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Users' search mechanisms and risks of inappropriateness in healthcare innovations: The role of literacy and trust in professional contexts

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Users' search mechanisms and risks of inappropriateness in healthcare innovations: The role of literacy and trust in professional contexts

Brief Running Title: User knowledge search in professional context

Abstract

In the context of professional service organizations, user engagement with knowledge search might generate significant risks of inappropriateness to innovation processes. Previous research suggests that professionals would then keep users at arms' length, controlling the design and implementation of innovations internally. This study overcomes this view investigating how professional service organizations can enable users' knowledge search while controlling for the risks of inappropriateness. Combining a qualitative research on 5 innovation processes in healthcare organizations with quantitative research on 110 service users, our findings highlight that professional providers, such as senior clinicians, shaped their tactics according to the 'threats' of laggards, i.e. users searching knowledge outside of professional logics of appropriateness; more than to the opportunities of lead-user communities. Professional providers sought to "activate" users' engagement with knowledge search by investing on their literacy, i.e. showing the basics of the logic of appropriateness informing their decision; and on trust relationships, i.e. becoming transparent on the criteria of knowledge selection during the innovation processes.

Keywords: Users; Knowledge Search; Literacy; Trust; Professionals; Healthcare

1. Introduction

Innovation research emphasizes the importance of searching knowledge beyond organizational boundaries to differentiate the sources of new ideas and information (Li et al., 2013; Raisch et al., 2009; Rosenkopf and Nerkar, 2001). Most studies have usually investigated mechanisms used by one firm to search the knowledge produced by other firms, e.g. alliances, acquisitions, employee mobility, open source platforms, pyramiding, and service intermediaries (Savino et al., 2015). More recently, firms have been also recommended to search the knowledge produced by user communities. Some users proactively search and produce knowledge about new technical and scientific advancements to evaluate their service providers and market opportunities (Greer and Lei, 2012; Bogers et al., 2010). So, firms can gain important competitive advantages by identifying relevant users and incorporating their knowledge in the innovation processes. Mechanisms abound, such as the use of IT platforms, user enrolment and focus groups (Hienerth et al., 2014; Parmentier and Mangematin, 2014; Yoshida et al., 2014; Nahuis et al., 2012).

Noticeably, most research in this field has focused on large private firms pursuing shareholder value in high-tech industries (Savino et al., 2015; Greer and Lei, 2012). These studies tend to overlook the risks of user engagement, as they assume that firms can rely at least on lead-users, and keep others at arms' length. The generalizability of this assumption is however questionable in organizations with smaller size, different goals and embedded in low-tech sectors (Savino et al., 2015; Lane et al., 2006). These organizations face relevant risks when their users search new knowledge; and very little is known about what they should do to prevent unintended consequences.

This study addresses this gap, investigating the experience of healthcare organizations attempting to elicit knowledge search from their patients while facing threats to the appropriateness of care. Healthcare organizations represent an exemplar of professionalized service organizations, which possess two important features (von Nordenflycht, 2010; Abbott, 1986). First, their services are based on the work of professionals (e.g. doctors, nurses), who abide by logics and ethical codes of service appropriateness, i.e. generate maximum value for users, rather than for shareholders or others. Second, professional work is informed by expert knowledge, acquired over long years of certified professional development and training, and virtually inaccessible to managers, employees, and users (Radaelli et al., 2014). These features generate competing demands on patients' knowledge search. The logics of appropriateness imply that users *must* be engaged with knowledge search to increase the appropriateness of innovations. Users, however, cannot possess the skills and abilities necessary to search and absorb knowledge appropriately; and thus struggle to navigate misinformation and fraud (Kraft et al., 2015; SteelFisher et al., 2015; Deer, 2011). In several occasions, patients have pushed professional organizations to spend money on inappropriate innovations, or refused to attend appropriate new services. Healthcare providers must do something to orient patients' knowledge search toward principles of appropriateness, without locking patients into their own ideas. How they can do so remains unknown. So, we ask: *how can professionals elicit patients' knowledge search during innovation processes while reducing the risks of inappropriateness?*

To address this question, we developed a mixed-method study of multiple service innovations. The manuscript is organized as follows. First, we review the literature to identify key concepts and theoretical gaps. Second, we describe the qualitative research used to induce an interpretive model of users' engagement with knowledge search. The findings informed the taxonomy of knowledge search behaviors, i.e. some patients stay passive or reactive in the search of new knowledge, with others search knowledge to challenge professionals' decision-making, and only a few acted as lead-users. Building from this, we describe the role of patient activation, use of traditional/virtual sources of information, health literacy and trust in eliciting patients' knowledge search. Later, we describe the quantitative research that tested this induced model on a sample of 110 patients with chronic obstructive pulmonary disease (COPD). Finally, we discuss the results and contributions to literature.

2. Theoretical Background

2.1. Knowledge search and logics of appropriateness

Service innovations in healthcare are required to follow principles of appropriateness, i.e. "care is effective based on valid evidence; efficient [in terms of] cost-effectiveness; and consistent with the ethical principles and preferences of the relevant individual" (WHO, 2000; p. 2). Healthcare innovation processes derive their legitimacy from (i) the rigor of their scientific approach, and (ii) the response of patients. Unscientific and untested services should not be provided to patients as they might introduce risks to the safety of patients; while services that are not attended by patients should be changed because they are not meeting the expected appropriateness. One implication is that processes of healthcare innovation should be structured into a formal stage of knowledge search, in which scientific and experiential knowledge is identified; and a stage of recombination, in which the complex knowledge is translated into new services. Professionals are expected to: (i) search relevant scientific evidence on the effectiveness and costs of new interventions; (ii) search experiential/contextual knowledge from their own practice, and from peers; (iii) discuss and recombine this knowledge in multi-professional teams; (iv) develop structured pathways that describe the new service, to allows replication and assessment; and (v) test the new service on a selected group of patients to ascertain the consequences (Walshe and Rundall, 2001; West and Wallace, 1991). Clinicians *must* prove the appropriateness of their decision-making by producing evidence of effectiveness. They usually apply an 'evidence pyramid', and collect evidence from meta-analyses and systematic reviews to legitimize change; and produce evidence from Randomized Clinical Trials (RCTs) or cohort studies to demonstrate improvements (Murad et al., 2016).

Overall, through education and practice, these expectations consolidate into *logics of appropriateness*, i.e. institutionalized rules, roles and norms that demand clinicians to have high standards regarding what knowledge should inform their innovations, where they should search it, and how they should apply it. So, for instance, clinicians use scientific journals and peer reviews, and avoid generic sources of information, such as newspapers, websites and forums (Gabbay and Le May, 2004), because these are regarded as weak evidence and unfit for the standards of appropriateness.

By contrast, newspapers, websites and forums represent the privileged sources of information for patients, who typically lack the ability to navigate more complex knowledge (McMullan, 2006). The knowledge embedded in these media is often inaccurate, blown out of proportions or intentionally mischievous. Lured into the prospects of “easy” and/or “immediate” cure, patient groups have often pushed providers to invest money on very inappropriate innovations (Bodemer et al., 2012; Claassen et al., 2012). Clinicians need to orient patients’ knowledge within acceptable logics of appropriateness, while allowing for some creativity. Previous research does not specifically explain how they can do so. Rather, three neighboring research streams described possible approaches. To prepare the theoretical background of our empirical research, we review these research streams, i.e.: (i) knowledge search beyond organizational boundaries; (ii) user-based innovation; and (iii) sociology of professions.

