Psychosocial Health, e-Health Literacy, and Perceptions of e-Health as Predictors and Moderators of e-Health Use Among Caregivers of Children with Special Healthcare Needs

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Abstract

Objectives: In this study, we explored the relationships between the psychosocial health of caregivers of children with special healthcare needs and their e-health use. Additionally, the analysis examined moderating effects of a caregiver's perceptions of e-health and his or her e-health literacy on the associations among four domains of psychosocial health and e-health use. Materials and Methods: To date, 313 caregivers of children, 12–18 years of age, with special healthcare needs have been recruited. Covariate-adjusted multivariable regressions determined associations between psychosocial health domains of caregivers and e-health use. E-health literacy and perceptions of e-health were further tested as moderators of the relationship between psychosocial health and e-health use. Results: Among the caregiver population, 31% had problems with social functioning, 36.1% with communication, 43.3% with family relationships, and 46.3% with worrying for their child. After adjusting for demographic variables, e-health use was associated with poorer levels of social functioning, communication, worry, and family relationship. E-health use was also associated with e-health literacy. Perceptions of e-health significantly moderated the relationships among social functioning, communication, and e-health, with the relationship being significantly stronger in caregivers with more positive perceptions of e-health. Conclusions: Caregivers of children with special healthcare needs have notable levels of psychosocial challenges and those challenges are associated with their e-health resource seeking. Although e-health interventions, including ones that focus on child health education and caregiver support, may be the future of healthcare, a concerted effort is needed to educate caregivers about the benefits of e-health.

Introduction

The application of information and communications technologies in healthcare has grown exponentially over the last decade, and its potential to improve effectiveness, efficiency, and knowledge is recognized worldwide.[1,2] The benefits of e-health use, defined as the use of health services and information disseminated through the Internet and related technologies,[3] is potentially significant among caregiver populations, especially those who are caregivers for children with special healthcare needs (CSHCNs). Previous research documents that many caregivers of CSHCNs turn to e-health to satisfy their need for information and social support[4]; however, there is scant research investigating the psychosocial contexts in which they use e-health.

CAREGIVER PSYCHOSOCIAL HEALTH AND USE OF E-HEALTH

There is evidence suggesting that caregivers face high levels of emotional stress[5]; incidences of anxiety and depression are higher among caregiver families, including those adapting to caring for a CSHCN, than in the general population.[6] Caregivers of CSHCNs' preoccupation with the child's functional limitations, chronic illnesses, and possible long-term dependence may distract them from focusing on their own psychosocial care and well-being.[7] Literature on examining the associations between psychosocial health and e-health use/behaviors among caregivers of CSHCNs is scarce; however, there are some indications suggesting that psychosocial factors may affect an individual's general online use and behaviors and that individuals who have worse psychosocial health prefer online social interactions[8] and thus can act as a part of the psychosocial adaptation process for caregivers.[9,10] Recent studies further suggest that caregivers of children are also more likely than caregivers of adults to want information

related to their own well-being, particularly time and stress management,[4] and as a part of a coping strategy.[11–13] Perceived benefits of online support and e-health use for caregivers of CSHCNs have included getting information, sharing experiences that might not be shared with their own families,[4,14] management of psychosocial problems,[15] and, lastly, attaining greater control over the amount and type of social support.[9,16]

Additionally, while there is little empirical research examining a CSHCN caregiver's psychosocial health and his or her e-health use/behaviors, there is also no available literature examining the mechanisms or factors through which a caregiver's psychosocial health affects his or her e-health use/behaviors. Two such mechanisms explored in this study are a caregiver's e-health literacy and his or her perceptions of e-health.

