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Service design in healthcare: a segmentation-based approach

Jon Engström
Stockholm Business School, Stockholm University, Stockholm, Sweden
Olof Norin
Capio StGöran Hospital, Stockholm, Sweden
Serge de Gosson de Varennes
Pricer, Stockholm, Sweden, and
Aku Valtakoski
Department of Management and Engineering, Linköping University, Linköping, Sweden

Abstract

Purpose – The study aims to explore how segmentation as a methodology can be adapted to the healthcare context to provide a more nuanced understanding of the served population and to facilitate the design of patient-centric services.

Design/methodology/approach – The study was based on a collaborative project with a national healthcare organization following the principles of action design research. The study describes the quantitative segmentation performed during the project, followed by a qualitative interview study of how segments correspond with patient behaviors in an actual healthcare setting, and service design workshops facilitated by segments. A number of design principles are outlined based on the learnings of the project.

Findings – The segmentation approach increased understanding of patient variability within the service provider organization and was considered an effective foundation for modular service design. Patient characteristics and life circumstances were related to specific patterns of health behaviors, such as avoidance or passivity, or a persistent proactivity. These patterns influenced the patients' preferred value co-creation role and what type of support patients sought from the care provider.

Practical implications – The proposed segmentation approach is immediately generalizable to further healthcare contexts and similar services: improved understanding of patients, vulnerable patients in particular, improves the fit and inclusivity of services.

Originality/value – The segmentation approach to service design was demonstrated to be effective in a large-scale context. The approach allows service providers to design service options that improve the fit with individual patients' needs for support and autonomy. The results illuminate how patient characteristics influence health and value co-creation behaviors.

Keywords Health care, Market segmentation, Co-creation, New service development, Modularization, Service design

Paper type Research paper

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Introduction

Healthcare organizations are under strain due to the conflicting goals of person centeredness and service standardization (Keeling *et al.*, 2018; Tinetti *et al.*, 2012). As highlighted in transformative service research (Anderson and Ostrom, 2015; Ostrom *et al.*, 2015), healthcare providers increasingly seek to improve patient well-being by providing personalized services that match patients' needs, abilities, and preferences (Danaher and Gallan, 2016; McColl-Kennedy *et al.*, 2017b; Starfield, 2011). Service design, typically building on user involvement, prototyping and experimentation, has been presented as an effective method for creating more personalized healthcare services (Patrício *et al.*, 2020; Teixeira *et al.*, 2017). However, service design requires considerable time and expertise. Healthcare service design process is also often complicated by the challenges of involving diverse groups of patients and other stakeholders, and a lack of resources and training (Ramos *et al.*, 2021). The rising standards for treatment quality and the need to reduce costs raise further barriers for service design, as both increase pressure for service standardization rather than personalization (Bohmer, 2005; Kaplan and Porter, 2011), leaving vulnerable patients potentially underserved by one-size-fits-all services (Fisk *et al.*, 2018).

One approach that seeks to circumvent these issues is modular service design – the development of standardized service components with defined interfaces that can be combined to form unique combinations to meet patient needs (Voss and Hsuan, 2009). Modularization is a commonly proposed solution for combining service personalization with efficiency and scalability in healthcare (Bohmer, 2005; Porter *et al.*, 2013; Silander *et al.*, 2017; Vähätalo and Kallio, 2015; Wirtz, 2019). However, with some exceptions (de Blok *et al.*, 2014; Peters *et al.*, 2020), extant research on service modularity provides few guidelines on how exactly to develop modular healthcare services and how the variance in patient characteristics should inform modular service design (cf. McColl-Kennedy *et al.*, 2017b).

SALAR, an organization representing Swedish healthcare providers, had identified a need for service personalization in primary healthcare due to increasing patient heterogeneity and reliance on patients' self-management required by the rising prevalence of chronic diseases. Since customer segmentation had been found to be valuable for addressing varying customer needs in other service industries, SALAR decided to explore how segmentation could be useful in the healthcare context. This paper documents a collaborative action design research project (ADR; Sein *et al.*, 2011) between external researchers and SALAR. The objective was to explore how segmentation methodology can be adapted to the healthcare context, with the aims of improving understanding of the served patient population and providing a foundation for more patient-centric service design. The project consisted of problem formulation, a quantitative segmentation followed by a qualitative examination of segments, and workshops in which primary units used the segments in prototyping service modules.

Following the principles of ADR, our central contributions are expressed as design principles for the application of segmentation in similar contexts, derived from the problems and solutions faced in the project. We also highlight the practical contributions to the participating organization in terms of new knowledge and catalytic effects. The results also contribute to research on value co-creation in healthcare (cf. Elg *et al.*, 2020).

By adapting the segmentation method to the healthcare sector, our study contributes to service design in healthcare and other similar contexts. The contributions are summarized as the following design principles. First, the findings suggest that health behavior and their antecedents form an appropriate basis for identifying valid and actionable segments in healthcare. Manifest demographic factors (cf. Parkinson *et al.*, 2018) could not fully explain variations in patient value co-creation, re-emphasizing the importance of a holistic understanding of patients.

Second, to make full use of the segmentation approach, it should not be limited to the immediate design of healthcare services but also seen as a means to increase awareness of patient variability and as a catalyst for organizational sense-making regarding patients and their role in healthcare services. During and after the presented project the approach was used by the participating organization to initiate discussion about patients and the served population, and how their characteristics influence the provided services. This responds to Keeling *et al.*'s (2018) call for research on understanding healthcare from patients' individual perspectives rather than from the healthcare system point of view.

Third, we suggest that segmentation is an effective a precursor to modular service development. In the project, segmentation and modularization were successfully combined to divide the service design tasks into smaller parts and to visualize how parts of healthcare processes could be changed to improve their match with varying patient segments. This adds to literature on service modularization which has lacked research on practical approaches to modular service development (cf. de Blok *et al.*, 2014; Peters *et al.*, 2020).

Our study contributes to service research, more specifically on value co-creation in healthcare. Our findings illustrate how patient characteristics and life circumstances correspond with specific patterns of health behaviors, such as avoidance or passivity, or a persistent proactivity and eagerness for value co-creation (cf. McColl-Kennedy *et al.*, 2012). Patient characteristics and circumstances influenced their preferred role in value co-creation and what type of support they sought from the care provider. Our results thus highlight the importance of observing patient heterogeneity; patients' characteristics influence their behavior (cf. Anderson *et al.*, 2018). In particular, the segmentation approach can help to recognize and understand vulnerable patients and addressing their needs (Fisk *et al.*, 2018). While the approach is developed in a primary healthcare context, it is immediately generalizable to other healthcare contexts, and potentially to similar services such as social services that rely on the active and autonomous participation of clients.

Conceptual background

Effective healthcare service provision depends on value co-creation (Dellande *et al.*, 2004; McColl-Kennedy *et al.*, 2012, 2017a; Seiders *et al.*, 2015; Sweeney *et al.*, 2015). Value is created when patients and service providers interact by combining their resources and capabilities to improve patient well-being (McColl-Kennedy *et al.*, 2012; Vargo, 2008). Patient co-creation behavior thus affects both treatment outcomes (Hibbard *et al.*, 2015) and costs (Hibbard *et al.*, 2013). Value co-creation occurs both in *in-clinic context* at service providers' premises through direct interaction between patients and service provider, and in *ex-clinic context* through patients' independent action (Sweeney *et al.*, 2015). Healthcare providers can influence patient behavior through service design (Patrício *et al.*, 2020). However, finding suitable design is complicated by the heterogeneity among patients and the multitude of factors affecting patient behaviors (Anderson *et al.*, 2018).