2.2. Knowledge search beyond organizational boundaries

Several past studies have looked at mechanisms for knowledge search beyond organizational boundaries as necessary to access non-redundant ideas (Savino et al., 2015). To reduce problems of cognitive lock-in, firms should differentiate the knowledge sources, e.g. other firms in their supply chain, direct and indirect competitors, consultancy firms, and research institutions (Kohler et al. 2012; Chen et al. 2011; Grimpe and Sofka 2009; Laursen and Salter 2004). Firms can implement several mechanisms to search and absorb new knowledge, e.g. alliances, firm acquisition, employee mobility, open source platforms, pyramiding, service intermediaries and collective research centers (Savino et al., 2015).

These studies suggest that *weak ties* (i.e. infrequent and distant relationships between knowledge sources and recipients) are salient to identify non-redundant knowledge, while *strong ties* (i.e. more frequent and structured relationships) should be used to transfer and recombine such knowledge (Granovetter, 1983; Burt, 1992; Hansen, 1999, 2002). Weak ties prevent risks of cognitive lock-in, since the firm remains at arms' length from others. More structured relationships are however necessary to transfer the complex knowledge, which includes tacit insights, interpretations and heuristics, entrenched in individual experiences and context-specific routines (Becerra et al., 2008; Easterby-Smith et al., 2008; Polanyi, 1966). Complex knowledge is thus *sticky*, and recipients need to spend time and efforts to absorb new information (Szulanski, 1996; von Hippel, 1994). This suggests that firms should get close to organizations struggling with knowledge search, and help them through training and socialization tactics (Van Wijk et al., 2008; Inkpen and Tsang, 2005; Hansen, 1999). Alternatively, the firm can select privileged 'partners', and keep others at arms' length. The selection is based on benevolence-based trust and competence-based trust, i.e. trusting that the knowledge source wants to do good to the firm, and has the skills to search relevant knowledge (Phelps et al., 2012; Renzl, 2008; Levin and Cross, 2004).

2.3.Collaborative innovation with users

Studies on collaborative innovation with users acknowledge that firms can also relate to users. Some users are especially proactive, and engage with knowledge search to increase their customer experience and/or support firms' innovation processes (Greer and Lei, 2012; Von Hippel, 2009; Luthje and Herstatt, 2004). These users demonstrate a capacity to develop expert and technical knowledge, and share their findings with firms (Hienerth et al., 2014; Von Hippel, 2009). In particular, previous research remarked the importance of lead-users, i.e. users "who face the same needs of the general marketplace but face them months or years earlier than the bulk of the market and expect to benefit significantly from a solution to those needs" (Von Hippel, 1986; p. 796). More generally, several studies showed how users perform knowledge search through multiple sources, from generic websites and IT platforms to specialist forums and higher education programmes (Greer and Lei, 2012). This behavior can inform multiple outcomes, from micro-adjustments to established products to the design of new services and products (Greer and Lei, 2012; Luthje and Herstatt, 2004). In turn, firms can access low-cost knowledge, build brand awareness, create customer commitment, and create more competitive offerings (Frow et al., 2015). To do so, they might use focus groups, customer surveys and IT platforms to collect new ideas; review the content user forums and communities while remaining at arms' length; employ expert users; and develop structured co-production programmes (Frow et al., 2015). LEGO®, for instance, developed a web-based ecosystem (www.ldraw.org) in which users can generate virtual models and scenes, as well as configure new building blocks (Hienerth et al., 2014). Differently, several firms and government branches have enrolled end users in their organization to develop products (Wagner, 2002). Risks of inappropriateness are usually overlooked. It is usually assumed that (i) firms can identify and select relevant key users (e.g. lead-users) to engage in the innovation process, or keep others at arm's length; (ii) key users develop competencies and expectations that are consistent with firm's; and (iii) employees, experts and managers do not antagonize the engagement of lead-users, because it does not threaten their jurisdictions and decision-making (Greer and Lei, 2015; Enkel et al., 2005; Parmentier and Mangematin, 2014; Hienerth et al., 2014). So, the key problem for firms is to find relevant lead-users and cost-effective ways to embed them in the innovation process.

2.4. Sociology of professions

The generalizability of these considerations to healthcare organizations is dubious for two reasons: (i) healthcare organizations follow principles of appropriateness and altruistic service, which demands to include *all* users in the process, and not just lead-users; and (ii) patients might openly challenge the decision-making of clinicians, who react by reinforcing their status as sole ‘arbiters of risk’ and appropriateness, i.e. the only possessing the knowledge and accountability to make decisions (Currie et al., 2012; Llewellyn, 2001). Professionals experience a paradoxical tension in their relationship with patients. The logics of appropriateness suggest that professionals should put users at the center of their decision-making (Coule and Patmore, 2013; Suddaby, 2008). Users’ lack of expert knowledge, however, generates a great risk for service appropriateness. Non-professional actors are unlikely to identify appropriate information, and might pressure professional workers to pursue inappropriate innovations (Abbott, 1986; Dinovitzer et al., 2015). Professionals face a conundrum: if they follow users’ lead, they might undermine the appropriateness of innovation processes. But if they do not, they might undermine the relationship with users. To mediate the two risks, Koh et al. (2013) recommended structured and long-term collaborations with patients, such as “focus groups, interviews, surveys and the most active form of engagement which is serving on a study board or advisory council and attending regular meetings with researchers (as in active participatory research studies and community based participatory research)” (Domecq et al., 2014; p. 5). Evidence on the effectiveness of these initiatives is however limited and contradictory (; Domecq et al., 2014; Berger et al., 2013). The very possibility for clinicians to implement structured collaborations is dubious, because of “the lengthy process that involved training, transportation, attendance, etc.; [logistics] such as extra time needed to complete research, time constraints of patients and researchers, and incremental funding needed for patient engagement; overarching worry

[that] patient engagement may become tokenistic (a false appearance of inclusiveness), resulting in a devaluated patients' input; [and] scope creep" (Domecq et al., 2014; p. 6). Furthermore, patients rarely exploit these occasions, as they either concede full jurisdiction to clinicians or act in isolation from their clinicians. If and how professionals might elicit users' knowledge search within a framework of appropriateness thus remains unknown.

We thus ask: *how do professional workers (clinicians) enable to elicit the engagement of users (patients) in knowledge search within logics of appropriateness*?

3. Inductive research methodology

To address this question, we implemented an exploratory sequential mixed method study. This approach combines an initial qualitative method aimed at inducing from professionals an explanatory model on patients' knowledge search; and a subsequent quantitative method to test the model with patients (Cresswell, 2013). Mixed methods are increasingly used in innovation research, building on the premise that triangulating qualitative and quantitative data reduces the weaknesses of each type of data (Osei-Frimpong et al., 2016; Teddlie and Tashakkori, 2009). Our design, in particular, aimed at triangulating insights from professionals (who controlled the design and implementation of initiatives to elicit patients' knowledge search); with empirical authentication from patients (who are the recipients of these initiatives, and implement knowledge searches).