E-HEALTH LITERACY

The potential role of electronic technologies in providing support and information to caregivers of CSHCNs is great, but they will be of little value if the intended user lacks the skills to effectively engage with them. Nearly half the adult population in the United States have literacy levels below what is needed to fully engage in an information-rich society.[17] E-health literacy has been defined as the ability to seek, find, understand, and appraise health information from electronic sources and the extent to which individuals have context-specific and analytical skills needed to successfully navigate online health information.[18] In a population such as caregivers of CSHCNs, the need to navigate the Internet with confidence is particularly important for health issues where the consequences for using low-quality, misleading, or false information are great.[3]

PERCEPTIONS OF E-HEALTH

User perceptions of e-health (i.e., the usefulness and fit with everyday life[19]) is another potential factor in engagement with e-health but has not been the subject of much research. Several studies have linked positive perceptions of the Internet with increased online information gathering,[20–22] and individuals with depressive symptoms can perceive Internet communities as being more useful in providing information and support than other traditional modes of information seeking such as face-to-face interactions with providers or peers.[23] Some studies have further reported that individuals with depressive symptoms who are avid users of Internet communities experience

offline improvement in their mental health from the online support.[24]

Therefore, this analysis posits two hypotheses:

H1. A caregiver's psychosocial health will predict his or her e-health use. Specifically, those with lower psychosocial health will have higher e-health use.

H2. The effect of psychosocial health on e-health behaviors may have a differential impact on caregivers based on their e-health literacy and their perceptions of e-health.

The hypothesized model of the moderation effects is given in *Figure 1*. In this model, the relationship between e-health technology usage and a caregiver's psychosocial well-being is expected to be different at different levels of e-health literacy and perceptions of e-health.

Materials and Methods
SAMPLE RECRUITMENT

The Teen Literacy in Transition Study (TeenLit) recruits children 12–18 years of age with chronic health illness and their primary caregivers using a two-stage process. First, a query of claims data from a large pediatric Medicaid accountable care organization is used to identify teens, 15–18 years old, with one of 15 diagnoses most commonly found among CSHCNs. Families of potentially eligible teens with chronic illness are sent a letter offering them the opportunity to opt out of being contacted about the study by notifying the study staff. The opt-out rate for the initial sample from claims data for Years 1, 2, and 3 is less than 1%. Households who did not opt out were then contacted via telephone to ascertain interest in the study.
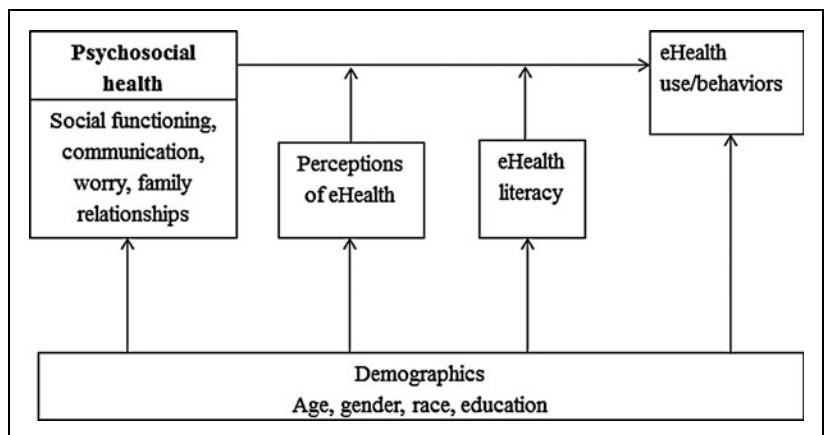
Fig. 1. Theorized model of the relationship among psychosocial factors, e-health literacy, perceptions of e-health, and e-health use/behaviors.

Fig. 2. E-Health Literacy Scale items.

Of households from the original accountable care organization sample, excluding those who opted out, 38.4% were reached via telephone. During the call, the study and inclusion criteria were discussed with the caregiver. Eligibility was confirmed only if the child's age at call remained within the study criteria and if the adolescent met the definition of CSHCN based on screening with the Questionnaire for Identifying Children with Chronic Conditions,[25] which is an interviewer-administered instrument used to identify children with chronic or disabling conditions consisting of 16 item sequences. Each sequence starts with an initial question that asks if a child has a specific healthcare experience (e.g., use of prescription medication, use of specialized therapy). If the response is yes, the respondent is asked whether the condition is caused by a medical, behavioral, or other health condition and if the experience with healthcare is expected to last more than a year. Adolescents are considered to have a special healthcare need if they answered "yes" to any stem and its two follow-up questions.[26] To date, 37.7% of families reached via telephone have chosen to participate.