Healthcare service design

Service design is a human centered, holistic, creative approach for creating new services (Blomkvist *et al.*, 2010). By thoroughly exploring users' individual and contextual experiences, and using an iterative process of prototyping, service design can create services that facilitate value co-creation (Yu and Sangiorgi, 2018). The approach is well-suited for developing complex services such as healthcare services, given that these services rely on a network of actors to co-create value and are increasingly affected by the infusion of technology (Patrício *et al.*, 2020; Teixeira *et al.*, 2017).

However, since the attitudinal and behavioral characteristics of patients vary greatly it is difficult to design services that meet the needs of all patients equally well. A service designed for one patient group can be ill-suited for patients with different characteristics, leading to undesired patient behaviors and less-than-optimal treatment outcomes. At worst, one-size-fits-all designs may lead to the exclusion of vulnerable patients (Fisk *et al.*, 2018). Furthermore, extensive service personalization is usually prohibitively expensive (cf. Porter *et al.*, 2013).

A proposed solution for balancing patient-centric customization with efficiency gains from standardization is service modularity (Sundbo, 2002). Modular services consist of loosely coupled, relatively independent components with a specific function and standardized interfaces with other modules (Voss and Hsuan, 2009). Once defined, service modules can be improved independently and combined to form service configurations that meet a patient's individual needs (Silander *et al.*, 2017). Service personalization during delivery can be achieved through matching standardized service modules with customer's needs and capabilities (de Blok *et al.*, 2013).

Extant literature suggests the usefulness of modular healthcare services (Bohmer, 2005; Porter *et al.*, 2013). For example, Vähätalo and Kallio (2015) argue that modularity is beneficial precisely because it allows healthcare services to be customized to meet the heterogeneous individual needs of patients. However, prior research has not systematically addressed how to design modular healthcare services or how to match them with the patient characteristics. For instance, de Blok *et al.* (2014) discuss modular service development, focusing on the creation of standardized interfaces between modules. They suggest that individual patient needs should be attended to, but do not elaborate what kind of needs should be observed, or how these needs would lead to specific service modules. Similarly, Peters *et al.* (2020) highlight the importance of module interfaces in a healthcare network with multiple service providers, yet do not address how to incorporate the varying needs of patients in service design. Broekhuis *et al.* (2017) describe modular healthcare service development process from healthcare professionals' perspective, but exclude patient involvement and a detailed analysis of patient characteristics.

Segmentation and health behaviors

Patient segmentation refers to identifying homogeneous groups of patients that are likely to behave similarly given a specific service design (cf. Wedel and Kamakura, 2012; Chong *et al.*, 2019). Multiple scholars have advocated the value of segmentation for healthcare service development (Bohmer, 2005; Porter *et al.*, 2013), healthcare planning (Lynn *et al.*, 2007) as well as the promotion of health behaviors (Andreasen, 2002). Although patient segmentation has indeed been employed in the healthcare context (Chong *et al.*, 2019), its use has often been limited to studies on how to communicate with different patient groups (Maibach *et al.*, 1996). Furthermore, much of this research has relied solely on surface-level characteristics such as medical information and demographics (Chong *et al.*, 2019).

To understand patients more comprehensively, we build on research on health behavior. Health behaviors are observable actions taken by patients in relation to the maintenance, restoration, and improvement of health (Gochman, 1997). These behaviors can be divided into two main categories (cf. Table 1): *in-clinic* and *ex-clinic* activities (Sweeney *et al.*, 2015). The former comprises treatment compliance, active information sharing, proactive involvement in decision making, and interaction with healthcare professionals, while the latter involves health-promoting activities (exercise, maintaining a healthy diet), assessment of illness, and management of illness and self-care. While generally positive, health behaviors may also be maladaptive; examples of these include smoking, poor diet, avoidance and denial (Glanz *et al.*, 2008).

Patients' health behaviors vary in nature and intensity, and range from passive compliance to proactive, coordinating behavior (McColl-Kennedy *et al.*, 2012). Patients are more likely to undertake behaviors that require little effort (Sweeney *et al.*, 2015). Patients with chronic illnesses are commonly strained by the need to coordinate between healthcare providers simultaneously with managing personal and economic issues caused by their condition (Tran *et al.*, 2015). In extreme cases, patients may even seek to avoid treatment and interaction with healthcare professionals (Moore *et al.*, 2004). Two ex-clinic behaviors are particularly important in primary care: patients' use of Internet resources to learn about their disease and self-diagnose (Dutta-Bergman, 2005) and the use of alternative medicine and its

Table 1.
Overview of health behaviors

Category	Specific behaviors	References
In-clinic health behaviors Health behaviors related to direct interaction with service provider	Compliance with instructions	Dellande *et al.* (2004), McColl-Kennedy *et al.* (2012), Gallan *et al.* (2013) and McColl-Kennedy *et al.* (2017)
	Information sharing	Sweeney *et al.* (2015) and Gallan *et al.* (2013)
	Involvement in decision making	Sweeney *et al.* (2015), Jung *et al.* (2003) and McColl-Kennedy *et al.* (2012)
	Interaction with staff	Sweeney *et al.* (2015) and McColl-Kennedy *et al.* (2017)
Ex-clinic health behaviors Health behaviors related to patient's independent treatment adherence and proactive health maintenance	Information search	Sweeney *et al.* (2015), McColl-Kennedy *et al.* (2012) and Dutta-Bergman (2005)
	Adherence to treatment plan	McColl-Kennedy *et al.* (2012) and Dougall and Baum (2011)
	Maintaining healthy diet and habits	Dougall and Baum (2011), Sweeney *et al.* (2015) and McColl-Kennedy *et al.* (2017)
	Seeking peer support	Seweney *et al.* (2015) and McColl-Kennedy *et al.* (2017)
	Use of complementary therapies	McColl-Kennedy *et al.* (2012) and Frass *et al.* (2012)
	Coping and stress management	Sweeney *et al.* (2015) and McColl-Kennedy *et al.* (2017)
	Avoidance behavior	Moore *et al.* (2004)

disclosure to healthcare professionals (Frass *et al.*, 2012). Despite the importance of health behaviors for treatment outcomes, aside from smoking and exercise relatively little is known about how people's health behaviors vary (Conner and Norman, 2017).

Research on healthcare services has identified a broad range of factors that influence patient behavior. These include psychological (Gallan *et al.*, 2013; Zainuddin *et al.*, 2011, 2013) and social antecedents (McColl-Kennedy *et al.*, 2017a; Scambler, 2008) and further factors such as mental capabilities, personal traits, preferences, and financial circumstances (Anderson *et al.*, 2018). Factors that affect patient behavior are also commonly discussed in research on primary care and health behavior (e.g. Noar and Zimmerman, 2005).

In the following, we review and summarize the most important factors influencing health behaviors as indicated in prior research. We drew on previous reviews of health behaviors, including Glanz *et al.* (2008) on health behaviors research, Conner and Norman's (2017) review of key determinants of health behaviors, and Smith *et al.'s* (2017) compendium of the most important determinants of health behaviors. Following Smith *et al.* (2017), we divided the identified factors into four groups: Demographic factors; Traits, emotions and self-beliefs; Subjective well-being; and Social factors.

Demographic factors. Health behaviors correlate with *demographic factors* such as age, gender and socio-economic status. For example, women tend to engage more in preventive health behaviors than men (Schünemann *et al.*, 2017). Socio-economic status and age are positively related with positive health behaviors (Berrigan *et al.*, 2003). Demographics also influence co-creation preferences in healthcare (Jung *et al.*, 2003): more affluent and more highly educated patients prefer active participation; younger patients and females emphasize preventive care; and older and less educated patients prefer a more traditional role while seeking continuity in healthcare.

