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Value co-creation in online healthcare communities: The impact of patients' reference frames on cure and care

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Abstract

The gradual transition of health care toward businesses during the past 50 years has converted passive patients into active customers. In our digital society, patients increasingly use online health communities to satisfy complex needs that healthcare professionals leave unmet, including the creation of cure-oriented (i.e., functional) and care-oriented (i.e., emotion) value. This research investigates patients' reference frames (self versus other) as an information processing mechanism and their impact on value creation in online communities. The analysis of 1,687 online postings of a leading healthcare platform shows that self-referencing is typical for information obtained through an individualistic, patient–doctor encounter; other-referencing emerges when patients focus on the needs of their peers. Information gathered through the patient–doctor encounter and processed with a self-referencing frame accordingly enhances cure-related value, but limits care-oriented value co-creation. Other-referencing does exactly the opposite: it creates a barrier to cure-related value, but stimulates care-related value. A patient's experience with the community largely moderates the impact of both self- and other-referencing on cure- and care-related value. These findings show that online health communities can identify and address unmet patient needs, but healthcare professionals still play a critical role in terms of ensuring information quality in online health communities.

KEYWORDS

healthcare communities, other referencing, self-referencing, value co-creation

1 | INTRODUCTION

In the twentieth century and certainly since the advent of the 1960s, especially in the more capitalist economies, health care has been viewed more and more as a business thereby increasingly considering patients as customers. Today in this twenty-first century, the digital nature of our economy provides consumers with access to a wealth of information and facilitates online interactions (Libai et al., 2010; Teichmann, Stokburger-Sauer, Plank, & Strobl, 2015). Many industries, from consumer goods to health care, rely on online communities as communication tools, co-creation platforms, or extensions to customer management systems (Alavi, Ahuja, & Medury, 2011; Blazevic & Lievens, 2008; Mahr & Lievens, 2012). For example, interactions in online communities can complement traditional, face-to-face healthcare encounters (Kivits, 2006); on the online health community, PatientsLikeMe.com, members share information and emotional support through online postings that pertain to their shared disease. Connecting to peers through forums or private messages also enables these patients to tap into collective knowledge about new treatments and coping strategies, which helps them manage their disease and

increases their adherence to treatment plans (Camacho, Landsman, & Stremersch, 2009).

Patients' reliance on online information to manage and understand their diseases has been accelerated by modern trends of increasing time constraints and rising healthcare costs, which force healthcare professionals to focus nearly exclusively on physical and medical treatments, rather than more complex patient needs (e.g., needs for empathy, comprehensible information, hands-on advice) (Johnson & Ambrose, 2006). Yet, patients seek both factual information about treatment (i.e., cure) and emotional support (i.e., care) (Apeosa-Varano, Barker, & Hinton, 2011; De Valck, Bensing, Bruynooghe, & Batenburg, 2001). By supporting patient-to-patient interactions, online health communities can provide both cure- and care-related value. In these communities, patients simultaneously fulfill roles as providers and recipients of healthcare content that meets both informational and emotional needs (McColl-Kennedy, Vargo, Dagger, Sweeney, & van Kasteren, 2012). Despite recognition of this potential of online health communities, the healthcare industry has struggled with their implementation (McKinsey & Co., 2014), perhaps largely because healthcare customers are ill and under stress, demand high credence services, and

require considerable attention, especially if they suffer chronic diseases (Berry & Bendapudi, 2007). Furthermore, since patients adopt an active attitude and share information with peers online, healthcare providers need to be agile and reflect on how their service is integrated in the customer's ongoing experience and activities that extend beyond the traditional service process. Novel services such as online communities are promising instruments that may affect the existing process. Hence, providers need insights in the functioning of online health communities in order to deliver a service that fits the customer's experience in their particular context (Heinonen et al., 2010).

To understand value creation in online communities, the current study examines mechanisms that steer patients' information processing, as manifested in their frame of reference (Reed, 2002). A patient enters a community with information about her or his individual situation, obtained from an encounter with a doctor, then shares this information as online postings about her or his own situation, or self-referencing (Silvia & Gendolla, 2001). The community context also encourages patients to focus on others and respond to their peers' postings though, such that they contribute value by referring to others' situation, or other-referencing. The "self" and "other" referencing mechanisms accordingly refer to different types of information processing performed by the patient who posts messages in the online community (Rogers, Kuiper, & Kirker, 1977). Self-referencing reflects information processing guided by a traditional, offline healthcare model; other-referencing suggests information processing that is directed by an emerging online model (Duval & Wicklund, 1972). Hence, the doctor encounter triggers a self-focus with a patient and thereby fosters the sharing of information via a self-referencing mechanism in the online community. The presence of others in a community context, however, encourages this patient to focus on the other participants and thereby provide advice by applying other-referencing in their postings. Both referencing types might coexist in an online posting, if patients shift their attention between their own and others' situations. Therefore, the current research examines the impact of the reference frame of a patient's online posting on cure- and care-related value co-creation.