Reasons for nonparticipation included parents and teens who had a busy schedule, parents saying that their teen is over 18 years of age, parents who were not interested in participating, the teen having a medical emergency, or the family currently experiencing an emergency situation.

The survey interviews with the teen and their healthcare-responsible parent/caregiver were conducted in either a clinical facility or in the participant's home or community. To date, 313 caregivers of CSCHNs (15 males and 298 females) have been recruited in the study. All elements of the study have been approved by the organization's Institutional Review Board.

MEASURES

Demographics. Demographic information collected from each caregiver included gender, race (summarized for this analysis as white and nonwhite), age, and education. Ages were collapsed into six ranges (<30 years, 30–40 years, 41–50 years, 51–60 years, 61–70 years, and >70 years) and were coded from 1 to 6. Caregiver education ranged from "no high school diploma" to "graduate/professional training (Master's, Doctorate)" and was subsequently coded from 1 to 5. These factors have been previously linked with both e-health use and psychosocial health[27–29] and were included in the model as statistical controls.

E-health literacy. Caregiver e-health literacy is assessed using the e-Health Literacy Scale (e-HEALS).[18] e-HEALS is the only validated instrument available to measure e-health-related skills.[30] e-HEALS is a self-report tool that is based on an individual's perception of his or her own skills at navigating e-health and is designed to provide a general estimate of e-health-related skills. The scale items consist of eight 5-point Likert items where responses range from "strongly disagree" to "strongly agree." Individual items for the scale are provided in *Figure 2*. The scale has an internal consistency

Fig. 3. PedsQL Family Impact module scale items for social functioning, communication, worry, and family relationships.

of 0.88 among participants 13–21 years old.[18] Responses to each item were averaged into a composite scale ranging from 1 to 5, with higher scores reflecting higher levels of e-health literacy. Respondents who scored above 3 in the final composite scale were categorized as having adequate e-health literacy.

Perceptions of e-health. Perceptions of e-health were assessed using two Likert items: (1) "How useful do you feel the Internet is in helping you in making decisions about your health (response categories—not useful at all, not useful, unsure, useful, very useful), and (2) "How important is it for you to be able to access health resources on the Internet" (response categories—not important at all, not important, unsure, important, very important). The responses were averaged into a composite score ranging from 1 to 5, with higher scores reflective of more positive perceptions of e-health among caregivers.

Psychosocial well-being. The TeenLit survey measures the caregiver's psychosocial well-being via the PedsQL™ Family Impact Module.[31] The module was designed to measure the impact of pediatric chronic health conditions on parents and the family. *Figure 3* provides individual items for each module (social functioning, communication, worry, and family relationships). Item responses ranged from "never" and "Almost never" to "sometimes," "often," and "always." The responses were collapsed into composite scales for each psychosocial domain where scores ranged from 1 to 5. Internal consistency has been previously demonstrated for each domain in the module and has ranged from 0.82 to 0.97.[31] Higher scores on the scales reflect poorer social functioning, worse communication, greater anxiety/worry among the caregivers, and increased problems with family relationships among respondents.

e-Health use/behaviors. The TeenLit survey measures several proactive online behaviors among caregivers. The items assessed are listed in *Figure 4*. Each e-health task was coded as a dichotomous item (response category "yes/no"). These items were summed to create an e-health

behavior scale where scores ranged from 0 to 20. The internal consistency for the scale in our analysis was $\alpha = 0.87$.