Traits, emotions, and self-beliefs. Health behaviors are also affected by a patient's internal psychological and cognitive processes, including *personal traits, emotional states and beliefs* *about themself and the world*. Although simplified personality traits are often criticized (Boyle, 2008) they are still useful for explaining health behaviors. For instance, impulsivity is associated with risky behaviors such as drug abuse (Vollrath *et al.*, 1999). Illness and treatment can induce negative emotions in patients. In particular, anxiety felt during threatening situations influences most aspects of behavioral self-regulation and often leads to maladaptive behavior and depletion of willpower (Cameron and Leventhal, 2003).

Other negative emotions such as powerlessness, hopelessness, and loneliness are associated with insufficient preventive health behaviors (Hawkley and Cacioppo, 2010; Nemcek, 1990). For example, hopelessness is related with depression, apathy, and reduced motivation to act (Raleigh, 2000). Positive emotions can also influence health behaviors; when patients feel good, their thinking becomes more creative, flexible, and open to new information, leading to novel ideas, actions, and social bonds (Fredrickson, 2001). For instance, a study on healthcare co-creation found that customer positivity stimulated patient participation, which in turn improved perceived quality and satisfaction (Gallan *et al.*, 2013).

Beliefs – the espoused assumptions of patients about themselves and the world - can also affect health behaviors. Relevant beliefs include the perceived risks of developing an illness, the expected severity of illness, sources of illness, and perceived ability to influence one's health (Nemcek, 1990). The patient's belief in their own abilities (e.g. self-efficacy or sense of competence) is a well-established predictor of positive in-clinic and ex-clinic behaviors (Ng *et al.*, 2012). The sense of relatedness (the belief that one is cared for) and autonomy are also important, particularly for positive long-term ex-clinic behaviors (Ng *et al.*, 2012).

Subjective well-being. Well-being, or quality of life, refers to patients' subjective, global assessment of satisfaction with their lives, and has emotional and cognitive components (Fox, 2004). Patients' perception of personal well-being correlates with their health behaviors, as the sense of well-being and motivation have the same sources. When a person's psychological needs of relatedness, competency, and autonomy are met, they are likely to experience well-being and motivation to engage in positive behaviors (Ryan and Deci, 2000). A person who lacks a sense of well-being is consequently at risk of a vicious cycle, whereas positive well-being can induce a virtuous cycle.

Social factors. Patients are also influenced by social factors related to their relationship with friends, family, and other social groups. Social relationships influence behaviors by reinforcing social roles and norms and by shaping the beliefs of individuals. A social network of relationships can be a resource providing emotional, informational, and economic support, thus enabling health behaviors (Berkman *et al.*, 2000; Ferlander, 2007). Social relationships also influence the psychological antecedents for behavior; for example, personal relationships directly affect relatedness, a basic psychological need (Ryan and Deci, 2000).

Stressors that negatively influence patients' well-being and behaviors may emerge in the social and material environment. Stress can be a motivating factor, as individuals seek to insulate themselves from the stressors through psychological adaptation or concrete action (Dougall and Baum, 2011). While short-term stress is typically manageable, longer-term stress can both directly and indirectly affect the onset, progression, and treatment of major diseases (Dougall and Baum, 2011).

Overview of project

The research project was motivated by the practical problems faced by SALAR member organizations in providing healthcare services for diverse patient groups with increasing numbers of chronic patients. The project began as an internal initiative that aimed at developing a segmentation model for primary care. Gradually, the project developed into an action design project (ADR, Sein *et al.*, 2011) between SALAR employees and external researchers, thus encompassing both practice and academic research systems (Elg *et al.*, 2020).

Two co-authors attended to both practical and theoretical aspects as they were hired by SALAR for the project (a physician, MD PhD, and a mathematician consultant, PhD) but were also interested in its academic relevance. The practice system was also represented by two nurses and two healthcare improvement professionals. The other two co-authors were external researchers. One had theoretical understanding about service design and health behaviors and participated in the collection of qualitative empirical data, while the other provided expertise on service modularization and contributed to the conceptual development of the segmentation approach.

The project consisted of four steps, summarized in Figure 1. First, the problems and the objectives for the project were defined. In the second step, a holistic segmentation model was developed based on literature on health behaviors and applied in a survey-based study of the population. Following the successful identification of segments we conducted in-depth interview study of patients in a physical healthcare center to evaluate and validate the identified segments and to better understand the variation in individual behaviors in relation to segments and their implications for value co-creation. Finally, the utility of the identified segmentation model for modular service design was explored in two service design workshops with primary care professionals. Following action research principles the results were communicated within the participating organizations throughout the process.

Ethical considerations

The web-based survey targeted the general population and was conducted with SALAR as the principal using a trusted partner. The findings were documented in a report in Swedish on SALAR's website. No personal data were collected by the partner on behalf of SALAR, and at no point did the authors have information traceable to an individual. The interview study of patients required ethical approval, which was granted by the Regional Ethical Review Board. All participants gave written consent to participate and were informed that they could withdraw at any point. We used fictitious names in the reporting of participants. No ethical concerns were raised by the workshops with professionals.

Step 1. Defining objectives

Healthcare organizations currently face the challenge of providing a more personalized and responsive primary care that would better support patient autonomy. SALAR searched inspiration for service development from both within and outside of healthcare services. In particular, SALAR's contacts with a national grocery chain known for its high customer satisfaction proved influential. Despite the obvious differences between primary care and grocery stores, there were also marked similarities. The over thousand mostly independent outlets of the grocery chain throughout Sweden resembled primary care centers both in terms of number of stores and their geographical distribution. The grocery chain had successfully

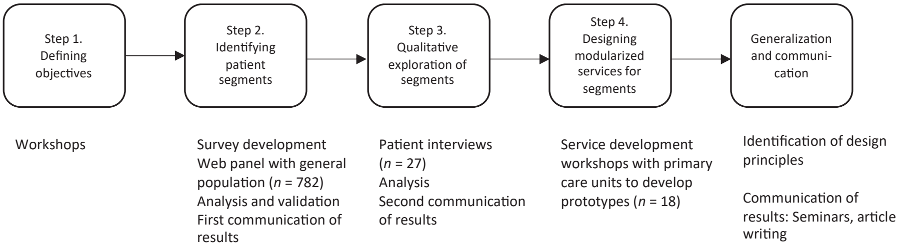

Figure 1.
Overview of the design action research project

used customer segmentation to help the local stores to understand what segments they serve and to adjust their assortment accordingly.

The project team thus set out to test segmenting patients according to characteristics that are meaningful in a primary care context, with the purpose of being able to better meet their needs. The objective was to develop a model that would be relevant across the broad range of primary care centers, including thousands of units that were geographically widely dispersed. Furthermore, any adopted method would need to be accepted and deemed useful by healthcare professionals. If this succeeded, the second objective was to find practical uses for the approach that could improve the patient-centricity of the services provided by the local units that typically had little experience of design methodologies and management principles such as segmentation, and often had to make do with limited resources.

Step 2: Identifying patient segments

The survey instrument was developed collaboratively. We sought to include the most important patient characteristics affecting health behaviors identified in previous research, while relying on the healthcare professionals' assessment of their relevance for the primary care context. These factors are outlined in the conceptual framework, in the section *Segmentation and health behaviors*. Specific measurement scales were drawn from previous research. Constructs included in the instrument include quality of life, ex-clinic co-creation, in-clinic co-creation behaviors, and factors influencing these behaviors, with some context-specific measures developed with the health professionals. The final instrument consisted of 69 items, including background questions (see Appendix 1).