By investigating this topic, the authors address calls for more research into the sharing of information in online communities among customers (Stokburger-Sauer & Wiertz, 2015) and increased understanding of value creation, especially for health care (Ostrom, Parasuraman, Bowen, Patrício, & Voss, 2015). This article makes three main contributions. First, it integrates service marketing theory regarding value co-creation with social psychology (self versus other) (Duval & Wicklund, 1972) and thereby creates new insights about how information gets processed and then translated into cure- and care-related value. The reference frame a patient adopts (i.e., self versus other) in online postings emerges as a crucial determinant of his or her information-processing mechanism and the nature of the value perceived by readers of the online posting. Second, this study adds to previous research on online communities by examining the effects of the community experience, capturing a potential temporal effect. Prior research on online communities has suggested some effects of experience on group cohesion (Ludwig et al., 2014) and performance (Postmes, Spears, & Lea, 1998); this study disentangles these effects,

depending on the patient's reference frame. Third, the setting of this research introduces a new type of online data that provide healthcare researchers and practitioners with novel opportunities for understanding patient-to-patient interactions. Online communities offer a more naturalistic, unobtrusive way to gather sensitive information and thereby lead to more valid results (Kozinets, 2002). Specifically, this study captures the linguistic features of individual online postings to measure information processing, as influenced by online and offline encounters (Pennebaker, Mehl, & Niederhoffer, 2003). In turn, both academics and healthcare practitioners may gain insights into how patients (1) experience online community interactions, (2) process information from a self and/or other perspective, and (3) create cure- and care-related value.

The next section offers a review of literature into value co-creation in online health communities and some hypotheses regarding the impact of self- and other-referencing. After the description of the methodology, this article presents the study findings, then concludes with a discussion and suggestions for further research.

2 | THEORETICAL FRAMEWORK: VALUE CO-CREATION IN ONLINE HEALTH COMMUNITIES

The concept of co-creation emphasizes the active role of customers in the creation of value (Prahalad & Ramaswamy, 2000). In healthcare contexts, value co-creation refers to "activities centered around the individual patient or in collaboration with members of the service delivery network including the patient, family, friends, other patients, health professionals and the outside community" (McCull-Kennedy et al., 2012, p. 6). Participation in a healthcare community constitutes an additional activity, carried out by patients, that adds value to the central patient-provider interaction (Hartmann, Wiertz, & Arnould, 2015). The emergence of web-based information tools and social technologies (e.g., blogs, wikis, social networking services, social bookmarking, collaborative filtering, file sharing) has created increasing opportunities to communicate across the borders of time and space and to support the co-creation of knowledge sharing networks (Sawhney & Prandelli, 2000). The fact that the majority of internet users check the internet before they visit their doctor (Pew Research Center, 2013) suggests that users draw on internet sources regardless of the (dis)approval of their doctor.

In a co-creation paradigm, customers are not passive recipients of products and services, but rather are active co-creators who integrate resources from diverse parties to create value (Prahalad & Ramaswamy, 2004b). Previous research into the impact of online health communities on offline behavior reveals their potential to foster collaboration and negotiation between patients and physicians (Keeling, Laing, & Newholm, 2015). The current research focuses instead on patient-to-patient interactions in online health communities, adopting a patient perspective, such that the focus is on value created by and for patients. Other parties such as doctors, nurses, hospitals, insurance providers, and informal caregivers serve as resources

for online healthcare community (OHC) members, who share information from and experiences about the other parties; hence, these diverse parties are indirectly involved in the co-creation process.

2.1 | Co-creation of cure- and care-related value in online health communities

According to social support research (Chronister, Johnson, & Berven, 2006; Cutrona & Russell, 1990; Mathwick, Wiertz, & De Ruyter, 2008; Nambisan, 2011), two generic types of value are created in online health communities: cure and care. Cure-related value refers to informational, cognitive content, defined by Cutrona and Rusell (1990, p. 322) as “guidance concerning possible solutions to a problem.” It has important implications, in that better informed and more knowledgeable patients are more inclined to take an active role in their healthcare management and implement treatment plans (Camacho et al., 2009). These active patients want to be involved in the treatment decision-making process, so the chosen therapy likely fits the patient's treatment and outcome preferences better, which should enhance the general health status (Camacho et al., 2009). A patient from one of the largest multiple sclerosis patient communities illustrates a focus on cure with the following comment:

I thought it would be helpful to condense some common question and answers about how to maintain blood pressure in one thread. This will grow over time and be a helpful resource. If you think of something that should be included ... ask away!