DATA ANALYSIS

Descriptive statistics were used to examine participant characteristics, psychosocial health, perceptions of e-health, e-health literacy, and e-health use/behaviors by demographic variables. The *t* test and Pearson product-moment correlations were conducted to determine differences based on gender, race, age, or education for the population's psychosocial health, e-health perceptions, e-health literacy, and e-health use. We used Pearson product-moment correlation analysis to determine directionality and strength of relationships between the four psychosocial domains (social functioning, communication, worry, family relationships, and the three domains of e-health (perceptions, literacy, and use). Additional multivariable regression models were further computed to determine the associations between the four psychosocial health domains and e-health use/behaviors while statistically controlling for demographic covariates. The Hayes PROCESS macro (Model 2, release 120504) was used for the moderator

1.	Signed up to receive email updates or alerts about health or medical issues
2.	Read someone else's commentary or experience about health or medical issues on an online news group, website or blog
3.	Watched an online video about health or medical issues
4.	Gone online to find others who might have health concerns similar to yours
5.	Tracked your weight, diet or exercise routine online
6.	Tracked any other health indicators or symptoms online
7.	Posted comments, questions or information about health or medical issues in an online discussion, a listserv, or other online group forum
8.	Posted comments, questions or information about health or medical issues on a blog
9.	Posted comments, questions or information about health or medical issues on a social networking site such as Facebook, MySpace, or LinkedIn
10.	Posted comments, questions or information about health or medical issues on Twitter or another status update site
11.	Posted comments, questions or information about health or medical issues on a website of any kind, such as a health site or news site that allows comments and discussion
12.	Used social networking sites like Facebook and MySpace to start or join a health-related group
13.	Used social networking sites like Facebook and MySpace to follow your friends' personal health experiences or health updates
14.	Used social networking sites like Facebook and MySpace to raise money or draw attention to a health-related issue or cause
15.	Used social networking sites like Facebook and MySpace to remember or memorialize others who suffered from a certain health condition
16.	Consulted online rankings or reviews of doctors or other providers
17.	Consulted online rankings or reviews of hospitals or other medical facilities
18.	Consulted online reviews of particular drugs or medical treatments
19.	Posted a review online of a doctor
20.	Posted a review online of a hospital
21.	Posted your experiences with a particular drug or medical treatment online

Fig. 4. E-health use/behavior scale items.

				E-HEALTH USE/ BEHAVIORS	PEDSQL FAMILY MODULE SCALES			
		E-HEALTH LITERACY	PERCEPTIONS OF E-HEALTH		SOCIAL FUNCTIONING	COMMUNICATION	WORRY	FAMILY RELATIONSHIPS
CHARACTERISTIC	N (%)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Gender								
Male	15 (4.79)	3.63 (0.70)	3.83 (0.74)	2.20 (1.86)	1.63 (0.89)	1.76 (0.93)	1.96 (0.80)	1.92 (0.86)
Female	298 (95.21)	3.51 (0.88)	3.62 (1.04)	4.26 (2.20)	2.09 (1.01)	2.18 (1.04)	2.59 (0.99)	2.45 (1.08)
Race								
White	210 (67.09)	3.49 (0.88)	3.64 (1.00)	4.35 (2.33)	2.09 (1.04)	2.27 (1.08)	2.62 (0.99)	2.47 (1.06)
Nonwhite	103 (32.91)	3.55 (0.87)	3.63 (1.07)	3.77 (1.73)	2.04 (0.94)	1.93 (0.92)	2.46 (0.98)	2.33 (1.08)
Age (years)								
<30–40	140 (44.73)	3.63 (0.83)	3.70 (0.99)	4.93 (2.13)	2.03 (1.02)	2.26 (1.08)	2.67 (0.99)	2.48 (1.04)
41–60	154 (49.20)	3.48 (0.88)	3.60 (1.03)	3.79 (2.17)	2.13 (1.01)	2.07 (0.99)	2.48 (0.99)	2.38 (1.13)
61 to >70	19 (6.07)	2.93 (0.94)	2.97 (1.05)	1.53 (2.25)	1.89 (0.89)	2.11 (1.07)	2.51 (0.95)	2.47 (0.85)
Education								
No HS	34 (10.86)	3.1 (0.98)	3.30 (1.21)	2.44 (3.29)	2.19 (0.98)	2.23 (0.98)	2.52 (0.77)	2.68 (1.08)
HS or GED	82 (26.20)	3.35 (0.78)	3.51 (0.99)	3.90 (2.82)	2.04 (0.93)	2.17 (1.03)	2.55 (1.07)	2.33 (1.05)
Some college and above	197 (62.94)	3.65 (0.87)	3.74 (0.99)	4.57 (3.33)	2.07 (1.03)	2.14 (1.06)	2.58 (0.99)	2.42 (1.08)
Total	313 (100)	3.51 (0.88)	3.63 (1.03)	4.16 (2.14)	2.07 (1.0)	2.16 (1.04)	2.56 (0.99)	2.43 (1.07)

Table 1. Sample Demographics and Descriptive Statistics of Caregivers with Children with Special Healthcare Needs

Data are mean (standard deviation) values unless indicated otherwise.