The data were collected using an anonymous web-panel. After excluding outliers, the useable sample comprising 782 Swedish individuals aged over 18. The sample corresponded well with national population distributions of gender, age and education, with a slight overrepresentation of persons aged 55 and over and persons with tertiary education.

The segments were identified iteratively using the Self-Organizing Map (SOM) method based on unsupervised pattern recognition and learning (Wehrens and Buydens, 2007). During the iteration the number of segments was varied and items that did not discriminate between the segments were excluded. The iteration process was considered complete when a stable segmentation model with sufficient face validity emerges (Mooi and Sarstedt, 2010). Criterion validity was assessed by investigating inter-segment differences in criterion variables – outcome variables that have a theoretically expected relationship with the segmentation variables. The differences between segments in well-being and satisfaction as outcomes were significant for 4 and 5 of the possible 6 differences, respectively. The face and expert validity of the emerged segmentation model were assessed by the participating SALAR practitioners and an outside group of healthcare professionals. Both deemed the segmentation satisfactory.

Findings

The segmentation process identified four distinctive patient segments, named *Proactives, Searchers*, *Traditionalists and Vulnerables,* described below. Crucially, the segments were not uniquely defined by demographics; each segment includes a full range of demographic characteristics, suggesting that the segments are primarily distinguished not by demographics but by differences in further individual characteristics and social factors. The demographic profiles and key characteristics of the four identified patient segments are reported in Appendix 2.

Segment 1: Proactives. This segment covered 45% of the sample. The segment was above average in terms of age (54), the proportion of retirees and college educated persons.

Proactives had above-average self-reported quality of life, health, competence, relatedness, and autonomy. They were also significantly more involved in social activities and experienced less than average stress. They were particularly willing to engage in value co-creation, related to both disease prevention and treatment.

Segment 2: Searchers. The second segment included 24% of the respondents. The average age was 45 years, with a bimodal distribution of young and elderly people, and disproportionately fewer respondents aged 40–50. Fifty-seven percent were female, with a near average level of tertiary education. The segment had the lowest share of fulltime employees, above average share of retirees and persons living in single households (31%; average 21%).

Searchers reported somewhat lower levels of sense of competence, relatedness, and autonomy than Proactives, and the highest sense of loneliness and an above-average sense of hopelessness. Their willingness to engage in in-clinic and ex-clinic health behaviors was above average, and they reported the highest level of information seeking behavior. Significantly more than the other segments, they feared having a severe disease and experienced higher degrees of discomfort and anxiety in contact with healthcare. Compared to Proactives, Searchers were significantly more avoidant of healthcare, and were prone to seeking alternative treatments. Their stress levels were higher than average, particularly in relation to emotional, physical, or relational problems. In comparison to other segments, they were more interested to be interact with peers with similar health-related issues.

Segment 3: Traditionalists. Segment 3 constituted 25% of the sample. The average age was 46 years, with an above-average share of youngest and oldest individuals. In this segment, 36% were female, 50% had attended college, and 20% were retired. Traditionalists scored average on a wide range of dimensions, including quality of life, sense of competence, relatedness, autonomy, healthcare discomfort, anxiety, levels of stress, and number of social contacts. The key dimension differentiating Traditionalists from the first two segments was the notably low levels of self-reported willingness for value co-creation in proactive health behaviors and in-clinic activities.

Segment 4: Vulnerables. Segment 4 is the smallest segment, representing only 6% of the respondents. Yet, it emerged most consistently during the segmentation process. Vulnerables were 60% male. Their level of education was lower than in the other segments – only 35% had a college degree. Vulnerables scored significantly lower than the other segments on many variables, including well-being, subjective assessment of own health, perceived competence, autonomy and relatedness, and proactive behaviors (particularly very low on exercise). They had significantly low willingness to participate in in-clinic co-creation. They found it harder than other segments to make difficult decisions. In comparison to the other segments, they participated less frequently in social activities and were prone to think that there nobody would support them in case of a health-related problem. By contrast, their levels of health and healthcare related anxiety were slightly below average. Vulnerables experienced significantly higher stress than the other segments due to issues with their financial situation and emotional, physical, or relational problems.

Discussion

The four identified segments of primary healthcare patients demonstrate the importance of accounting for more than patient demographics when designing healthcare services. Although the segments varied in terms of demographics, the differences in behavioral characteristics and evaluations of healthcare were more prominent, even between demographically similar segments. For example, although Searchers and Vulnerables were demographically similar, their attitudes towards proactive health behaviors diverged markedly. Given that patient-centric care depends on the patients' willingness for co-creation, a standardized service design would likely result in vastly different treatment outcomes for the two segments.

Step 3. A qualitative exploration of the identified segments

To evaluate the validity of the four identified segments and to further explore the associated patient attitudes and behaviors, we conducted a qualitative study of patients *in situ* – in an actual healthcare context in conjunction with a primary care visit. Through interviews with patients, we explore how and why patient characteristics are related to patient behaviors, preferences, and satisfaction with existing services. We interviewed randomly selected patients at a primary care center in a suburb of Stockholm, Sweden. This primary care center was chosen because its patients were representative of the population at large in terms of diversity of age, socioeconomic status, and ethnicity. The interviewees were recruited at the waiting room of the center. Of the 60 patients approached 27 (19 female, 8 male) agreed to participate. Those who declined mentioned time constraints or provided no reason. The age of interviewees ranged 18–94 years, with an average of 57 years. Nineteen were born in Sweden and eight abroad.

Two of the authors conducted the semi-structured interviews separately. The interview guide followed the themes included in the survey, including subjective well-being and health; in-clinic and ex-clinic behaviors and preferences; traits, emotions, and beliefs; participation in social life and access to social resources. The interviews lasted between 11 and 47 min. We use pseudonyms to preserve interviewee anonymity.

The interviews were recorded with permission of the interviewees and transcribed into text. Two of the authors analyzed the data with the directed content analysis method described by Hsieh and Shannon (2005) facilitated by NVIVO software. The texts were coded independently based on the pre-agreed coding scheme according to the themes of the interview guide. Examples of used codes include "healthcare avoidance", "takes active role in decision making", "fears and anxieties", and "trusts healthcare". Inter-rater reliability measured with Cohen's kappa was 0.54, acceptable for explorative qualitative analysis (McHugh, 2012).

The two authors also independently categorized each interviewee into the four identified segments based on resemblance with the segments' characteristics and assessed how well the interviewees fit with the proposed model. The coders agreed on the categorization of 21 of the interviewees, yielding a Cohen's kappa of 0.63. The remaining six cases were discussed and categorized together.

Findings

The findings, summarized in Table 2, were largely consistent with the segmentation model in Step 2. In the following, we discuss in more detail three main themes: ex-clinic behavior and attitudes toward health, in-clinic behavior, and satisfaction with healthcare services.

Ex-clinic behaviors and attitudes. There were marked differences in attitudes towards personal health between the four segments, relating to the prospects and the possibility to influence well-being and health. The Proactives and Traditionalists maintained an optimistic attitude towards health and had a science-based understanding of the causes of disease, citing factors such as germs, heredity, diet, smoking, and environmental factors. While Proactives viewed their health and well-being as something they could manage using their own abilities, social networks, and healthcare providers, the Traditionalists regarded that their health was somewhat beyond their control.