The inductive stage was informed by a multiple case study. Case studies are relevant methodologies to generate theory on organizational dynamics, i.e. to address the 'how' and 'why' questions (Yin, 2013). Multiple case studies are especially relevant to find patterns across different settings, and increase the generalizability of findings (Eisenhardt, 1989). We relied on two research projects. The first project involved professional workers in secondary care, separately involved in four service innovations. Innovation 1 involved a new multidisciplinary service, managed by psychologists and acute specialists, for the treatment of the psychological distress caused by physical pain. Innovation 2 involved a new pathway, managed by psychologists, nurses and social workers, to improve the management of patients with medium-to-low severity of conditions. Innovation 3 involved a radical redesign of the pathways for teenager patients with mental health problems. Finally, Innovation 4 involved the implementation of a new digital system for the mobilization of patient-related data across acute specialisms. Data collection was a combination of 97 interviews; 57 non-participant observation (internal meetings with clinicians' teams developing the new service, promotional events and training events). The interviews were organized around three main topics: relevant sources and mechanisms for knowledge search; role of patients in the innovation process; mechanisms and conditions of patient engagement.

The second project involved a new digital-based service for asthma management, developed by a group of general practitioners, respiratory consultants, and allergy specialists. The research investigated patients' involvement by asking how patients provided information about the transformation of practice and the adoption of digital technologies; and how patients adopted innovative behaviors to support service change. Clinicians with a high digital and innovative profile were identified with a four-stage process. First, a focus group with six pharmaceutical representatives developed two profiles of highly innovative behaviors, one related to the use of digital technologies and one related to the information practices. Second, the profiles were shared with selected medics, who were asked to generate names of colleagues, who belonged to each profile. Third, one fieldworker double-checked the contacts (e.g. publications, social media presence, personal website). Finally, the identified clinicians were contacted by phone or skype to arrange an interview. The selected 15 clinicians (6 allergists and 9 lung specialists) were then interviewed, following a semi-structured interview schedule. Two focus groups with 12 clinicians (six per focus group) were then organized to collect further insights on the relationship with patients.

Overall, the five cases were part of a theoretical sampling, as they varied in terms of patient engagement and clinicians' tactics. Table 1 summarizes the research data.

Table 1: Data Sources

	Interviews	**Observations**	**Archival Data**
Innovation 1	14 Senior clinicians 5 Junior clinicians 1 Project manager	26 internal meetings 7 promotion events 2 training events	9 service specifications 3 internal reports 30 meeting minutes
Innovation 2	25 Senior clinicians 5 Junior clinicians	6 internal meetings 7 training meetings	4 service specifications 7 meeting minutes
Innovation 3	6 Senior clinicians 15 managers	2 internal meetings 3 conferences/workshops	1 service specification 4 internal reports
Innovation 4	20 Senior clinicians 6 project managers	4 internal meetings	2 service specifications
Innovation 5	15 Senior clinicians	2 focus groups	
Total	79 Senior clinicians 10 Junior clinicians 22 Managers	38 internal meetings 10 promotion events 9 training events 2 focus groups	16 service specifications 7 internal reports 37 meeting minutes

To analyze the data, we followed indications from Gioia et al. (2013) on inductive research. Strategically, two different fieldworkers collected data on the two projects, and developed the early data analysis. The data was analyzed separately by the other researchers, who were detached from the context of application, and thus could provide alternative perspectives. The analyses were compared first within each project, and then across projects, until a final agreement was reached. Operationally, the extracts from transcribed interviews and observations were assigned first-order codes by the fieldworkers, reflecting concepts expressed in the language of the informants. These first-order concepts were gradually aggregated into second-order constructs if they reflected common themes. These second-order concepts were in turn aggregated into third-order dimensions, which represent the final theoretical model. To determine themes and dimensions, we travelled iteratively between data, emergent theory, and previous literature.

4. Findings: model development

All cases moved from an intention to introduce service innovation, as professionals had intercepted discontent and concerns from users, as well as found opportunities for improvements. These efforts involved an initial attempt to identify scientific evidence demonstrating causal links between certain interventions and outcome improvements. The scientific evidence was not sufficient to design innovation since it: (i) was often high-level, specialist and a-contextual (hence, clinicians needed local knowledge to contextualize this information); (ii) did not cover all the key decisions required in a service (hence clinicians needed experiential knowledge, improvisation and intuition to 'fill the gaps'); and (iii) did not capture the most recent experiments in other professional organizations (hence clinicians needed to insights and word-of-mouth from their social network). The clinicians used internal knowledge from formal service assessments (e.g. audits), extreme experiences (e.g. the death of a patient, near misses), and individual beliefs/opinions ('feeling the gut'). Clinicians also searched (i) ideas executive boards, medical directors, commissioners, funding bodies and quality assurance groups; (ii) experiences in other contexts through informal chats, word-of-mouth, workshops, seminars and professional events.

Patients' knowledge search contributed in different ways across the five innovation sites. In Case 3, patients participated *throughout* the innovation process. Professionals opened processes of consultations, to which patients contributed by sharing their knowledge through social media, workshops and meetings. Patients helped designing a new access center for teenage patients by providing their opinions and aspirations as patients, and their experiences and information with other providers. In Cases 1 and 2, patients contributed more indirectly. Clinicians collected information patient inputs during clinical consultations, and used them during professional-only teamwork. In Cases 4 and 5, clinicians were reluctant to use patient inputs, and patients remained at arms' length. Our comparative case approach analyzed these differences (Table 2).

Table 2: Cases overview

Cases	**Patient knowledge in innovation process**	**Patient-provider relationship**	**Investments in health literacy**	**Investments in relational trust**
1: Multidisciplinary service for pain management	Moderate inclusion of patients' knowledge. Inputs discussed by clinicians in multi-professional teamwork	Moderate improvement	**High**: websites, face-to-face consultations to build basic knowledge and awareness of logics of appropriateness	**Low**: innovation processes 'hidden' to patient groups
2: Psychological service for mid-low severity patients	Moderate inclusion of patients' knowledge. Inputs discussed by clinicians in early stages of innovation	Moderate improvement	**Low**: brief consultations dedicated to clinical decision-making; information leaflets about basic knowledge; no communication of logics of appropriateness	**Moderate**: inclusion of patient discussions/surveys during design of new pathways; rationale of new service explained to selected group of patients; request of knowledge search to help the process
3: Transition path for young mental health patients	High inclusion of patients' knowledge in new services and decisions.	High improvement	**High**: websites, face-to-face consultations, conferences and seminars to build basic knowledge and awareness of logics of appropriateness	**High**: development of process of patient engagement; high participation because of clear rationale for change; requests of knowledge search; methods to include patient inputs
4: Digitalized tool for knowledge management across acute specialisms	Low inclusion of patients' knowledge in decision-making	No generalized improvement	**Low**: brief consultations dedicated to clinical decision-making; information leaflets about basic knowledge; no communication of logics of appropriateness	**Low**: innovation processes 'hidden' to patient groups
5: Digitalized tool for knowledge management for asthma patients	Low inclusion of patients' knowledge in decision-making	No generalized improvement	**Low**: brief consultations dedicated to clinical decision-making; information leaflets about basic knowledge; no communication of logics of appropriateness	**Low**: innovation processes 'hidden' to patient groups

4.1. Patients' approaches to knowledge search

Across all sites, clinicians acknowledged the impossibility to control or know how patients search new knowledge. Clinicians tried to use face-to-face consultations to know more about patients' methods and sources of knowledge search, but could only scratch its surface. Patients searched knowledge through traditional and virtual channels. Traditional channels include newspapers, television programmes and discussions with fellow patients. Virtual channels include IT-based platforms such as websites, patient forums, and other Apps. Patients' use of these sources is typically unstructured, since few patients plan knowledge search strategies. Patient approaches can be classified into four categories.

