urban Community Area Code: X^2 (14)=21.08, p=0.100; Urban Influence Code: X^2 (7)=6.17, p=0.520; Rural Urban Continuum Code X^2 (6)=3.75, p=0.711).

Table 4 Two cluster belief solution with factors in order of importance

Cluster 1: Positives 67.4%	Cluster 2: Negatives 32.6%
Factor 1: Improve care and communication (mean 4.32)	Factor 2: Add cost and time burdens (mean 4.14)
Factor 2: Add cost and time burdens (mean 2.48)	Factor 3: Present access and vulnerability concerns (mean 5.22)
Factor 4: Impact workflow and control (mean 5.17)	Factor 4: Impact workflow and control (mean 3.65)
Factor 3: Present access and vulnerability concerns (mean 3.69)	Factor 1: Improve care and communication (mean 2.91)

DISCUSSION

The results of this study fill a gap in knowledge about the factors that shape behavioral health providers' attitudes toward HIE. Overall, four factors emerged about behavioral health providers' beliefs that HIE will: (1) improve care and communication, (2) add cost and time burdens, (3) present access and vulnerability concerns, and (4) impact workflow and control. A cluster analysis of provider factor scores returned a two cluster solution, with one larger group having more positive attitudes and a second smaller group having more negative attitudes.

The four factors identified in this study are similar to themes identified in two previous studies of behavioral health providers. A previous qualitative study identified three theme areas representing both positive and negative comments, with four areas predominating: benefits to quality of care, barriers concerning privacy and security, and benefits and barriers to delivery of services.[46] The current study's four factors closely resemble the previous study's results, with the Improve care and communication factor reflecting Benefits to quality of care, the Present access and vulnerability concerns factor reflecting Barriers

Table 3 Factor descriptive statistics and nested regression model testing the contribution of benefits and barriers beliefs

Variables	Mean (SD)†	Factor score range†	Full-beliefs model	Benefits model	Barriers model
Factor 1: Improve care and communication	3.86 (0.93)	0.44–5.35	0.50***	0.81***	
Factor 2: Add cost and time burdens	3.02 (1.05)	0.53–5.48	−0.26***		−0.36***
Factor 3: Present access and vulnerability concerns	4.19 (1.02)	1.50–6.77	−0.36***		−0.48***
Factor 4: Impact workflow and control	4.68 (1.02)	2.16–7.36	0.20***	0.40***	0.39***
Regression and significance			$F(4,558)=347.23$, $p<0.001$	$F(2,560)=485.28$, $p<0.001$	$F(3,559)=377.20$, $p<0.001$
R^2			0.71	0.63	0.67
Change in R^2 from full-beliefs model				$F(2,558)=77.17$, $p<0.001$	$F(1,558)=85.75$, $p<0.001$

*p<0.03, ***p<0.001.
†Factor scores were obtained by multiplying the least squares weights by respondents' scores and therefore vary from the original 1 to 5 Likert scale of the individual questions.

concerning privacy and security, the Add time and cost burden and Impact workflow and control factors reflecting Barriers to delivery of services, and the Impact workflow and control factor also reflecting Benefits to delivery of services. The current study's larger sample size provides validation of themes identified in the smaller, qualitative study. The nine factors identified in the study of psychiatric clinicians[48] mentioned above exhibited fewer similarities with the current study, with: the Improve care and communication factor relating to Data enrichment; Add cost and time burdens relating to Data efficiency; Present access and vulnerability concerns relating to Data security; and Impact workflow and control relating to Data security and Data efficiency. Of the six factors that did not appear to directly relate to those in the current study, four focused on post-adoption behavioral changes (ie, Data erosion, Xenophobia, Recording precautions, Personal acceptability). The current study did not ask questions about expected post-adoption behaviors, but given results that confidentiality is a central concern prior to adoption, it may provide a rationale for the post-implementation behaviors identified in the post-implementation study. The previous study's remaining two factors indicate skepticism that EMRs will impact stigma of mental illness (ie, Data sensitivity), and documented that confidentiality is a strongly held professional principle (ie, Personal importance of confidentiality). It is likely that these two factors did not emerge as questions for the survey from elicited benefits and barriers because providers did not believe there would be changes to either stigma or their personally held views about confidentiality as a result of HIE.