Both Searchers and Vulnerables had a negative, anxious attitude towards health, combined with a sense of lack of control. Interviewees in these two segments referred to scientifically based causes of illness, but also referred to stressful social and psychological factors. Some had espoused alternative explanations such as destiny or toxins for their poor health. Searchers were typically motivated to act to improve their health and reduce anxiety. In contrast, among Vulnerables, the anxiety, coupled with a lack of self-confidence, stressful life situations, and poor resources, led to a more passive attitude. Elisa (F, 80, Vulnerable), an

Proactives	Searchers
Ex-clinic behaviors *Proactive health behaviors*: "I eat well and exercise. My mum is very health conscious and gives me tips and products!" Louise (F, 18) *Active information search*: "I use keywords and look at the results, and then I review everything, and look for what we might related and factual or if there are some inaccuracies." (Kerstin, F, 73) *Trusts medication:* "I do [trust medication]. Otherwise, we would not have the life expectancy we have today. But generally, we use drugs too often." (Lisa, F, 28) *Conditional adherence*: "I might buy the prescribed drug and never use them. It's happened a couple of times." (Kerstin, F, 73) *Peer support if benefits*: ". . . I feel I can solve things myself . . . I rather talk to my family." (Lars, M, 51) "Mm, yes, I might consider that . . . to find out if there are alternatives, if you are operated on, which alternative is most advantageous." (Stina, F, 44) *In-clinic behaviors* *Contacts healthcare only if necessary:* "I wait. It depends on the illness." (Carina, F, 46) *High involvement:* "Yes, I want to be involved and to take decisions . . . I want to know all alternatives, so that I can be involved to think and express my view." (Stina, F, 44) *Satisfaction with services* *Largely satisfied*: "It's available, close and always open, so I'm satisfied." (Kerstin, F, 73) *Prioritizes availability*: ". . . fast [contact] and to get an appointment is very important. It could be enough with just a 15-min visit." (Lisa, F, 28) *Changes provider or looks for second opinion:* "For the first time I've received an x-ray. This is my third primary care center." (Lisa, F, 28)	*Ex-clinic behaviors* *Anxiety over heath:* ". . . I do absolutely feel worried if I experience a symptom and think of what it might be . . . It causes both concentration problems, and I may also become distracted [at work]." (Erik, M, 31) *Active information search*: "I am very good at that [laughs] . . . I want to have like 78 different sources of information on the internet [. . .]. But I also have a very critical view on what I read." (Erik, M, 31) *Scepticisms towards medications, positive to alternatives:* "I think people take too much, it would be possible to avoid a lot of medications." (Eva, F, 58) "I think alternative medicine is something we need to give more respect." (Maryam, F, 61) *Conditional adherence*: "It depends. I had gastritis a while ago and got some medicine . . . but I did not feel well on it and then I quit of course." (Eva, F, 58) *Peer support for emotional support*: "I'd love it. [. . .] others that have not experienced it do not understand as well" *In-clinic behaviors* *Contacts healthcare quickly (or avoids):* "No I never wait, I call directly. Because you never know what it might be". (Betty, F, 18) High involvement: "Of course I want to be involved in it, much, much more than anybody else. I think healthcare has to show respect for the patient's view." (Maryam, F, 61) *Satisfaction with services* *Dissatisfaction due to lack of personal connection*: "Some doctors seem to put a diagnosis before they have listened to what you have to say." (Erik, M, 31) *Distrust*: ". . . when I have mammography, sometimes I pray to God that I will not get cancer, since I will not get the treatment, it takes a lot of time." (Bahareh, F, 51)
Traditionalists	Vulnerables
Ex-clinic behaviors *Unconcerned attitude:* "No, I'm not like that as a person that worry and stuff. Not even now that I have had huge problems with the stomach, and they keep looking for what it is. Then I think, 'it is what it is.'" (Aliya, F, 23) *Limited proactive health behaviors:* "My kids are yelling at me I weigh too much and that I keep eating wrong, and too much sugar and exercise too little and so." (Olov, M, 59) *Limited information search:* "I am who I am, and my health is what it is, so I do not care [to search for information]." (Gerd, 83) *Trusts medication:* "I'm pretty positive about medications . . . I think they do more good than harm." (Olov, M, 58) *Distrusts alternative medicine:* "It is just humbug. And they'll make lots of money on a lot of crap." (Gerd, F, 83) *Adheres to treatment:* "What the doctors prescribe, you have to take." (Farid, M, 76) *Limited interest in peer support:* "No more dinosaurs!" (Evert, 83) *In-clinic behaviors* *Seeks help only if necessary:* "I do not call, one should tolerate a little bit. I had pneumonia last fall and they told me, 'You have to go to the doctor!' 'No,' I said, 'what will they do?' I'm waiting for the appointment I already have." (Gerd, F, 83) *Lower level of involvement:* "The doctor has the last word, if you trust him." (Farid, M, 76) *Satisfaction with services* *Largely satisfied:* "I feel welcome, and I trust my doctor." (Lisbeth, F, 81) *Accepting limitations:* "I whine sometimes when they do not do what they should, but I trust them." (Torsten, M, 87)	*Ex-clinic behaviors* *Fatalistic and pessimistic attitude:* "There are no guarantees. You hear about people who exercise, eat well, and do everything right, and it still goes bad." (Anna, F, 73) *Limited proactivity:* "I try but sometimes it does not work . . . I do not know, but I think that sometimes it is just not possible." (ELisa, F, 80) *Limited information search:* "Maybe Google a little bit on what to eat and what others think. But not much of that." (Anna, F, 73) *Lack of sense of competence:* "I'm not very outgoing and so I find it hard to get started on the things I need to do and would probably isolate myself and stuff. I am quite ill-equipped, I think." (Anna, F, 73) *Disinterest in peer support:* "I do not think [I would be interested]. It depends on the subject. It is a very difficult question." (ELisa, F, 80) *In-clinic behaviors* *Stress in clinical settings:* "I am terrified of hospitals; I avoid them as long as I can. I am very afraid of getting anything unpleasant, I really am." (Anna, F, 73) *Limited involvement:* "It is good to get information because there are some things that ordinary people cannot [understand] . . . we who are not educated in healthcare, we do not know much, and it is better to get the information." (ELisa, F, 80) *Desire support:* "It feels good when you notice that someone cares, and not just hands out pills." (ELisa, F, 80) *Satisfaction* *Pronounced dissatisfaction:* "I do not like them here . . . I just want a doctor I can talk to." (Stefanie, F, 38) "I think you always get pretty treated badly by the doctor; [they] always gets angry and annoyed when I have been there and do not think you get that much help." (Anna, F, 73)

Table 2.
Overview of health behaviors and satisfaction per patient segment

immigrant, had a crippling concern about her health, which was poor due to work injuries, and for her family remaining in her native country. She stumbled in her attempts to improve her health and expressed a sense of hopelessness: *"I think a lot about the future. What will happen?"*

The difference in patient attitudes towards health between segments was reflected in their ex-clinic behavior. Proactive interviewees ate healthily, exercised frequently, and associated these habits with a sense of enjoyment. Searchers also engaged in proactive health behaviors, primarily for their effects on health. Traditionalists generally had a more relaxed outlook, with several describing themselves as lazy. Olov (M, 83, Traditionalist) pondered on the balance between enjoyment and health: *"I do like to eat good food and drink . . . so, well, it's about finding natural ways of moving around in life"*. The interviewees in the Vulnerable segment had low overall confidence and rarely engaged in proactive behaviors.

When they experienced symptoms, Proactives and Searchers typically searched actively for information on symptoms and treatments. For Proactives information search was motivated by forward-looking, preventative objectives. For Searchers the search was sometimes compulsive and induced by anxiety. Betty (F, 18, Searchers) said: *"I type in 'it hurts like knife stabs in my stomach' and I get thousands of answers, and I read everything."* Nevertheless, both segments were mostly well-informed and able to judge the credibility of their source of information. The "whatever comes" attitude of the Traditionalists was reflected in a more conservative approach to seeking information. In the Vulnerables segment information search was usually very limited.