Care-related value co-creation instead refers to emotional, affective support, which Cutrona and Rusell (1990, p. 322) define as “providing/receiving comfort and security during times of stress.” Patients diagnosed with a life-threatening disease suffer high levels of psychological disturbance, anxiety, and stress, which demands emotional support (Ben-Sira, 1980). Patients in online health communities provide it in the form of empathy and affective support (Dholakia, Blazevic, Wiertz, & Algesheimer, 2009). Recognizing other patients' experiences and stories makes it easier to bear the burden of their disease and cope with psychological disturbances (White & Dorman, 2001). The following quote illustrates this care-related value, in a multiple-system atrophy (MSA) online community in which expressions of empathy are highly appreciated:

That was a beautiful expression and truly helped me. I feel so affirmed and comforted. I feel the hug and the care, and from someone who knows what it is I am speaking about. You, too, are dealing with these things.

To address both value dimensions, this study differentiates cure- and care-related value co-creation in patients' online postings. On the one hand, cure-related value aims to improve understanding of the disease and treatment; it appears as cognitive information in online postings. On the other hand, care-related value enhances feelings of belonging and empathy and appears as emotional information in online postings.

2.2 | Value cocreation through self-referencing and other-referencing

The co-creation of cure- and care-related value should depend on the reference frame, or information processing mechanism, used by patients when they post messages to the online community (Park, Shin, & Ju, 2015). Although a traditional healthcare model puts the individual patient–doctor encounter at the center of attention, the rise of online health communities emphasizes the input of peers and collective healthcare delivery. Patients may have gathered offline in support groups in the past (Turner, Grube, & Meyers, 2001), but the online context provides access to a very large set of diverse peers, which increases the richness of the information exchange. The individual patient does not focus solely on the self anymore, but instead shifts attention between the self and peers. Therefore, this study adopts self-awareness theory from Duval and Wicklund (1972) to assess patients' information processing in online communities. Awareness balances between the self and others, such that the “self” implies awareness about internally generated information (e.g., perceptions, sensations, attitudes, intentions, emotions) with help from a healthcare professional. Hence, during the doctor encounter, the patient is essentially focused on his own perceptions and sensations. This self-focus, then, translates into online postings that use self-referencing to share their experiences with diagnosis and treatment. “Others” indicates awareness about externally generated information that enables patients to benchmark their experience against the disease trajectories of their peers and direct their attention to the others in the group (Singer & Kolligian, 1987). By focusing on peers, patients extend beyond their individual situation to develop a social frame of reference (Tajfel & Turner, 1985). Hence, the patient that shares his own experiences via self-referencing might be triggered by the community context to shift his attention toward his peers. This focus on the other participants in the community might lead to online postings that use other-referencing to provide advice and support. In this sense, self- and other-referencing are complementary mechanisms that coexist in postings to online communities. A patient from one of the largest multiple sclerosis patient communities illustrates a self-referencing perspective with the following comment:

I am noticing more autonomic symptoms. My entire life my temperature was always 98.6, until I was ill and I would get a fever. I am starting to wonder if my movement disorder is turning towards more of an autonomic struggle.

Because patients are influenced by information retrieved from both traditional patient–provider relationships and patient-to-patient interactions, information processing occurs through self-referencing and through other-referencing. Hence, following quote illustrates the use of other-referencing:

All of your symptoms are Lyme disease symptoms. You must find a Lyme literate specialist and have them draw your blood and send it to IGeneX.

In what follows, the authors develop and discuss the hypotheses regarding self- and other-referencing, which can be found in Figure 1.

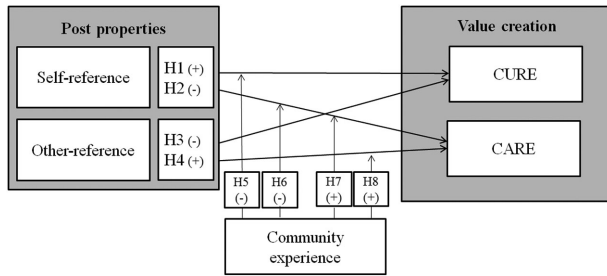


FIGURE 1 Conceptual framework

2.2.1 | Impact of self-referencing on cure and care

During doctor visits, patients probe their internally generated information, so the self is a natural reference for information processing. Patients reflect on their individual treatment plan, their reactions to it, and their overall health status (Carver, 1979; Rogers et al., 1977). The knowledge gained from this internally directed attention triggers cognitive processes and insights (Gibbons et al., 1985; Kühnen & Oyserman, 2002), which translate into cure-based value. Therefore, a positive relationship should arise between self-referencing and cure-based value creation. Formally,

H1: Self-referencing during participation in an online health community relates positively to cure-based value co-creation.