First, several patients were *passive knowledge recipients*, disengaging from any attempt of knowledge search and accepting every clinicians' decision-making. They did so to reduce (i) their exposure to new information that they could not process, and thus the possibility to overestimate their symptoms and increase their anxiety; (ii) interpersonal risks with their clinicians, fearing that this might contest their authority or become a way for professionals to share responsibility and blame.

> ***Post-interview excerpt – Innovations 3***
> ***Senior Consultant (SC) 6:*** *Internet is great, but you can find anything in it. Google your symptoms in it and you'll find all sorts of assessments. They are not wrong, but an array of possibilities we gradually eliminate through appropriate tests Well, several patients call me scared as s**t, because they thought they were going to die soon… I need to clarify these things face-to-face, explaining why that self-diagnosis is wrong. Some might not believe me, actually, but most do and actually decide they had enough of Google searches.*

Second, other patients were *reactive knowledge collectors*, only searching information about their condition and prescriptions. For instance, patients who receive prescriptions for a certain medication might use Internet to acquire more knowledge about its side effects. Patients intentionally remained at arm's length from clinicians with regard to knowledge search, which could have implications on service innovation.

> ***Field-note excerpt – Innovations 1-3***
> ***Patient representative (PR):*** *Several patients want to engage with research and innovations, because their voice can be heard. We should not underestimate the burden of knowledge for*

> *patients. Knowing how symptoms emerge, limitations in diagnosis and therapy, inevitable outcomes can generate all sorts of emotions – anxiety, anger, weariness…*

Third, other patients were proactive *lead-users*, searching new information about other available services, diagnoses and therapies from multiple sources. Consistently with the definition of lead-users from von Hippel (1986), these patients: (i) experienced the most significant problems of the established services, e.g., they had experienced chronic pain without an appropriate solution (Innovation 1) or a difficult transition from different service mental health providers (Innovation 3) – thus they expected to benefit significantly from innovations; and (ii) were positioned advantageously to search knowledge, e.g. they had travelled across the Country to meet different service providers, had friends and relatives working in healthcare, or were embedded in patient groups. These patients were particularly interested in and well-equipped to improve the current services, and independently tried to collect new information of available alternatives elsewhere, e.g. through forums and informal conversations with peers, or through more elaborated searches. In Case 1, for instance, some patients had travelled across the Country to meet different service providers in order to improve their pain management. Talking with other patients with similar experiences, they had developed an up-to-date knowledge on available alternatives, before these had been published in scientific journals. These patients used the Internet to search more information and communicate them to their current providers to, at least, discuss new service options.

> ***Interview excerpt – Innovation 2***
> ***SC2:*** *Medical consultants are extremely busy, and our [time off clinics] has been reduced drastically. [In the few hours per week] we are expected to do audits, research, attend conferences and seminars, supervise students and juniors, participate in managerial meetings, write publications and applications etcetera. It's an impossible task. Capacity is a big issue. We need to look at job plans and decide if you want consultants to just be clinicians and look after patients. We should focus on the most complex patients. Then you give them capacity to be clinical leaders in the team, and innovators.*

These behaviors improved the relationship with clinicians, who welcomed these inputs from patients. Clinicians shared patient insights with peers during the multidisciplinary team meetings, or directly engaged patients in the innovation process. Across all sites, clinicians directly quoted patients' knowledge searches to legitimize changes in the services. Clinicians could then look at the literature "with new eyes"; liaise with external providers with similar experiences; develop better communications with these patients in the consultations.

> ***Fieldnote excerpt – Innovation 1***
> ***SC1:*** *Some patients are glorious goldmines of information, especially when they move from other regions. They carry insights on what others do. You would think that we know who does what everywhere and any time in the NHS, but there is no such knowledge system. So, what is not reported in conferences, seminars or journals is fundamentally unavailable to us… Those patients perhaps don't even realize how precious it was for us to know about the other experiences, because we could pick up the phone, call the colleagues and say: "We are trying to develop this new service, and this patient told us about you – can we have a chat?"*

Fourth, other patients were proactive *laggards*, i.e. they were latest to accept the established services and very vocal in expressing their skepticism and challenging clinicians. We derive the term "laggard" from Rogers (2003) and from observations in the contexts of Innovation 1, 2 and 3. Professionals did not use this term, but represented the following concept: some patients had bad experiences with the service providers or held specific misconceptions about traditional care. Hence, they were the hardest group of people to reach out. Unlike passive and reactive patients, these actors actively engaged with knowledge search, perusing "contrarian" views on what service innovations should do. In doing so, they challenged the status and decisions of their clinicians, and searched knowledge to identify alternative medications or services. Mental health workers were especially exposed to this risk. Patients perceived the stigma of mental health diagnosis, and search knowledge that could legitimize their decision not to attend psychological sessions.

This behavior deteriorated the relationship with clinicians, e.g. showing mistrust over their intentions and capabilities. Patients could refuse to attend the clinics, or to adhere to clinical decisions. Innovation 1 clinicians, for instance, reported how some patients refused to attend meetings with the psychologists despite complaining of anxiety and sleep deprivation, and stopped attending consultations with their acute specialist, who proposed the new service.

> ***Interview excerpt – Innovation 1***
> ***SC1:*** *In general, there is a lot of stigma with psychological services [as if] attending our clinics means they are crazy. These patients also have physical pain, so they wonder why they*

> *should attend psychological services. They think [acute specialists] are not taking their pain seriously and dump them to us. We try to explain we are investigating if there is any psychological distress, and perhaps doing that improves their pain management. But often, they do not attend, and go elsewhere.*

This behavior also deteriorated the innovation process. Clinicians accommodated some request from patients, which generated concerns over the maximum appropriateness.

> ***Fieldnote excerpt – Innovation 3***
> ***SC10:*** *It is quite evident that [changes] were made to accommodate what patients thought was best for them. I'm a bit conflicted about that, because we probably could be managing [this pathway] in a more innovative way. However, the evidence is not so clear to rule out [patients' expectations]. So I can see the problem of balancing the two… This proposal is very appropriate, but is it the most appropriate we could have delivered?*

Alternatively, clinicians excluded patients from the innovation processes to avoid making compromises on the quality of the service.

> ***Interview excerpt – Innovation 1***
> ***Health researcher:*** *A colleague received dreadful press and death threats because he dared to consider a psychological component to [organic symptoms]. Radical patient groups have views that may be contrary to how we should develop services… Scientists shouldn't be harassed for trying to understand the root causes for these challenging problems. A lot of people believe some very strange ideas around the origins of these types of conditions. You just have to look on the Internet to see some wacky views. People are entitled to have these views, but please don't lambaste the people doing some proper scientific work.*

Based on this evidence, we propose:

P1. Knowledge searches made by lead-users (perceived by professionals to be consistent with their logics of appropriateness) improve the relationship with professional providers, and support superior processes of innovation.

Lemma: Knowledge searches made by laggards (perceived by professionals to be inconsistent with their logics of appropriateness) degrade the relationship with professional providers, and support inferior processes of innovation.