All segments engaged in health self-management at some level and trusted Western healthcare and medications. The Proactives and Traditionalists predominantly stated that they adhere to treatment plans. For Traditionalists, the authority of healthcare professionals was an important motivator. By comparison, some Searchers were more skeptical, and often lapsed in their medicine intake if they felt that positive effects did not materialize. They also had a more positive attitude towards alternative medicine. Vulnerables often felt they lacked sufficient personal or social resources to follow treatment.

The attitudes towards peer group support varied between the segments. Proactives received both information and support from their personal social networks but considered peers primarily as a source of additional information. By contrast, Searchers regarded peer groups as a source of emotional support. Bahareh (F, 51, Searchers) thought that her peers helped her to "*not only think negative thoughts in my life*". Traditionalists saw peer groups mainly as social relationships unrelated to health issues – people you could "go to the pub with". Vulnerables not only had limited social support, but also felt apprehensive about participating in social events.

In-clinic behavior. The segments differed in terms of attitudes, emotions, and behavior related to the in-clinic context. Searchers and Vulnerables typically experienced considerable anxiety prior to healthcare visits. Sepideh (F, 20, Searcher) told us: *"I am very nervous and worried when I know that something is wrong and I am going to the doctor."* All segments avoided unnecessary healthcare visits, except for patients with very high levels of anxiety, such as Betty (F, 18, Searchers): *"I never wait, I call directly."* Some interviewees also outright avoided seeking help due to fear. Proactives valued quick access to services more highly than others.

Continuity in patient–doctor relationships was important for all segments, as it provided a sense of safety and mitigated the need for interviewees to repeat themselves. The Searchers in particular stressed the desire for a close relationship.

Although patients in all segments wanted to be involved in treatment decisions, this was more pronounced among Proactives and Searchers. Stina's view (F, 44, Proactive) – *"I want to know all alternatives, so that I can be involved to think and express my view"* – can be contrasted with Alfred's (M, 85, Traditionalist): *"The doctor should tell me what can be done and what the* *available resources are, and then I just have to be thankful for that."* The Proactives also often sought a second opinion. The Searchers stressed a need for attentive staff; Maryam (F, 61, Seeker) viewed this as a way *"to establish that we are human beings."* Erik (M, 31, Searcher) found that *"some doctors [. . .] seem to give you a diagnosis before they have listened to what you have to say."*

Satisfaction with healthcare services. Given the evident differences in the attitudes and behaviors displayed by the four segments, it was not surprising that their level of satisfaction with current healthcare services varied significantly; each segment experienced the uniform, non-personalized service design uniquely. Since Proactives were forward-looking in their attitude towards health and treatment and they wanted access healthcare services as soon as possible. Because this was not always feasible, they felt somewhat dissatisfied with the services. However, once in the in-clinic context, where they could actively engage in solving the health issue, they were usually satisfied. Notably, they were very willing and able to search for an alternative healthcare provider to satisfy their personal needs for treatment if they felt dissatisfied with the original provider, sometimes using their social networks to find a more suitable provider.

Searchers were less satisfied with the services. Either they were worried about the outcomes, duration, or the distress caused by the treatment, or felt that healthcare professionals did not respect or listen to them.

Traditionalists lacked a strong motivation to contact a healthcare provider, so they often postponed appointments until absolutely necessary. Once in contact with healthcare professionals, however, they were happy to assume a passive role as a patient in concordance with the traditional paternalistic healthcare services and were in general satisfied with current services.

Given their general anxiety and perceived lack of competence, Vulnerables were often dissatisfied with the services. They were afraid of doctors and felt they did not receive sufficient compassion or support from them. Anna (F, 73, Vulnerable) described her negative experiences: *"[the doctor] always gets angry and annoyed when I have been there, and I do not think you get that much help"*. This dissatisfaction made Vulnerables less keen on contacting healthcare to seek treatment, making them even more disadvantaged.

Discussion

In agreement with previous research, our findings indicate that economic, social, and psychological resources create a sense of self-reliance for Proactives. Vulnerables, in contrast, often lacked such resources, producing opposite effects. Similar to McColl-Kennedy *et al.* (2012), we found that the co-creation styles of the segments varied from passive and infrequent (Traditionalist, Vulnerable) to active and intensive (Proactive and Searchers). The segments also seek different relationships with the healthcare provider: Proactives had a consumerist view of the relationship, while Searchers sought a partnership, and Traditionalists and Vulnerables preferred a more traditional, paternalistic relationship with clear guidance and instructions.

The findings also illustrate how the characteristics of the segments lead to different health behaviors. For example, proneness to anxiety affects how and when individuals seek information and treatment. Furthermore, the alignment between patient expectations and healthcare service influences the satisfaction of patients and treatment outcomes as a function of behavior. The level of satisfaction varied across the segments, further suggesting that a "one-size-fits-all" design is not optimal for primary healthcare services.

Step 4. Designing modularized services for segments

To assess the utility of the segmentation model as a basis for designing modular services we organized two workshops with primary care center personnel. The workshops also helped to further validate the identified segments by investigating how the segment characteristics corresponded with primary care professionals' first-hand experience.

The two workshops were organized with the help of SALAR, which also provided background information on the seven participating primary care centers. Two of the authors facilitated the workshops. Participants ($n = 18$) were primary care professionals, including physicians, nurses, physiotherapists, and managers. Summaries of the patient segmentation were sent to the participants in advance.

The researchers started the workshops by presenting the segmentation findings and an overview of modular service design. The participants were then divided into groups of two to four people. Each group was given the assignment to (1) evaluate the face validity of the segmentation model; (2) describe and evaluate one current care process from the perspective of the segments; (3) propose an alternative modular process based on the needs of one or more segments; (4) analyze the proposed processes in terms of feasibility and customer value; (5) assess the overall usefulness of the segmentation approach. The group discussions were documented on pre-prepared sheets of paper that had space for current service description, new designs per segment, motivations and reflections, and room for illustrations. The proposals for improved services were presented to other groups for further discussion and feedback. The participants' notes and the sketches created during the workshops were collected and transcribed into text. The researchers also kept notes of the conversations and emerging ideas. These data were used to describe the proposed new service designs and to conduct a thematic analysis of the participants' reflections.

Findings

From the summary of the participants notes and discussions, we concluded that the healthcare professionals deemed that the identified four segments corresponded well with their experiences in their care centers, and that no significant patient groups were unrepresented. There were, however, minor differences in the professionals' characterization of the segments and in the way they considered the differences between segments to affect patients' behaviors. In particular, the Vulnerables segment kindled debate. The professionals associated the segment with patients called "multiseekers" who seek care frequently and often suffer from social or economic difficulties in addition to poor health.

The service processes analyzed by the participants included the reception of patients, diabetes care, hypertension care, care for depression, and asthma care (see Table 3), which were all typically standardized. Some processes were occasionally adapted to individual patients' needs in an ad-hoc manner. For instance, a nurse described how patients were sometimes matched with a specific doctor: *"When we see that a patient needs extra support, we try to ensure that the patient is matched with a doctor that we know is more attentive and empathetic."* Although some primary care centers had used slightly differentiated processes by providing increased levels of self-measurement to some patients, none had systematically pursued modular service design. The professionals considered that standardized services often lead to dissatisfaction among patients and noted that uniform processes may lead to insufficient attention to some patients, while other patients desired more autonomy. One participant explained:

> Some of our diabetes patients get annoyed when we call them for check-ups. They feel fully in control of their measurements, and to make yet another visit is a nuisance. They postpone appointments, being busy with their hectic lives.