Comparison of the results of this study and a recent study in Massachusetts of physicians' attitudes concerning the impact of HIE, suggests that behavioral health providers have differing patterns of beliefs than do medical providers.[4] Over three-quarters of the medical providers believed that HIE would result in time savings. Behavioral health providers appear to be less certain of time savings than medical providers: concerns about cost and time burdens were particularly important to those in the Negative cluster (Negatives, mean 4.14; Positives, mean 2.48). Almost three-quarters of physicians believed that HIE would have a positive effect on reducing healthcare costs. The present study included one question about healthcare cost savings with behavioral health providers reporting ambivalence about HIE's role in saving costs for practices. Continuing with the Massachusetts study, 71% of physicians were concerned about privacy and security; however, of that number, only 16% indicated that they were very concerned, leading the study's authors to conclude that privacy and security was not a major issue. This finding is similar to most previous research on medical providers that has found only mild concerns about privacy and security among medical providers.[4 9 12] In one notable exception, however, primary care physicians in small practices did cite security and privacy concerns as a barrier to participating in EHRs.[68] The current study included three statements about privacy and security. Two of the statements (Improve privacy and security of confidential client information, and Improve your ability to control who has access to your clients' information) were among those with which behavioral health providers most strongly disagreed. This finding is consistent with the existence of higher standards for confidentiality in behavioral healthcare as well as with the views of those who have suggested that behavioral health providers have greater concerns about privacy and confidentiality.[48 69–71] Unless providers have assurance that protections are in place, it may be expected that they will be reluctant to use HIE. Finally, similar to the current study, most physicians (86%) in the Massachusetts study believed that HIE would improve quality of patient care.[4]

To accelerate adoption and use of EHRs and HIE, the American Recovery and Reinvestment Act (2009) provides incentives of up to $63 750 to eligible providers who meaningfully implement EHRs.[72] Among behavioral health providers, only those who are prescribers (ie, psychiatrists, nurse practitioners, and physician assistants) are eligible for incentives. Prescribers comprise, by far, the smallest proportion of behavioral health providers, therefore dampening the possible impact this program has had in behavioral health. Office-based electronic records cost $25 000–$45 000 per provider to implement and $3000–$17 100 per provider to maintain, and have greater financial impacts on smaller offices.[68 73 74] Disproportionate impact on smaller offices is especially relevant in behavioral health since most psychiatrists and psychologists report individual practices as their primary or secondary employment setting.[73 75] Similar incentives may be needed to enable behavioral health providers to participate in HIE, particularly among those in the Negatives cluster for whom concerns about Added time and costs burdens were the most important factor.

LIMITATIONS

There are a number of limitations to this study. First, the response rate, despite use of the Dillman method, was low at 33%.[57] The sample was not significantly different from the population on gender, age, practice setting, and many professional licensure categories, which may assuage some concerns about the representativeness of the sample. Second, some variables that would have been of interest were not collected. For example, it is known that smaller medical practices lag in adoption of EHRs.[16] It would have been illuminating to have been able to relate size of practice to the results. Third, this study focused on beliefs about HIE, but did not take the next step in assessing the value of these beliefs in predicting actual use. A relationship would be expected, based on TAM, but this study does not test that relationship.

CONCLUSION

The factors identified in this study present actionable insights that may increase awareness about the unique beliefs behavioral health providers have about HIE.[76] Behavioral health providers are receptive to HIE, but believe it may present access and vulnerability concerns and will add cost and time burdens. The inclusion of behavioral health information in HIE is desired and needed for all providers to have complete information.[19] This study suggests that perceived barriers are preventing behavioral health providers from taking advantage of the benefits that they expect.

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