Lemma 2: Knowledge searches made by passive/reactive users do not alter significantly the relationship with professional providers or the processes of innovation

4.2.Key features of lead-users

Professional tactics aimed at (i) motivating reactive and passive patients to engage more with knowledge search and (ii) reducing the risk that laggards gained momentum and supported inappropriate innovations. Overall, they hoped to "transform" these patients into lead-users. Three features characterized the lead-users. First, they were motivated to directly participate in the decisions about their care. Curiosity to know more about 'what is out there', and the desire to take responsibility for decision-making overcame the anxieties of knowledge search and decision-making. Second, they processed information and develop proper conversations with service providers without feeling subordinated to (or overwhelmed by) professional status. Third, they were aware of their personal limitations and the need to connect with more knowledgeable actors to make decisions.

> ***Conference excerpt – Innovation 3***
> ***Patient:*** *A few years ago, I decided to write about my life with [this disease], after a long history of misdiagnoses. [This innovation] meant a lot to me because of the signs that were missed in my life. I became part of [a steering group], and collaborated with [service provider]. I wanted to fight the stigma surrounding our condition [because] it leads to people not wanting to be open [and delaying cures]. We needed to approach it with experts, improving our lines of communication*

This evidence aligns with the concept of *patient activation* in the literature. Activated patients "believe they have important roles to play in managing their conditions, possess the knowledge needed to manage their health; take action, using their skills and behavioral repertoire to maintain their well-being; and stay the course under stress" (Hibbard et al., 2007; p. 1458). Activation is a combination of patients' resilience (i.e., remain proactive despite stress and adversities); and awareness of their role in the process of care (i.e. motivated to take responsibilities without interfering with the professional workforce). Activated patients (Fumagalli et al., 2015) engage in several behaviors – e.g. training, providing feedbacks, searching new knowledge – to overcome "the passivity of sick role behavior and [assume] responsibility for their care" (Aujoulat et al., 2008; p. 1229). Patient activation is likely to emerge from patients who have persistent conditions, which need continued observance, generate stigma or impair social life. Consistently with this, we thus propose:

P2: Patients with higher degrees of activation are more likely to perform appropriate forms of knowledge search oriented to service change or innovation.

Knowledge searches might be inhibited by a lack of access to traditional and virtual channels. Despite the broad diffusion of Internet, for instance, several patients did not have rapid access to it, or did not know how to meaningfully use these media. Patients' insecurity about their search skills generated additional anxiety that relevant information is missed, and that subsequent conversations with a clinician would reveal their limitations.

> ***Field-note – Innovation 4***
> ***SC7:*** *I promote the use of a new technology to almost all my patients. However, I need to be careful about their skills, and how they react. I cannot push it on patients, or this creates problems in our relationship. Some patients are reluctant, because they do not feel confident about their IT skills, do not care about new technologies, or just want to keep things as they are. [Changes] become an additional burden and responsibility for them, who already are in a fragile condition…*

Conversely, patients were more likely to explore new knowledge when they were confident in the use of traditional and virtual channels. Stronger access to traditional and virtual sources and stronger perception of control over these meant that patients also had (i) has greater confidence in the achievement of meaningful outcomes and (ii) has fewer concerns about unintended consequences. Patients might however become over-confident, and lower the level of attention in the selection and interpretation of new knowledge.

> ***Meeting excerpt – Innovation 1*** *[Discussing another innovation]*
> ***SC8:*** *They should have chosen a better name for the programme. That's one of my pet peeves: the notion that 'patients take the lead' [anonymized name] feels excluding of healthcare professionals that work in the wonderful multidisciplinary team around that patient.*
> ***SC3:*** *Well, most patients don't take [such names] too seriously…*
> ***SC8:*** *Agreed, but they accept the ethos. They ask: if 'patients take the lead', why am I not? The truth is that we must take the final decision, because we are accountable for it. This shift [in decision-making] cannot happen.*
> ***SC1:*** *It creates different expectations, I agree.*
> ***SC8:*** *Patient-centered care is a better term. It conveys the idea that [innovations] should put patients at the center of our decision-making, not at the top…*

Notwithstanding the actual capacity to find new knowledge, however, our findings suggest linear and positive effects of self-efficacy on task persistence. Hence, we propose:

P3: Patients with greater access and ability to use of traditional and virtual channels are more likely to engage with knowledge search.

4.3.Professional tactics to elicit appropriate search mechanisms

Across the cases, professionals invested on initiatives that sought to (i) elicit a more proactive and "innovative" response from the majority of patients, who either disengaged from any knowledge search, or concentrated only on the routine service delivery; (ii) reduce the chance that patients acted as laggards, who used knowledge searches to divert innovation processes towards inappropriate directs. Professionals were especially concerned for the threats of laggards, who remain "hidden" from their view and eventually acquire a "bigger voice" than others. In Innovation 1, for instance, a minority group of patients was so vocal that it threatened researcher and clinicians attempting to couple physiotherapy with psychotherapy.

> ***Interview excerpt – Innovation 1***
> ***SC1:*** *We decided to change name of the new service to prevent problems with "certain" patients, who don't accept the idea of psychological interventions. The former name and description of the service, we thought, had too much of a "psychological flavor", and were likely to disengage a significant amount of patients. So, we introduced more neutral terms, such as "distress" and "complex care" instead of "psychological complications".*

Noticeably, then, professional tactics were primarily designed to prevent problems from laggards, and subsequently to grasp opportunities from lead-users. Two tactics were especially salient to manage patients' knowledge searches within acceptable logics of appropriateness. First, professional providers worked to limit the 'stickiness' of scientific knowledge for patients. These initiatives involved communication events and the sharing of educational material to increase patients' basic knowledge and awareness of the logics of appropriateness. Across all innovation sites, clinicians used face-to-face consultations to provide patients with a first education on their condition, to collect information about patients' knowledge search, and to explain their decision-making. These conversations were not directly meant for innovation purposes, but created the background for patients' knowledge search as (i) clinicians collected information about patients' knowledge, to understand if and how they search knowledge; and (ii) patients prevented misunderstanding, disrupted false beliefs, and received clarifications on what knowledge was regarded as appropriate by the clinicians. In Case 1, some acute specialists built these conversations around a website, which included lay descriptions of medical conditions, diagnoses and therapies; debunking of false 'myths'; frequently asked questions; and links to portals where patients search knowledge in 'safe' environment, e.g. Cochrane Database.

> ***Interview excerpt – Innovation 1***
> ***SC7:*** *Our patients very often ask: what are the causes of my pain? Am I imagining it? What about the treatments? What should I expect? A colleague had the brilliant idea of developing a website to address these questions. I use it during consultations with the patients. Then they*

> *can google it at home and read it through… It is full of hyperlinks, and who knows where this leads them [chuckles]…*

In Case 3, conversations about the "appropriateness" of the services moved outside of face-to-face consultations. Public meetings, workshops and community events represented the key social environments in which clinicians communicated their intentions to improve the services, and elicited patients' inputs. Clinicians shaped patients' understanding of appropriateness by communicating their methodology and appropriate sources of knowledge.