Coping with chronic illness is an emotional journey, encompassing both negative (e.g., anxiety) and positive (e.g., hope) emotions (Pennebaker, Zech, & Rimé, 2001). When postings are contributed from a self-referencing perspective, and thus put the information exchanged in the individual doctor encounter at the center of attention, less attention might be paid to emotions. Hence, patients are often reluctant to share their emotions with healthcare providers and strictly stay focused on physical or medical topics, because doctors rarely respond appropriately to expressions of feelings (Wilson, Kendall, & Brooks, 2007). When they participate in online health communities from a self-referencing perspective, patients do not create any emotional value in their online postings, which should lead to a negative relationship between self-referencing and the co-creation of care-based value. Accordingly,

H2: Self-referencing during participation in an online health community relates negatively to care-based value co-creation.

2.2.2 | Impact of other-referencing on cure and care

When they engage in other-referencing, patients focus on other people's situation and contribute information (Duval & Wicklund, 1972). Thereby, patients translate and apply the medical knowledge they possess to the situation of others in the community. Since patients are experts in living with a condition, they are very well suited to provide advice on how to cope with a medical condition. However, they do not possess the expert knowledge that is needed to interpret medical information in light of another person's particular situation that hinders the provision of qualitative, personalized advice. Hence, patients might introduce biases in online postings when attempting to translate medical advice to a person's particular situation or due to ambiguous

formulations (Hadlow & Pitts, 1991; Reilly, 1989). Therefore, other-referencing may have a negative relationship with the co-creation of cure-based value. Formally,

H3: Other-referencing during participation in an online health community relates negatively to cure-based value co-creation.

Adopting an other-referencing perspective also means paying attention to other people's emotional aspirations and responding in an effective way by providing empathy (M. H. Davis, 1983; Hoffman, 1978). Because patients have experience coping with their disease, day in and day out, they are well suited to respond to emotional postings and provide care-based value to peers (Tyreman, 2005; Wilson et al., 2007). Furthermore, empathic concern is greater among people who share the same concerns or life-changing experiences, such as the diagnosis of a shared disease (Hodges, Kiel, Kramer, Veach, & Villanueva, 2010). A positive relationship then should arise between other-referencing and the co-creation of care-based value, such that:

H4: Other-referencing during participation in an online health community relates positively to care-based value co-creation.

2.2.3 | Interaction with community experience

Patients' community experience (i.e., number of online postings they share) should capture possible temporal effects on information processing. Hence, over time, with increasing community experience, it is expected that the self-focus in patients' postings will decrease, while the other-focus will increase. This is because, the community context increasingly shifts the patient's reference frame toward his peers in the community. The level of community experience balances the levels of self- and other-referencing and may alter the impacts on value co-creation. That is, when people's online community experience increases, they tend to conform with group norms, such that group cohesion gets stimulated (Postmes, Spears, & Lea, 2000). As previous research has shown, the collective knowledge created in online communities may be preferable to individual expertise, because communities combine many, diverse information sources (Surowiecki, 2005). However, group cohesion limits the amount of internal reflection among this group of diverse members, which also affects the nature of their online postings. Therefore, community experience should reduce the positive impact of self-referencing on cure-based value co-creation:

H5: The level of community experience attenuates the positive effect of self-referencing on cure-based value co-creation.

With regard to the predicted negative relationship between self-referencing and care-based value co-creation, due to patients' reluctance to share their emotions (Wilson et al., 2007), competence with sharing emotional content online should develop over time, depending on the social environment (Saarni, 1999). More experience with an online community and its members should make it easier to share emotional content based in internal reflection, or self-referencing (i.e., individual evaluations of feelings). Moreover, as patients become part of the online community, they will try and connect with their peers (i.e.,

other patients) by venting their own feelings, emotions, and reflections regarding their disease or condition. This may trigger trust and hence lead to more care-based value co-creation as community experience increases. Hence, the authors expect community experience to weaken the negative relationship between self-referencing and the co-creation of care-based value, such that:

H6: The level of community experience weakens the negative effect of self-referencing on care-based value co-creation.

Other-referencing may have a negative effect on care-based value co-creation due to potential biases linked to misinterpretations (Hadlow & Pitts, 1991), and more community experience may create a greater barrier to constructive knowledge development within the community, due to members' conformity with group norms (Postmes et al., 2000). When patients provide advice to others, using other-referencing, they align their contributions with the existing community content. This trend undermines the value of collective knowledge co-creation (Lorenz, Rauhut, Schweitzer, & Helbing, 2011). Therefore, community experience may strengthen the negative impact of other-referencing on care-based value co-creation.

H7: The level of community experience strengthens the negative effect of other-referencing on care-based value co-creation.

Finally, the level of community experience should intensify the predicted positive influence of other-referencing on care-based value co-creation. The more active a patient is in the community, the more depth of knowledge she or he has about others' personal background, fears, pains, and insecurities (Cutler, 1995). These insights make it easier to provide care-related value. Furthermore, competences for sharing emotional content, as well as interpreting and responding to emotional content, develop over time (Saarni, 1999). More community experience then should strengthen the impact of other-referencing on care-based value co-creation. Formally,

H8: The level of community experience strengthens the positive effect of other-referencing on care-based value co-creation.