HS, high school.

analysis[32] to examine moderated effects of e-health literacy and caregiver perceptions of e-health on the relationships between psychosocial health domains and e-health use/behaviors controlling for demographic characteristics of the caregivers (age, sex, race, and education). The number of participants varied slightly in some analyses due to missing information. Statistical significance was set at 0.05, and SAS version 9.3 software (SAS Institute, Cary, NC) was used for all analyses.

Results

SAMPLE DESCRIPTION

Caregivers in this sample had a skewed gender distribution where over 90% were female and over 84% were the biological mother of the index child. The sample was 67.1% white, less than 1% Asian, 27.8% black, and 3.5% other or biracial. Almost 50% were between ages of 41 and 60 years, and 62.9% had some college education. Of the sample, 58.1% had adequate e-health literacy, and more than 57% agreed or strongly agreed that the Internet is useful and important in finding health resources and making health decisions. Additionally, 31.1% of our caregiver population sometimes, often, or almost always had problems with social functioning, with communication (36.1%), with family relationships (43.3%), and with worrying for their child (46.3%). *Table 1* further provides mean scores for e-health literacy scale, perceptions of e-health, e-health use/behaviors, and psychosocial domains for the sample. Analyses with the *t* test revealed that only being white was associated with worse scores on the communication domain ($t_{311} = -2.73$, $p = 0.007$), whereas older age was associated with lower scores on the e-HEALS ($r = -0.185$, $p = 0.001$), low positive perceptions of e-health ($r = -0.174$, $p = 0.002$), and lower e-health use/behaviors ($r = -0.222$, $p < 0.001$). Similarly, higher education was associated with higher scores on e-health literacy ($r = 0.211$, $p = 0.001$), high positive perceptions of e-health ($r = 0.185$, $p < 0.001$), and higher e-health use/behaviors ($r = 0.169$, $p = 0.003$).

Table 2. Correlations Among Measures of Psychosocial Health, e-Health Behaviors, e-Health Literacy, and Perceptions of e-Health

	(1)	(2)	(3)	(4)	(5)	(6)
(1) e-Health literacy	–	–	–	–	–	–
(2) Perceptions of e-health	0.545[b]	–	–	–	–	–
(3) e-Health use/behaviors	0.479[b]	0.475[b]	–	–	–	–
(4) Social functioning	−0.044	0.0825	0.156[b]	–	–	–
(5) Communication	−0.059	0.136[a]	0.138[a]	0.737[b]	–	–
(6) Worry	−0.026	0.163[b]	0.224[b]	0.584[b]	0.731[b]	–
(7) Family relationships	−0.061	0.126[a]	0.140[a]	0.627[b]	0.656[b]	0.596[b]

[a]$p < 0.05$, [b]$p < 0.001$.

ASSOCIATIONS AMONG VARIABLES

Table 2 presents correlations among the primary study variables. Modest significant correlations among the e-health variables (e-health literacy, perceptions of e-health, and e-health use/behaviors) ranging from 0.475 to 0.545 were found. This is consistent with prior studies that found significant associations among level of motivation, degree of engagement, and uptake of e-health resources.[19] Correlations among the measures of psychosocial health (PedsQL Family Impact Module) are also presented in *Table 2*, and consistent with previous literature, the subscales of the module were moderately related.[31] Also consistent with a prior study,[8] the psychosocial measures related to e-health use/behaviors with significant but low correlations (ranging from 0.138 to 0.224), suggesting that the caregivers with poorer psychoso-

Table 3. Regression Results for Four Psychosocial Domains of the PedsQL Family Impact Module and e-Health Use/Behaviors Among Caregivers of Children with Special Healthcare Needs Controlling for Demographic Variables ($n = 297$)

DOMAIN[a]	B[b]	SE	P VALUE	ADJUSTED R^2
Social functioning	0.167	0.05	0.001	0.282
Communication	0.163	0.07	0.017	0.270
Worry	0.165	0.04	0.000	0.292
Family relationships	0.117	0.04	0.003	0.278

[a]Higher scores on domains reflect poorer health in the domain.