> ***Interview excerpt – Innovation 3***
> ***SC9:*** *We have forums to receive updates from patients. Some read a lot of stuff from different sources, and talk to each other. Then, they ask: "what don't you do that?" Some idea is brilliant, most are not. These conversations happened only during consultations, where we have little time to explain what we can do with that information. In these forums, we can communicate our approach and methods, so it is clear what we can and cannot do, what is relevant and is not. We put them in the condition to help us.*

Elsewhere, interactions with patients did not address the problem of knowledge stickiness. In Cases 2, 4 and 5, workload pressures inhibited conversations and events with patients. Clinicians opted for the provision of leaflets, providing summary information about patient conditions, the rationale and nature interventions and useful links to collect more information. These initiatives suggest that professionals invested in the provision of basic *health literacy* to their patients. Health literacy represents "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Nielsen-Bohlman et al., 2004; p. 32). Higher degrees of health literacy are expected to increase the ability to "gain access to age and context specific information from a variety of different sources; discriminate between sources of information; understand and personalize health information that has been obtained; appropriately apply relevant health information for personal benefit" (Nutbeam, 2008; p. 2076). Hence, patients with greater health literacy should be more active and effective in searching new knowledge outside of the direct relationship with clinicians; and capable to engage with conservations with clinicians about such knowledge. We thus propose:

P4: Patients with greater health literacy display higher degrees of patient activation.

Lemma: Professional providers can increase users' literacy by carving time in their operational interfaces (e.g. face-to-face consultations) to explain their decision-making; implementing new interfaces (e.g. websites, leaflets) to publish their knowledge; and introducing short windows of contact (e.g. workshops, seminars) to discuss appropriate innovations.

Second, professionals worked to build a sense of reciprocity with the service stakeholders. The relationships between clinicians and patients are characterized by status differentials, as the former possess medical and experiential knowledge that is inaccessible to the latter. So, most patients usually leave the jurisdiction of knowledge search entirely to professionals; or are disillusioned about clinicians' behaviors and act antagonistically. Attempts to engage patients without a revision of this relationship failed to gain traction.

> ***Interview excerpt – Innovation 3***
> ***SC9:*** *The engagement of patients took a lot of time. Initially, we approached this issue naively, thinking that we just had to stick our heads out. We experimented with some patient forums, but the response was limited... We needed to be clearer about our intentions and what we asked from our patients. It was a hit-and-miss approach, while we realized we needed to develop a consultation process [and be clear about] how we collect information, what were the [inclusion criteria] and how we could use this.*

In Case 3, clinicians addressed this problem directly, and worked to increase patients' trust in their 'benevolence'. This included: being outspoken about the need and rationale for change, clarifying what kind of knowledge was useful and how the provided knowledge would be processed; publicly acknowledging patients' knowledge and feedbacks; generating occasions in which providers reported back to patients. By doing so, clinicians locked their innovation processes into acknowledging, while not necessarily incorporating, patient inputs.

> ***Fieldwork excerpt – Innovation 3***
> ***SC3:*** *We rejected some proposal, but we did not ignore them. We explained every decision by providing our rationale for including certain inputs and not others. Patients were stimulated to participate because one way or the other, they would receive something from the process. Either inputs were embedded in the innovation, or they learn why that information was not appropriate. They trusted we were not trying to screw with them or losing their time.*

Reassured patients organized to search and share knowledge. This materialized into a formal consultation process with patients, which included a website of the initiatives, public events where the initiative was presented; web forums, social media handles and other public forums with which patients could collect information about the initiative and share knowledge.

> ***Conference excerpt – Innovation 3***
> **Researcher:** *We have a great deal to celebrate. There have been a lot of important changes over the last few years. Our patients and providers have risen to the challenge developing a radical transformation of services... The event today has patients at the heart of it. Patients and patient representatives that I see today in the audience have been central to organizing this event and developing the format for today. You have entered the 'loop' a long time ago: let me emphasize that you have helped us raising our ambitions.*

Cases 2 performed similar actions "more timidly". Public consultations with patients were limited to the earlier stages of "knowledge scoping"; after which, clinicians and managers controlled the innovation process, and stopped eliciting patient inputs. Similarly, the other cases hid the existence of an innovation process from patients. In Case 1, clinicians used inputs from patients during the face-to-face consultations, but did not clearly state the existence of the innovation process to avoid the risk of losing its ownership. Clinicians did not request patients' knowledge search, so the innovation processes benefitted from the few patients who spontaneously engaged with this behavior. Following this, we propose:

P5: Patients with higher trust in the benevolence and competence of their providers display higher degrees of patient activation.

Lemma: Professional providers can increase users' trust in their benevolence and competences by exposing key steps of the innovation processes to the user community; explaining the rationale, requirements and boundaries of patients' knowledge searchers, clarifying the logics and practices used to select the relevant knowledge.

5. Quantitative research methodology

For a further validation of the induced model, we tested empirically its propositions on service users. Quantitative data for this study were collected through a face-to-face survey. Patients represented our unit of analysis, and all data came from primary sources. The survey focused on patients with chronic obstructive pulmonary disease (COPD). Information about COPD patients is strictly confidential, and not directly available to the public. Hence, for practical and ethical considerations, we involved 8 senior clinicians, who shared our interest in the factors influencing patients' knowledge search behaviors to (i) identify a list of patients, who were cognitively and psychologically adequate to provide reliable data; and (ii) discuss their participation to the research. 115 patients agreed to participate, and clinicians put these in contact with us. At this point, the fieldworkers clarified to patients that the survey exclusively had academic purposes; that all data would be handled with full confidentiality; and that there were no correct answers. 110 patients agreed to participate, and as many complete questionnaires were collected through face-to-face interviews. Sociodemographic control variables (age, gender, education and severity of the disease) were collected from respondents, and double-checked with clinical records (Table 2).

Table 2: Sociodemographic characteristics of the enrolled patients

Characteristic	Type	N	%
Gender	*Female*	37	34%
	Male	73	66%
Age	*41-50*	2	2%
	51-60	8	7%
	61-70	28	25%
	71-80	50	46%
	81-90	22	20%
Education	*Primary School*	32	29%
	Secondary School	34	31%
	College	29	26%
	Bachelor/Master Degree	13	12%
	Other	2	2%
Severity of the disease	*Level 0 (low severity)*	8	7%
Measured with mMRC scale	*Level 1*	41	37%
	Level 2	19	17%
	Level 3	20	18%
	Level 4 (high severity)	22	20%

Interviews were run by two authors and lasted on average 45 minutes. They took place in a dedicated room to guarantee privacy and comfort to patients. Clinicians ignored who the actual participants were, and did not take part to any interview to avoid any influence on patients. Clinicians did not have access to any individual questionnaire.

5.1.Measures

The questionnaire administered through face-to-face interviews included scales adapted from previous research. The measurement items were pre-tested by 8 senior clinicians and 10 patients (not included as respondents), who were asked to indicate whether these items were suitable and clearly phrased. Specifically, *Patient Activation* was measured with four items derived from Hibbard et al. (2005); *Use of (Traditional and Virtual) Sources of Information* were measured with three items for traditional sources and other three items for digital ones, both derived from Holtgräfe and Zentes (2012); *Health Literacy* was measured with three items derived from the Health Literacy scale by Chew et al. (2004) and Omachi et al. (2013); *Trust in Providers* was measured with five items derived from Anderson and Dedrick (1990). The scales for patients' *Knowledge Search* and *Improvement of Patient-Provider Relationship* were crafted by the authors for this specific study and measures with two items. Three considerations assured us that the two scales are suitable to test our propositions: (i) their contextual validity was validated by both providers and patients; (ii) collected data showed considerable variation in the answers, leading us to think that the items captured different opinions; (iii) the analysis also provided more than satisfying measurement properties. All manifest variables used to measure the latent variables are shown in Table 3 along with relevant indicators of convergent and discriminant validity.