3 | METHODOLOGY

3.1 | Setting

The research data came from two online health communities, both part of one of the leading U.S. healthcare platforms. The first community deals with general neurological and brain-related diseases (e.g., ALS, MSA, Parkinson's, epilepsy). The second focuses on MSA, a neurodegenerative disorder characterized by a combination of Parkinsonian, autonomic, and cerebellar signs (Wenning, Colosimo, Geser, & Poewe, 2004).

With the exception of a few messages posted by community moderators, the authors retrieved all messages posted in two communities from their start until the researchers entered. The first community, Neurobrain, centered on neurological issues and provided 1,292 online postings between September 2008 and October 2012. The second community, focused on MSA, provided 395 online postings

between January 2011 and August 2014. The data sets did not reveal any significant differences in the outcome variables, so they were merged to increase the generalizability of the findings. The nature of the focal chronic diseases suggests that the healthcare consumers on these platforms have developed profound, tacit knowledge about their treatments and coping strategies, which makes these communities adequate research settings. Community members choose whether to start new threads or respond to previous threads; thus, researchers can review consumer communication as it takes place, without constraints or moderation. The authors gathered 319 discussion threads (204 from Neurobrain, 115 from MSA), with postings from 515 unique participants.

3.1.1 | Operationalization

The data set of 1,687 total postings was analyzed with a computerized text mining program, linguistic inquiry and word count (LIWC)¹ (Ireland & Pennebaker, 2010; Ireland et al., 2011; Niederhoffer & Pennebaker, 2002; Pennebaker, Francis, & Booth, 2001). This software analyzes text documents on a word-by-word basis by comparing the words in text files against an internal dictionary of 4,500 words and word stems. Each word in the dictionary relates to one or more word categories. For example, the stem *aggress** is part of three-word categories: Affect, Negative Emotion, and Anger. All words that comprise these first seven letters (e.g., aggression, aggressive, aggressor) increment these three subscales. Relative measures help avoid confounding any effects with post length. The validity of the LIWC program also has been confirmed in other online health contexts, such as online self-presentation by anorexia patients (Lyons, Mehl, & Pennebaker, 2006) or the communication of positive emotions by cancer patients (Han et al., 2008).

3.1.2 | Independent variables: Self- and other-referencing

The *self-referencing* measure includes 12 first-person, singular pronoun categories (*I, my, mine*), counted in each online posting, divided by the total number of words in that post. *Other-referencing* reflects the use of 20 second-person, singular pronouns (*you, your, thou*), divided by the total number of words in the post. This method follows previous linguistic research related to a self-focus (D. Davis & Brock, 1975; Hung & Wyer, 2011; Rude, Gortner, & Pennebaker, 2004; Tausczik & Pennebaker, 2010). Self- and other-referencing also can co-exist, and they may have a differential impact. Therefore, they are conceptualized as two separate variables rather than a continuum, with self and other as two opposite extremes.

3.1.3 | Dependent variables: Cure and care

The measures of the two dependent variables, *cure* (i.e., factual information) and *care* (i.e., emotional support), relied on psychological measures. Cure entailed *cognitive and biological processes* that refer to practices such as *insights* (e.g., thinking), *body* (e.g., hand), and *health* (e.g., clinic) (Tausczik & Pennebaker, 2010). The care measure included *affective and social processes* and *personal concerns* such as *religion* and *death*. Affective processes include two subdimensions: positive and negative (Tausczik & Pennebaker, 2010). *Positive emotions* were

TABLE 1 Descriptive statistics

Independent variables	Self-referencing	M: 7.11	SD: 4.52
	Other-referencing	M: 2.09	SD: 3.41
Dependent variables	Cure	M: 8.24	SD: 5.10
	Care	M: 14.25	SD: 9.25
Moderating variable	Community experience	M: 0.98	SD: 3.13
Control variables	Gender	F: 78.1%	M: 21.9%
	Stars	M: 1.46	SD: 0.985

gauged by the use of words such as *love*, *nice*, and *sweet*. *Negative emotions* instead were measured by the use of words such as *anger*, *anxiety*, and *sadness*. Social processes comprise three subdimensions: family, friends, and humans. *Family* is measured by the use of words such as *daughter*, *husband*, and *aunt*; *friends* are gauged by the use of words such as *buddy*, *friend*, or *neighbor*; and *humans* are measured by terms such as *adult*, *baby*, and *boy*. For the *religion* personal concerns, the measures focus on words such as *god*, *pray*, or *bless*, whereas the measure for *death* focuses on terms such as *fatal*, *dying*, and *coffin*.