[b]Adjusted for race, age, education, and gender.

SE, standard error.

Table 4. Results from a Regression Analysis Examining the Moderation of Effects of e-Health Literacy and Perceptions of e-Health of the Social Functioning Domain (PedsQL Family Impact Module) on e-Health Use/Behaviors

	COEFFICIENT	SE	T	P
Intercept	−6.111	0.891	−2.114	0.035
Social functioning	−1.344	0.887	−1.515	0.131
e-Health literacy	1.747	0.622	2.807	0.005
Perceptions of e-health	−0.115	0.509	−0.226	0.822
(1) Social functioning × e-health literacy	−0.165	0.279	−0.589	0.556
(2) Social functioning × perceptions of e-health	0.656	0.246	2.666	0.008

The r^2 increase due to (1) = 0.001 ($p = 0.559$), due to (2) = 0.016 ($p = 0.008$), and due to (1) and (2) = 0.019 ($p = 0.014$). The analysis was adjusted for race, gender age, and education.

SE, standard error.

cial health have higher e-health use/behaviors than their counterparts.

HYPOTHESIS TESTING

H1. Caregivers with poor psychosocial health will have higher e-health use/behaviors. We conducted multivariable regression analysis to determine if significant associations between

Table 5. Results from a Regression Analysis Examining the Moderation of Effects of e-Health Literacy and Perceptions of e-Health of the Communication Domain (PedsQL Family Impact Module) on e-Health Use/Behaviors

	COEFFICIENT	SE	T	P
Intercept	−6.706	0.884	−2.325	0.021
Communication	−1.145	0.819	−1.397	0.164
e-Health literacy	1.709	0.616	2.773	0.006
Perceptions of e-health	0.097	0.52	0.186	0.852
(1) Communication × e-health literacy	−0.144	0.253	−0.569	0.569
(2) Communication × perceptions of e-health	0.530	0.241	2.203	0.028

The r^2 increase due to (1) = 0.001 ($p = 0.569$), due to (2) = 0.011 ($p = 0.028$), and due to (1) and (2) = 0.013 ($p = 0.060$). The analysis was adjusted for race, gender age, and education.

SE, standard error.

Table 6. Results from a Regression Analysis Examining the Moderation of Effects of e-Health Literacy and Perceptions of e-Health of the Worry Domain (PedsQL Family Impact Module) on e-Health Use/Behaviors

	COEFFICIENT	SE	T	P
Intercept	−4.328	0.321	−1.348	0.179
Worry	−1.145	0.819	−1.397	0.164
e-Health literacy	1.709	0.616	2.773	0.006
Perceptions of e-health	0.097	0.52	0.186	0.852
(1) Worry × e-health literacy	0.187	0.270	0.693	0.488
(2) Worry × perceptions of e-health	0.400	0.238	1.685	0.093

The r^2 increase due to (1) = 0.001 (p = 0.488), due to (2) = 0.006 (p = 0.093), and due to (1) and (2) = 0.016 (p = 0.040). The analysis was adjusted for race, gender age, and education.