Given that we relied on a single respondent design, we controlled for common method bias in two ways: through the design of the study and through statistical control (Podsakoff et al., 2003). Regarding the survey, we carefully pre-tested the items to ensure that ambiguous, vague or unfamiliar terms were not included; reassured respondents of confidentiality; emphasized that there were no 'correct' answers; and encouraged respondents to provide objective answers. The research project was labelled as a broad overview of the patients' knowledge search initiatives: no explicit reference to the intention to test antecedents or consequences was evident. Thus, the respondents' attention was not drawn to the relationships being targeted in this study. Questions including items and constructs related to each other in the general model were also separated in the questionnaire in order to prevent respondents from developing their own theories about possible cause–effect relationships. Finally, we used different scales and formats for the independent and criterion measures. As a second mean to ensure against common method bias, we examined the unrotated factor solution for the constructs included in our model checking that neither a single nor a general factor was likely to account for the majority of the covariance among the measures.

5.2.Results

Hypotheses were tested using structural equation modelling (SEM) with the maximum likelihood (ML) estimation method. Most SEM applications described in the literature are analyzed with this methodology. The hypothesized model was tested statistically in a simultaneous analysis of the entire system of variables to determine the extent to which it was consistent with the data. Where goodness-of-fit is adequate, the model can be seen as a plausible explanation of postulated interactions between constructs. The research model is analyzed and interpreted sequentially: first the assessment of the reliability and validity of the measurement model and secondly the assessment of the structural model. The R software (https://cran.r-project.org) was used to estimate both the measurement model and the structural model. The ML algorithm was used to obtain the paths, the loadings, the weights, and the quality criteria.

5.2.1. Measurement model

The measurement model consists of seven multi-item constructs with a total of 22 indicators. We used several tests to determine the convergent and discriminant validity of the reflective constructs. We controlled through an exploratory factor analysis that all item loadings between an indicator and its posited underlying latent variable were greater than 0.5 with no relevant cross-loadings. Next, all the measurement scales of the reflective constructs have been tested through confirmatory factor analysis (CFA). We verified the measures by assessing reliability and unidimensionality of each of the seven constructs, i.e. item-to-total correlations within each construct were examined. The measures also meet discriminant and convergent validity requirements: both composite reliability (CR) and average variance extracted (AVE) were above the recommended threshold of 0.7 and 0.5, respectively (Fornell and Larcker, 1981). Only the Patient Activation AVE is slightly below the threshold, but none of the constructs violates the Fornell-Larcker criterion. In particular we checked that the squared correlation between each pair of latent constructs does not exceed their AVE estimates (see Table 4). Finally, we evaluated the overall model fit in two ways (Hu and Bentler, 1998): with the chi-square goodness-of-fit statistic (which should be <2) and with other absolute and relative fit indices, namely we considered the comparative fit index (CFI) and Gamma hat or root mean square error of approximation (RMSEA). Overall the CFA reveals a sufficient model fit attested through such fit indices for the measurement model: χ^2=239.577; χ^2/d.f.=1.30; RMSEA=0.052; CFI=0.972.

Table 3: Measurement properties of reflective constructs from CFA (* = reversed)

Constructs	**Items (corresponding to the survey questions)**	**Loading**	**CR**	**AVE**
Health Literacy	I understand any information about my health	0.756	0.805	0.580
	I need other persons' help to understand information about my health*	0.803		
	I am confident in filling in all documents about my health and disease that the provider requires	0.735		
Trust in Provider	I do not think that my provider is taking care of me as a person	0.610	0.806	0.548
	My provider is taking into account my needs and put them in first place	0.713		
	I trust my provider so much that I try implement her recommendations	0.749		
	I trust my provider's judgement about my health	0.751		
	I think that my provider is doing everything she can to take care of me	0.879		
Patient Activation	I am confident I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition	0.554	0.712	0.387
	I know what each of my prescribed medications do	0.685		
	I am confident I can tell my health care provider concerns I have even when she does not ask	0.662		
	I can handle symptoms of my health condition on my own at home	0.592		
Use of Traditional Sources of Information	I can search information about health through the TV programs and newspapers	0.964	0.977	0.934
	I find difficult to search information about your health through the TV programs, newspapers, others sources but Internet	0.974		
	I can search information about your health through the TV programs, newspapers, others sources but Internet	0.961		
Use of Digital Sources of Information	I am able to search information about health on Internet	0.956	0.981	0.944
	I find difficult to search information about my health on Internet	0.994		
	I am used to search information about my health on Internet	0.965		
Knowledge Search	I often search new information about my health/disease	0.842	0.852	0.742
	I use different sources of information to search new insights on the management of my disease	0.886		
Improvement in Relationship with Provider	My understanding of providers' intentions has decreased in recent time*	0.808	0.904	0.826
	My appreciation for providers' recommendations has increased in recent time	1.016[a]		

Fit indexes: chi-square=239.577; p-value=0.004; chi/d.f.=1.30; CFI=0.972; RMSEA=.052

[a] *- On the legitimacy of coefficients above 1, please cf. Deegan (1978) and Joreskog (1999)*

Table 4: Correlation matrix

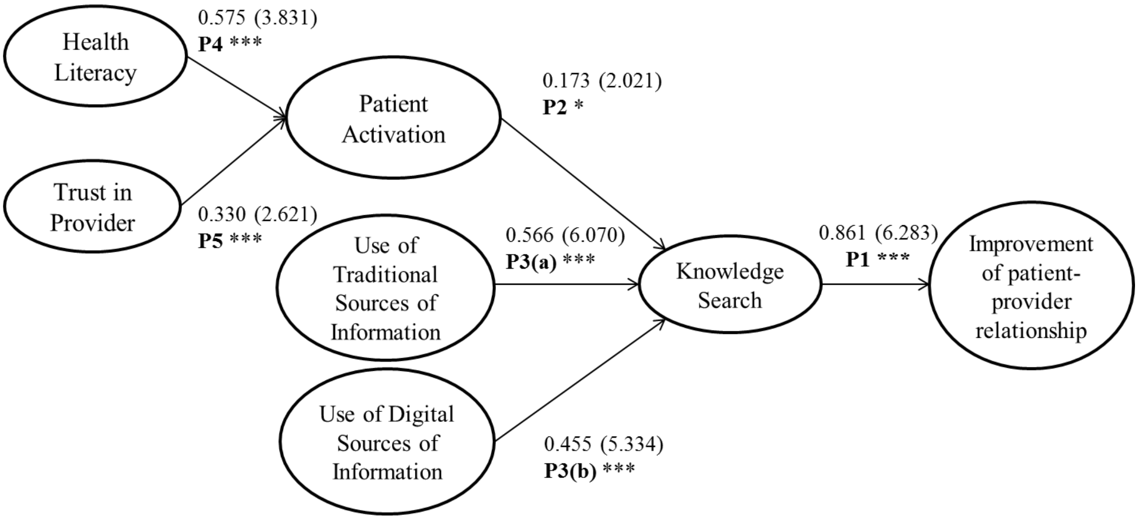
Variables	1	2	3	4	5	6	7
1. Health Literacy	**0.762**						
2. Trust in Provider	-0.072	**0.741**					
3. Patient Activation	0.515	0.298	**0.622**				
4. Use of Traditional Info	0.388	-0.085	0.357	**0.966**			
5. Use of Digital Info	0.411	-0.192	0.362	0.250	**0.972**		
6. Knowledge Search	0.394	-0.072	0.545	0.514	0.452	**0.861**	
7. Improvement of Patient-Provider Relationship	0.464	-0.118	0.370	0.659	0.583	0.622	**0.909**

The square root of the average variance extracted (AVE) is shown in bold on the diagonal. Correlations are in the lower triangle of the matrix.