3.1.4 | Moderating variables: Community experience

The measure of *community experience* is the number of postings, divided by membership length (days). This approach corrects for the likelihood that a longer term member of the community naturally shares more postings.

3.1.5 | Control variables: Gender and stars

Previous research suggests that *gender* plays a vital role in the nature of online communication (Boneva, Kraut, & Frohlich, 2001). Women are more inclined than men to send postings filled with personal content and use an expressive style that fosters emotional intimacy (Boneva et al., 2001). To control for this confounding effect, *gender* is a control variable in the model. Furthermore, patients can earn *stars* (i.e., 0–3), depending on how extensively they fill out their personal profile. The amount of personal information shared thus gives an indication of the patient's proficiency with processing individual information (i.e., self-referencing) and might affect the nature of value co-creation. Therefore, the number of stars is another control variable in the model.

3.2 | Analytics

Seemingly unrelated regression (SUR), as implemented in STATA Release 9, served to test the hypotheses derived from the conceptual framework (Zellner, 1963). The descriptive statistics and correlations are in Tables 1 and 2. When the error terms of the regression equations in multiple equation systems are correlated, SUR provides more efficient estimates than does ordinary least squares. Breusch and Pagan's (1980) χ^2 test of independence confirms that the estimated disturbance terms correlated at a 5% significance level, with $\chi^2(1) = 10.294$ and $p < 0.01$. The analysis is based on 1,687 observations.

4 | RESULTS

Gender and profile stars represented the control variables in the SUR model and do not significantly ($p < 0.05$) affect the results. As the results in Table 3 reveal, self-referencing exhibited the expected positive effect on cure (H1, $b = 0.211$, $p < 0.001$) and predicted negative effect on care (H2, $b = -0.084$, $p < 0.001$). For other-referencing, the results indicated a significant negative effect on cure (H3, $b = -0.062$, $p = 0.026$) and a significant positive effect on care (H4, $b = 0.345$, $p < 0.001$). In line with our expectations, community experience lessens the positive impact of self-referencing on cure-based value (H5, $b = -.0011$, $p = 0.006$). Regarding the negative relationship of self-referencing on care-based value, the authors expected community experience to have an attenuating impact. Based on these results, the authors have to reject this hypothesis since the community experience seems to strengthen the negative effect of self-referencing on care (H6, $b = 0.110$, $p < 0.001$). As expected, community experience strengthens the impact of other-referencing, the on care-based value (H8, $b = 0.061$, $p = 0.040$). Finally, no significant interaction effect of community experience was found for the effect of other-referencing on cure-based value (H7, n.s.).

5 | DISCUSSION AND RESEARCH IMPLICATIONS

Online health communities are an important source of value co-creation among peers (Nambisan & Nambisan, 2009; Weiss, Lurie, & MacInnis, 2008). The current study examines the impact of a patient's reference frame during online community participation on cure- and care-related value co-creation. In turn, it reveals that patients' self-referencing, associated with internal information processing, enhances cure-related value co-creation. Patients enter the online health community with a background based largely on a traditional patient-doctor encounter, during which the healthcare professional triggers a self-focus. Hence, by probing the patient's own perceptions and sensations as a basis for diagnosing and proposing a treatment plan, the professional directs the patient's attention inward, to the self (Silvia & Gendolla, 2001). The factual information around diagnosis and treatment that the patient receives from the professional prompts cure-related value co-creation. However, patients appear less inclined to engage in emotional support through self-referencing, because they focus on physical-medical issues in traditional models and thereby disregard emotions (Wilson et al., 2007). The self versus other perspective adopted in this paper might be linked to the concepts of self- and social surveillance as used by Park et al. (2015). The authors define self-surveillance as "behavior in which individuals monitor, manage, and control their own expression and presentation," while social surveillance is defined as "individuals' use of social networking sites to track others' actions, beliefs, and interests" (Park et al., 2015, p. 602). Self- and other-surveillance are based on social cues and affect how people adapt their behavior in a social appropriate way. In the current research context, however, the authors consider the self versus

TABLE 2 Correlation table

	Self-Referencing	Other-Referencing	Cure	Care
Self-referencing	1			
Other-referencing	-0.268 ^a	1		
Cure	0.099 ^a	-0.089 ^a	1	
Care	-0.287 ^a	0.499 ^a	-0.228 ^a	1
Community experience	-0.028 ^a	0.072 ^a	-0.037 ^a	0.010

^aCorrelation is significant at the 0.01 level (two-tailed).