SE, standard error.

psychosocial measures and e-health use remained after controlling for our demographic variables. *Table 3* presents the regression results from the analysis. Our results demonstrate that after controlling for demographic variables, associations between measures of psychosocial health and e-health use/behaviors remained significant. Poorer levels of social functioning (B = 0.166, t_{296} = 3.27, p = 0.001), communication (B = 0.163, t_{296} = 2.40, p = 0.017), worry (B = 0.165, t_{297} = 3.89, p < 0.001), and family relationship (B = 0.117, t_{296} = 3.01,

Table 7. Results from a Regression Analysis Examining the Moderation of Effects of e-Health Literacy and Perceptions of e-Health of the Family Relationships Domain (PedsQL Family Impact Module) on e-Health Use/Behaviors

	COEFFICIENT	SE	T	P
Intercept	−6.213	3.032	−1.348	0.041
Family relationships	−0.985	0.826	−1.092	0.234
e-Health literacy	1.522	0.657	2.314	0.021
Perceptions of e-health	0.207	0.555	0.373	0.709
(1) Family relationships × e-health literacy	−0.360	0.250	−0.144	0.886
(2) Family relationships × perceptions of e-health	0.406	0.233	1.742	0.083

The r^2 increase due to (1) = 0.000 (p = 0.886), r^2 increase due to (2) = 0.007 (p = 0.083), r^2 increase due to (1) and (2) = 0.009 (p = 0.128). The analysis was adjusted for race, gender, age, and education.

SE, standard error.

p = 0.003) predicted higher e-health use/behaviors. The measures also explained a moderate proportion of the variance in e-health use/behavior scores with r^2 values ranging from 0.270 to 0.292.

H2. The relationship between e-health technology usage and a caregiver's psychosocial well-being are moderated by e-health literacy levels and perceptions of e-health. The results from the moderation analyses (*Tables 4–7*) show that perceptions of e-health significantly moderated the relationships between social functioning and e-health use (interaction effect p = 0.008) and communication (interaction effect p = 0.028) and trended towards being significant for worry and family relationships (interaction effects p = 0.093 and p = 0.083, respectively). Although no significant moderation effect was found for e-health literacy, the factor remained a significant independent predictor in all e-health use/behavior models. In order to further probe the moderation effect of perceptions of e-health, the relationship between each psychosocial domain and e-health use stratified by perceptions of e-health (low versus high) was modeled. *Figure 5* presents the graphical representations of the stratified analysis. Overall, the relationship between psychosocial functioning and e-health use was notable in those with high/positive perception of e-health, but in those with low/negative perceptions of e-health the relationship was nearly nonexistent. Thus, although e-health literacy is a significant independent predictor of e-health use, perceptions of e-health moderate relationships between psychosocial health and e-health use where individuals with poorer psychosocial health who have high/positive perceptions of e-health are more likely to use e-health technologies than their counterparts with low/negative perceptions of e-health.

Discussion

Our seminal study builds on a small but growing literature on the psychology of e-health use, and results demonstrate that poorer caregiver psychosocial health is independently associated with increased e-health use, after adjusting for common sociodemographic factors. Caregivers, in general, are high users of online health information[4]; our findings suggest that they are more so when faced with diminishing psychosocial health. The findings further extend the literature by documenting the moderating perceptions of e-health on use behaviors, suggesting that e-health use among caregivers with psychosocial challenges is strongest for those with a positive perception of the e-health.