The proposed service improvements based on modular service design, summarized in Table 3, included variants of the care process, with varying levels of patient self-management, involvement in decisions, use of self-measurement and technology, frequency of contact, means of communication, emotional support, and empowerment.

Table 3.
As-is service processes and suggested adaptations per patient segment

As-is standardized process	Suggested adaptation for respective segments			
	Proactives	Searchers	Traditionalists	Vulnerables
Reception				
• Phone booking at specific hours • Waiting queue at arrival • Waiting in the waiting room	• Online booking • Greeting by host at arrival • Self-check in or by counter	• Booking by phone/online • Greeted by host at arrival, ability to ask questions • Personal contact for repeat patients • No check-in	• Use as-is process, with addition of being greeted by a waiting room host • Check-in using a check-in kiosk or by counter	Same as for *Searchers*
Hypertension				
• Reminder for yearly checkup by mail • Booking by phone • Tests one week prior to visit • Appointment with specialist • Clinicians discuss results • Decision on re-visit or change in medication	• Patient books when medication runs out • Self-management of tests • Results online • Patient books check-ups online and brings test results for discussion	• Patient given personal coordination nurse • Nurse keeps contact by phone for status and reassurance • Patient responsible for booking	• Patient called for yearly check-up and books a time slot • Health motivation talks with patient • Prescription of physical activity • Physical group activities	• Patient appointed a coordination nurse • Regular contact • A direct phone number to nurse • Additional check-ups
Depression/anxiety				
• Patient is referred to or contacts the primary care center • The patient is booked a meeting with a physician and counselor • The patient is also given advice for self-help • An evaluation consultation is performed with the patient, and potential referral to specialist • Treatment by medication, counseling, and group counseling • Follow-up with potential referral	• "Fast track" to treatment • Written information • Patient self-selection of treatment type, including individual and group counseling • Digital channels for communication and visits	• Provide written material and discuss the material with the patient • Discuss concerns and worries • Discuss preferred treatment, including individual and group counseling	Use as-is process	• Carefully go through written information, at multiple occasions • Discussion of concerns and questions • More frequent physical meetings

(*continued*)

Table 3.

As-is standardized process	Suggested adaptation for respective segments			
	Proactives	Searchers	Traditionalists	Vulnerables
Asthma				
• Patient calls primary care center or is called for an appointment • Consultation with a specialist nurse or physician	• Patient is provided with a measurement device • Patient is directed to existing online teaching materials • Patient is given guidelines on managing medication dosage based on measurements • Patient contacts healthcare at specified values	• Patient is provided with measurement device • Patient is asked to report measurements online frequently • Contact with patient through video consultations (feedback, support, and dosages of medication)	• Patients are called biannually for checkup • Information provided with a printed brochure rather than online	• Patient receives a fixed contact with a coordinating nurse • Nurse keeps regular contact with patient to check on progress • No self-measurement • Same physician each time
Diabetes				
• Patients are placed on waiting list for scheduled meeting with physician/diabetes nurse • Patient receives a treatment plan	• Patient performs self-measurements • Only contacts nurse if measurements deviate significantly • Patient adjusts dosage and medications • No check-ups	• Patient performs self-measurements • Patient has a dedicated contact person • Called for a biannual check-up meeting	Use as-is process	• Patients have increased number of check-ups at predetermined intervals

The participants suggested improvements that would increase patient autonomy for Proactives or would maintain or increase the level of autonomy while simultaneously expanding emotional support for Searchers. By contrast, only minor alterations to the services were considered necessary to support the needs of Traditionalists. These patients were reckoned to prefer the healthcare provider to take responsibility for managing the care process, yet they were still largely willing and able to follow treatment instructions. One group remarked that *"they often do what we tell them to, but fail to see the importance of details"*, suggesting that regular contact and control were still needed. The suggested changes to service design for Vulnerables would increase the intensity of contact with these patients and enhance their sense of security through more frequent and consistent contacts with the healthcare provider.

The professionals considered the modular improvements to services to be valuable for patients and feasible to be implemented. They also found that the segmentation approach facilitated the identification of new solutions, although detailed service design would be required before practical implementation. One group elaborated:

> The solutions are viable. They demand a further analysis and revision of the process, to adjust to different segments. It would be an improvement, and hopefully it would leave more time over to the patients that need it the most, the 'Vulnerables'.

Several participants noted that the technologies required to implement the modular service design were mostly already available. One group noted:

> Technology[wise] all solutions are possible. We need to let go of only focusing on the diagnosis and see the different types of people. We will have a better working environment when anxious people do not feel they need to continuously call us.

Discussion

The workshops indicated the practical value of patient segmentation. Healthcare professionals considered the identified segments valid and useful as a starting point for designing modularized services. The workshops illustrated how few changes to services are required to cater for Traditionalists who prefer a passive role in decision-making and self-care, concurring with previous notions that healthcare service design is still often based on a paternalistic view of patients (McColl-Kennedy *et al.*, 2017b). The findings further highlighted that Vulnerables are often underserved by current services, and that improving services for them would typically require considerable service redesign.

General discussion

This study puts forth a patient segmentation approach as a solution to a practical service design problem faced by primary healthcare organizations. Drawing on the guidelines of action and design research, our study contributes to both practical improvement in the participating organizations and generalizable theoretical knowledge (cf. Elg *et al.*, 2020; Gregor and Hevner, 2013). Next, following Sein *et al.*'s (2011) recommendations for presenting design research contributions, we present problems encountered during the evaluation of the segmentation approach and suggest principles for addressing them, thus improving the practical value of the solution. We also simultaneously elaborate the contributions to the participating organization, in terms of new knowledge, outcomes, and catalytic effects, and highlight the more theoretical contributions to the research field (cf. Elg *et al.*, 2020).

Health behavior theory as a foundation for segmentation

The first practical problem faced by the project was how to identify an appropriate theoretical basis for developing the segmentation approach. Building on the notion of value co-creation in healthcare (cf. McColl-Kennedy *et al.*, 2012) and following the increased emphasis on patient participation in the healthcare literature, we chose a behavioral approach that focused on health behaviors and their antecedents. We make two important observations. First, using health behavior as a foundation for the segmentation is an appropriate principle, as it was possible to identify meaningful patient segments that were found to correspond to the experiences of healthcare professionals, had criterion validity, and were deemed useful in the design of services. Second, using demographics as the only indicator of patients' willingness and ability to co-create can be misleading, as patients with seemingly favorable demographics may have other impediments to engaging in value co-creation. This is important, since prior research on primary care has often focused on demographics such as age, gender, and education in explaining patients' preferences for shared decision making and involvement (Jung *et al.*, 2003).

A service design approach based on segmentation and modularization

The second practical problem of the project was how to use the findings from the segmentation process to support local service design efforts. Common to many healthcare contexts, the local units lacked sufficient resources, competencies or experience with any service design methods. To facilitate service design at a local level, the project drew on healthcare service modularization (cf. Vähätalo and Kallio, 2015). Modularization was used to break down the design-task into smaller entities and to visualize how parts of healthcare processes could be offered in different ways to better match the varying patient segments. A module was defined as a process for a certain type of care or administrative task with well-defined interfaces, such as booking appointments or diabetes treatment. Elaborating the current processes helped users to reflect on for whom the current services were designed, using the segments as a template. Participants typically realized that services were often designed for *Traditionalists,* which meant that the extant processes neither fit the wants of the *Proactives* nor the needs of the *Vulnerables* and rarely provided sufficient emotional support for the *Searchers*. Modularization principles were used to design prototypes for alternate modules that could be offered in parallel (for instance, two alternate processes for diabetes treatment), improving service personalization for different patient segments. The approach thus facilitated the design of patient-personnel roles and interactions (Keeling *et al.*, 2018). Importantly, the healthcare professionals considered the proposed improved service designs to be implementable in their own organization. The professionals also noted that an increased autonomy given to some patients could free resources for more critical purposes.