TABLE 3 Summary of results

	Dependent Variables	
	Cure	Care
Constant	1.687 (0.000)	2.47 (0.000)
Independent variables		
Self-referencing	H1 0.211 (0.000)***	H2 -0.084 (0.000)***
Other-referencing	H3 -0.062 (0.026)*	H4 0.345 (0.000)***
Moderating variable		
Community experience	0.192 (0.024)*	-0.329 (0.000)***
Control variables		
Gender	-0.025 (0.553)	0.024 (0.489)
Stars	0.011 (0.533)	0.024 (0.707)
Moderation effects		
Self-referencing × Community experience	H5 -0.101 (0.006)**	H6 0.110 (0.000)***
Other-referencing × Community experience	H7 -0.010 (0.784)	H8 0.061 (0.040)*

Notes: Coefficients are reported with SEs in parentheses.

*** $p < 0.001$. ** $p < 0.01$. * $p < 0.05$.

other perspective as an information processing mechanism that has an impact on the nature of the value created via online postings.

The finding that patients internally process information shared in a traditional patient–doctor encounter and share it online implies an important role for healthcare professionals in terms of sustaining and ensuring information quality. Moreover, this study demonstrates the important role of online health communities, in which other-referencing is another crucial information processing mechanism, beyond self-referencing. It stresses the crucial role of peers and other people's experiences for value co-creation. Because patients are experts in coping with disease-related emotions and share the same life-changing experiences, they are well suited to providing peers with emotional support (Hodges et al., 2010), but weaker in co-creating cure-based value, likely due to the risk of misinterpretation when exchanging informational content with other laypeople (Hadlow & Pitts, 1991). In this sense, other-referencing seems to trigger a distinct effect than that of self-referencing. However, when taking into account the community experience of patients, the authors notice that also self-referencing stimulates the co-creation of emotional support (care-related value). Indeed, as stated earlier, patients become part of the online community and as such they will try and connect with their peers (i.e., other patients) by venting their own feelings, emotions, and reflections regarding their disease or condition. This may trigger trust and hence lead to more care-based value co-creation as community experience increases.

In the meantime, community experience weakens the impact of self-referencing on cure-related value. That is, online health communities provide an excellent platform for providing care and support to patients, but a weaker role as platforms to enhance cure-related value. Nevertheless, new patients in the community will provide cure-related information via self-referencing. This information comes from patient–doctor encounters processed internally, is then shared in the online community, so doctors must provide relevant, well-structured, easy-to-share information. With this status, online health communities also represent opportunities for healthcare organizations to enhance the informational quality of patient-to-patient interactions. Moreover, by observing patient-to-patient interactions in the online community, healthcare providers can learn about potential service improvements and innovations. The findings also show that both information processing mechanisms—self- and other-referencing—have a unique role to play and show unique, distinct impacts on value creation. In this sense, the online model complements traditional healthcare models involving only patient–doctor encounters.

This study indicates a major challenge for cure-related value co-creation. Although community experience seemingly should attenuate the impact of other-referencing on cure, no significant results arose, perhaps because patients have the potential to enhance cure-related value. The expertise that gradually develops through increased community experience might establish building blocks for more cure-related value co-creation. Then traditional healthcare providers may

be pivotal for ensuring information quality, as well as play an active role in educating patients about how to share reliable cure-related information in online health communities.

Finally, this study applied text mining as an innovative approach to assess the focal variables. This method can capture the nature of the value co-creation (i.e., cure or care) in an unobtrusive way, which is especially important in emotionally challenging settings. Furthermore, patients are unaware of the reference frame they use during information processing, though they express this frame in the linguistic features contained in their online postings. This research affirms that text mining is an appropriate way to probe patients' unconscious information processing activities.

6 | MANAGERIAL IMPLICATIONS

Despite the popularity of online health communities, many healthcare organizations struggle with implementing or coordinating such digital services (Bain & Co., 2012; McKinsey & Co., 2014). McKinsey & Co. (2014) explicitly advises industry actors and policy makers to increase their understanding of what drives value in digital services. This research responds to that need in several ways. First, by investigating the patient experience in online health communities, this article highlights the patient's reference frame as an underlying information processing mechanism (Reed, 2002). The differential impacts of self- and other-referencing on value co-creation in online health communities suggest that online health communities might be constructed as complementary services, beyond traditional patient-physician encounters. Healthcare professionals often are restricted in their time and budgets and cannot satisfactorily meet all patients' emotional support and additional information needs (Hoch & Ferguson, 2005; Johnson & Ambrose, 2006). But online health communities can help fulfill such needs and provide both cure- and care-related value. Therefore, healthcare professionals should consider ways to allocate patients to digital services to satisfy their unmet needs, cost effectively.

Second, patients internally process information from their encounters with their doctors, then might share this information online. Although time constraints might prevent healthcare professionals from providing extensive information about a disease or treatment, they must ensure that each patient understands the information presented. In doing so, healthcare professionals can indirectly influence the quality of the information disseminated in the online community. For example, physicians might seek a more active role in briefing and informing their patients, in a structured and specific way, offering not only verbal clarifications, but also factual support in the form of brochures, digital references, self-management tools, and so forth. Patients should be more involved during such service encounters, which also might increase their satisfaction (Shaffer & Sherrell, 1997).