One of the main goals of e-health is to provide health-enhancing information and services to its users and attending
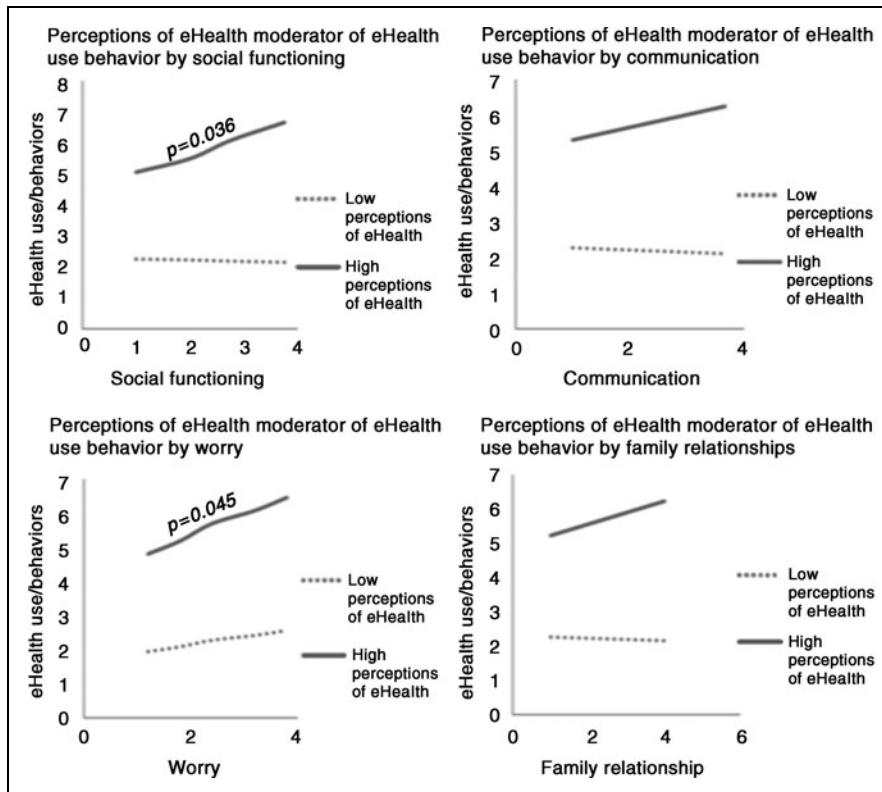
Fig. 5. Low and high perceptions of e-health moderator of the relationship between psychosocial domains and e-health use/behaviors. For slopes that were significantly different from zero or approached conventional levels of significance, the *p* value is given next to the slope. Psychosocial domains are depicted on the *x*-axis. Higher scores on the domains reflect poorer psychosocial health.

to questions can potentially improve a person's quality of life.[23] E-health-based interventions may provide added value in cases where individuals face difficulty functioning or communicating with others. However, e-health as an alternative healthcare resource is helpful only when people are able to use it and perceive it to be useful and important. Using e-health technology requires e-health literacy—the ability to read, use computers, search for information online, understand and synthesize health information from multiple sites, and put the information in context while making assessment on the trustworthiness of the content. These tasks are complex; our results demonstrate that caregivers who have high levels of e-health literacy are more equipped for these tasks and are therefore more capable and likely to use e-health. Similarly, a caregiver's perceptions of e-health will influence his or her level of acceptability of e-health as an alternative information and coping source and will, consequently, affect its rate of use. For example, some e-health interventions are not successful because participants see no health benefits for themselves in using e-health.[33] The findings from this

analysis support that maximizing population e-health literacy and e-health acceptance has the potential to expand use and possibly increase effectiveness of psychosocial services in a high-need population.

A few limitations of this study should be noted. First, the study was conducted in a chronically ill Medicaid population, and results may not be generalizable to a population with higher socioeconomic status. A caregiver population with higher socioeconomic status may have access to more expensive resources like therapy that a lower socioeconomic status caregiver may not. Second, we note that the e-health literacy scale (e-HEALS), despite being the most used measure of e-health literacy, is an incomplete measure of e-health literacy, and the reliability and validity of the scale have yet to be fully explored. Although the scale is reported to be unidimensional and is internally consistent, its validity may be questionable.[30] Additionally, although the perceptions of the e-health index were measured using two items that assessed how useful and how important e-health is to a caregiver of a CSHCN, more robust measures of the construct may have a more significant impact on the moderation effects. We also note that e-health literacy, perceptions, e-health use behaviors, and psychosocial health items were collected via self-report and can be subject to social desirability bias. Finally, although limited to a low socioeconomic status, Medicaid population, our study did not assess specific socioeconomic factors, such as time pressure or single income household status, that may be important and deserve inclusion in future studies.

Conclusions and Implications

To date, little research has explored the psychological states of caregivers of CSHCNs and their use of e-health or model mechanisms that affect these relationships. Findings from this study support the notion that parent health interventions should attend not only to parent e-health literacy and how caregivers perceive e-health, but also to psychosocial states of caregivers. An understanding of these variables will help target specific areas of vulnerability and help design more effective online interventions and e-health content. The results further underscore the importance of designing e-health

sites and interventions that are understood by caregivers at all health literacy levels. Additionally, although e-health may be a large part of the future of healthcare, there needs to be concerted effort by various agencies to educate caregivers about the benefits of e-health.

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