5.2.2. Structural model

The postulated path model produced a sufficient fit to the data (χ^2 = 299.466; χ^2/d.f. = 1.55; RMSEA = .071; CFI =.947). Figure 1 shows the results of the propositions testing, which support all the hypothesized relationships. Specifically, Proposition 1 (P1) is confirmed, as the link between knowledge search and the improvement of patient-provider relationship was positive and significant (β = 0.861, t = 6.283). Noticeably, the 8 senior consultants could not report laggards among the 115 patients. Senior consultants noted the relationship with 'lag-user' patients had so deteriorated that the latter could not be contacted (hence providing additional qualitative support to our lemma to P1). The sample thus included patients who remained within acceptable (for clinicians) boundaries of appropriateness. P2 was also confirmed. The link between patient activation and knowledge search was positive and significant (β = 0.173, t = 2.021). Likewise, P3 was confirmed. The link between the use of traditional and digital sources and knowledge search were positive and significant (respectively, β = 0.566, t = 6.070; β = 0.455, t = 5.334). Finally, P4 and P5 were confirmed. Health literacy and trust in provider had positive and significant links with patient activation (respectively, β = 0.575, t = 3.831; β = 0.330, t = 2.621).

Figure 1: SEM Results



****p-value<0.001; **p-value<0.01; *p-value<0.05; the value of the test statistic is in brackets*
Fit indexes: chi-square=299.466; p-value=0.000; chi/d.f.=1.55; CFI=0.947; RMSEA=.071

6. Discussion

Healthcare providers are exemplars of professional service organizations whose logics of appropriateness demand the prioritization of clients' interests, while the complex knowledge prevents full user engagement (Von Nordenflycht, 2010). So, while some patients might help providers accessing otherwise remote knowledge; others might implement incongruous search mechanisms and demand inappropriate innovations.

Previous research in professional contexts did not address this conundrum, showing contradictory examples of user engagement, or successful cases of professionals protecting their status as sole 'arbiters of risk and appropriateness' (Currie et al., 2012). Research in private settings, instead, shows firms 'cherry-picking' knowledge from user communities, and only engaging lead-users in innovation processes (Greer and Lei, 2012). Our findings divert from both perspectives showing that professionals concentrate on the engagement of 'laggards', i.e. patients who are proactive like lead-users, but enact inappropriate search mechanisms. Laggards are a threat to established jurisdictions and logics of appropriateness, and cannot be kept at arms' length because they actually hid themselves from professionals' view; and nevertheless influence the design and implementation of service innovations with inappropriate ideas and expectations.

The focus on laggards explains the emphasis on literacy and trust – both understood as *the* way to reduce the threats of inappropriateness, rather than a way to increase the opportunities from their creativity. More specifically, health literacy initiatives designed the cognitive framework for patients' knowledge search. Professionals provided patients with the basic knowledge on their logics of appropriateness – so that patients could self-regulate their knowledge search. These findings resonate with the concept of *shared mental models* (Mathieu et al., 2000), i.e. the collective understanding of knowledge within a group of innovators. We import this concept from the teamwork literature. Different team members hold different interpretations of relevant outcomes, tasks, technologies and inputs for a given goal (Cannon-Bowers et al., 1993). Organizations are invited to 'unpack' the nature of these differences, realizing that the *variety* of perspectives and inputs improves decision-making and generates more creativity; while, the *separation* of values, beliefs and attitudes generates conflicts (Harrison and Klein, 2007). Shared mental models exactly generate consensus on the basic values and beliefs, without homologating the individual perspectives (Mathieu et al., 2008). We extend these considerations to the relationship between professionals and users. *Variety* is enabled by patients having perspectives on service innovation and access to specific sources of information, both unavailable to professionals. The threats of "separation" are however salient, once patients ignore professional logics and practices of appropriateness. The investments in health literacy are thus attempts to reduce the separation of values and beliefs through shared mental models on the basic logics of appropriateness; while preserving the variety of perspectives by remaining at arms' length on the specifics of knowledge search. By learning the language of their providers and understanding their decision-making process, patients partook in new cognitive frameworks of values, beliefs and methodological tools, and their knowledge search became meaningful.

Investments in competence/benevolence trust provided instead the affective framework for user engagement. Users need reassurances from professionals about how their inputs are processed otherwise they would disengage from knowledge search or become disillusioned. Our findings resonate with the concept of *organizational fairness* regulating the relationship between firms and employees (Colquitt et al., 2001; Fulmer and Gelfand, 2012). The social exchange theory argues that employees are more likely to engage with organizational citizenship behaviors if they expect to be reciprocated from their employer. Greater perceptions of organizational fairness increase expectations of reciprocity, which in turn increase employees' proactivity. Our findings extend these considerations to the relationship between professionals and users. The most effective healthcare providers managed patients' expectations, by increasing their trust in the fairness of the innovation process. Professionals made the process and criteria used to collect process patient inputs transparent. This transparency was the reciprocation expected by patients, who displayed greater participation and less disillusionment than in other context. This is a significant departure from more 'traditional' research on knowledge search and user-based innovation, which suggested that firms select capable and trustworthy partners, and then use weak ties to scan the knowledge generated by other actors (e.g., Greer and Lei, 2012; Levin and Cross, 2004). On the contrary, our findings suggest that trust-based and literacy mechanisms work in the other direction, i.e. professionals had to legitimize their decision-making to users, so that the latter would decide to adjust their search mechanisms to professional logics of appropriateness.

7. Conclusions

Our study investigated how professional organizations oriented the search mechanisms of their users to access remote knowledge while preventing risks of inappropriateness. Our findings highlighted the coexistence of lead-users, who proactively search new knowledge to reinforce innovations processes; and “laggards”, who proactively search new knowledge to challenge professional decision-making. Beyond the identification and engagement of lead-users, professional organizations worked to remedy the engagement of laggards through mechanisms of literacy and trust. By doing so, professional organizations created cognitive and affective frameworks within which patients could self-regulate their search mechanisms.

To conclude, this study has a number of limitations which call for further theoretical and empirical research. First, the paper focuses on a particular professional sector, i.e. healthcare, where the risks of inappropriateness resulting from the involvement of users in the innovation process are particularly severe. Furthermore, the relationship between patients and service providers is special, as the former is especially vulnerable and often likely to accept uncritically the decisions of their latter. It would be interesting to study whether and under what conditions the findings of this study hold true in other professional service contexts (such as law firms, universities or research institutions), where the risks of inappropriateness might not be so severe, where the status of professionals and service providers is earned through different mechanisms and where the overall regulatory context is highly idiosyncratic. While we believe that the healthcare industry is a particularly paradigmatic context, we expect that other professional service providers might adopt specific strategies to involve users in knowledge search processes without detriment to the appropriateness of the offered service. Unveiling these strategies represents a very promising venue for future research. Second, the quantitative approach we employed has an exploratory nature and it does not allow generalizing statistically the findings within and outside the healthcare industry. Our aim was to make generalizations to the existing body of knowledge regarding the involvement of users in knowledge search processes in professional organizations. We hope that these findings will inform future empirical studies that will test our findings and question their generalizability.

Despite these limitations, we believe that our study has offered a number of insights that will extend our understanding of knowledge search processes and hopefully inform the practice of service providers in professional organizations.

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