Third, this research investigates the impact of community experience on value co-creation: it weakens the impact of patients' self-reference frame on cure but strengthens both patients' self- and other-referencing on care. Community managers therefore might try to decrease the impact of group cohesion by providing tools that

stimulate contributions of content that deviates from the group norm. For example, through active moderation of discussions, managers might ask participants explicitly to "think outside the box" (Sibai, de Valck, Farrell, & Rudd, 2015). However, group cohesion should be strong enough to support trust building, as is needed to foster the co-creation of care. Tools that enable users to "tell their story" might encourage participants to get to know one another. Overall though community managers face the challenging balance between encouraging group cohesion, to foster care, while mitigating excessive group cohesion, to facilitate cure.

Fourth, text mining can reveal patients' unconscious information processing activities and the nature of the resulting value creation. Healthcare organizations might benefit from using this technique as input for real-time monitoring of patients' well-being, which would enable them to explore unmet needs that might be fulfilled by new (online) services. Text mining also might contribute to the development of a community dashboard of key performance indicators, including standard measures, such as the number of new registrations and page views, as well as insights into the nature of the value created in the community (i.e., cure and care), tracked over time.

Fifth, this research adopts a consumer dominant logic to investigate online health communities as a source of co-creation. Since this logic introduces healthcare consumers as central actors in the co-creation paradigm, value is considered as being embedded in the practices of the consumer. This means that value extends beyond the interactive process between provider and patient, and consequently beyond the visibility of the healthcare provider such as in online health communities (Rihova, Buhalis, Moital, & Gouthro, 2013). This perspective introduces a major challenge for healthcare organizations' marketing logic. Hence, the ultimate outcome of marketing should not be the service as such, but the customer experience and the resulting value-in-use for customers in their particular context (Heinonen et al., 2010). By examining patients' information processing mechanisms online, this research adds to the providers' understanding of the functioning of online health communities, which provides new avenues for creating an impact on the patient experience. Hence, services can be constructed in a way that they work in complement with the patients' activities in online health communities.

7 | LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This study contains several limitations that may provide fruitful paths for research. First, the authors evaluated value co-creation on the basis of individual postings. A chronological order exists across online postings, so each post recapitulates, to some extent, the previous postings. Investigating the contribution dynamics within a discussion thread in depth is beyond the scope of the current research, though as an initial step, this study includes community experience as a dynamic construct. Further research along these lines might provide insights into how online value co-creation builds and develops over time. Investigators should examine different discussion threads, focusing on how

the conversation develops through others' input, when the discussion ends, and why.

Second, no significant result emerged regarding the relationship between other-referencing and cure. A challenge for cure-related value co-creation thus is identified, implying a potential moderating role of expertise. More research is needed to validate the argument that expertise can fuel the potential for cure-related value among patients.

Third, this study used LIWC, a standard computerized text analysis program, to measure the text-based variables associated with cure and care. The validity of the LIWC program has been confirmed in various online health contexts (Han et al., 2008; Lyons et al., 2006), but more insights might be uncovered by applying text mining models that have been developed explicitly to measure cure- and care-related value in online communities. Additional studies should develop customized text mining models to probe the subdimensions of cure and care and thereby provide more fine-grained results related to the nature of online value co-creation in healthcare settings.

ENDNOTE

¹ The LIWC text mining program was originally developed to analyze emotional writing. Thereby, the dimensions captured by the LIWC dictionaries strongly converge with content ratings performed by human coders (Pennebaker & Irellreland et al., 2011). The validity of the LIWC dimensions has been established and confirmed in more than 100 studies that applied this methodology to various texts, including online content (Cohn, Mehl, & Pennebaker, 2004; Ludwig et al., 2014). The LIWC approach appeared for the first time in marketing journals to unearth sentiment in newspaper articles (Humphreys, 2010). Based on word counts for a given text, LIWC calculates the proportion of words that match predefined dictionaries.

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APPENDIX

Posting	Self-referencing	Other-referencing	Cure	Care
Together with my doctor, I have found for me it's anything chocolate that triggers my migraines, I have had migraines for as long as I can remember.*	22.22%*	0	17.4%	0
Yikes Hazy; that sounds scary. Has the surgeon looked at it yet? If not, then would you call his/her office and tell someone? The surgeon would want to know. Your primary care doc or even neurologist may be just clueless. You just shouldn't feel a pulsation like that anywhere in your body except your basic arteries and a couple of places on your chest. I'd hate for it to be an aneurism; it would need to be protected!	1.27%	7.69%	11.39%	18.98%

*To illustrate the calculations of LIWC, the authors provide more detail. This posting contains 6 words of a total of 27 words that refer to self-referencing (I, me, my, I, I). Hence, LIWC calculates that this posting contains 22.22% self-referencing.