Previous research on healthcare service modularity has typically focused on patients' external characteristics (Chong *et al.*, 2019; Porter *et al.*, 2013). Our segmentation approach provides a practical tool for modular service development lacking in prior literature (cf. de Blok *et al.*, 2014; Broekhuis *et al.*, 2017).

Using segmentation for forming a better understanding of the served population

The overarching problem of the project was how to increase the understanding of the served population to better meet their needs. A principle derived from this project is that segmentation should not only be used for the direct design of services, but more broadly as a tool for reflection on user variability and patient groups. The segmentation approach contrast and complement to experienced-based co-design (Bate and Robert, 2006), that highlights individual experiences as a way to improve understanding of patient experiences and needs. Our approach raises important questions such as: what assumptions we make about our patients, whose needs inform services design, and exactly which individual characteristics and circumstances should be taken into consideration?

The project led to such reflection at SALAR and the directly involved organizations. The assembled materials and infographics from the project were also disseminated to associated organizations, notably in a seminar series with healthcare professionals in which over 1,200 staff members used the material as a basis for discussing variations in patient characteristics and needs. According to a participant evaluation the reception was positive. Patient segmentation thus holds promise to facilitate organizational sense-making and thus promote institutional change towards customer centricity in healthcare organizations (Kurtmollaiev *et al.*, 2018).

From a critical perspective, using concepts such as segmentation that originate in business thinking can be perceived as advancing commodification and consumerism in healthcare, and may clash with healthcare professionals' preferences, values, and current service practices (Hoff, 2020). Using segmentation should not be viewed as a panacea for poor patient focus, but rather as a starting point for dialog and self-analysis in healthcare organizations, leaving room for healthcare professionals' own reflection.

Contributions to service research on value co-creation in healthcare

The findings related to health behaviors and value co-creation in healthcare are relevant beyond the immediate empirical context, and contribute to the ongoing research on the role of patients in the value co-creation in healthcare services (e.g. Anderson *et al.*, 2018; Hardyman *et al.*, 2015; McColl-Kennedy *et al.*, 2012; McColl-Kennedy *et al.*, 2017b). Our study adds detail to previous research on patient heterogeneity (Danaher and Gallan, 2016; McColl-Kennedy *et al.*, 2017a), especially by highlighting the considerable differences in patient proactiveness and attitudes toward healthcare, which lead to variance in patient behavior and are likely to adversely affect treatment outcomes and patient satisfaction for a uniform healthcare service design. Considerable patient groups like the *Traditionals* are still content with a passive role and forcing them to play a bigger role in co-creation may lower treatment effectiveness and patient satisfaction. Conversely, many patients like the *Proactives* are ready to engage in value co-production independently and actively, and current service processes may limit their autonomy.

We found that health anxiety had a surprisingly strong influence on value co-creation. Identified as an important factor in the quantitative study, the impact of health anxiety was vividly illustrated in the qualitative study, where anxiety caused suffering, extensive information search, and both healthcare avoidance and pathological seek for treatment. Patients such as *Searchers* were affected by anxiety the most, leading them to search for information, reassurance, comfort, and contact with staff and other patients.

Some patients may lack the confidence and ability to engage in value co-creation for various reasons. In our case, the *Vulnerables* were typically affected by multiple personal and health issues that caused them to become withdrawn and express alienation toward the healthcare system. This lack of healthcare service inclusivity remains a major deficiency that should be alleviated by service redesign (Fisk *et al.*, 2018).

Limitations and future research

One important limitation of our results is that the four identified patient segments are specific to our context. The four patient segments are thus likely to have limited applicability in other healthcare contexts. However, the proposed segmentation approach is generalizable to any context. Replicating the study in other healthcare contexts would provide further evidence of the usefulness of the approach. The application of the proposed segmentation approach could also be useful in contexts such as social services that struggle with user centricity and where autonomous client behaviors and positive collaboration are vital for service outcomes.

We also note that the key patient characteristics used in segmentation are likely to depend on the specific context of application. Given the broadness of primary care services, we necessarily incorporated a large number of potential factors. In more narrowly circumscribed contexts, one may have recourse to considerable extant research on health behaviors and their antecedents specific to the context, which allows one to narrow down the number of key patient characteristics. For example, our study did not consider the question of ethnicity, but in more diverse contexts, ethnicity may be a crucial patient characteristic when developing a segmentation model. Therefore, future studies could address how further characteristics such as ethnicity affect patient segmentation.

Although our study illustrated how patient segmentation can facilitate modular service design, the project did not include the implementation of the suggested service designs. Aside from patient interviews we did not involve patients in service design, yet prototyping and implementing improved service designs should typically involve patients (cf. Hurley *et al.*, 2018; Teixeira *et al.*, 2017). Future studies could explore how to incorporate patients in service design facilitated by the segmentation approach.

Finally, since the developed service designs were not put into practice, we could not conclusively test whether the suggested new designs improved patient satisfaction or treatment outcomes. Future research should seek to confirm these suggested benefits of patient segmentation and service modularization. One potential direction for future research would be to link the patient segments with medical data in existing registers and to directly measure the effects of modularized healthcare.

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Corresponding author
Jon Engström can be contacted at: jon.engstrom@sbs.su.se

Appendix 1

Table A1.
Survey instrument questions

Category/construct	Source(s)	Items
Overt health behaviors		
Co-creation in-clinic	Sweeney *et al.* (2015)	*If I am unwell I want to assume an active role in my care*
		It is important for me to participate in decisions concerning my treatment
		When I am unwell I actively communicate with health care
Co-creation ex-clinic	Glasgow *et al.* (2005)	*I actively try to keep myself healthy and well-being*
		I exercise regularly
		I like to try new things that could influence my health positively
		I make sure to eat a healthy diet
Information seeking	Dutta-Bergman (2005)	*I actively seek for information concerning the diagnostics I have been given*
		I actively seek information about my symptoms before I decide to contact health care services
Avoidance behavior	[New items] cf. Moore *et al.* (2004)	*I avoid contact with health care as much as possible*
		When I am unwell I try self-treatment before contacting primary care
Use of alternative treatment	[New item] cf. Frass *et al.* (2012)	*I seek treatments others than those recommended by health care*
Adherence to treatment plan	Kubica *et al.* (2017)	*When I am ill I follow treatments agreed upon with health care*
Preference to peer support	[New item]	*If I came to experience problems with my health I would gladly come in contact with others having the same health related problems*
Subjective well-being		
Quality of life	Fox (2004)	*I am satisfied with my quality of life*
		I experience myself as being well
Perception of own health	Zhang *et al.* (2007)	*I experience my health as good*

(*continued*)

Table A1.

Category/construct	Source(s)	Items
Sens of meaning	Ryff (1989) in Smith *et al.* (2017)	*My life feels meaningful*
Traits, emotions, and self-beliefs		
Sense of competence	Sheldon and Hilpert (2012)	*I am good at successfully complete difficult tasks and projects* *I find ways to solve my problems and achieve my goals* *I often feel that I am not competent in various situations (Reverse)* *I think I could learn anything needed concerning my own treatment* *I trust my ability to take care of my own health*
Sense of relatedness	Sheldon and Hilpert (2012)	*I feel part of the community I live in* *I get along well with the people I come into contact with* *I have many people who are close to me* *I often feel lonely (Reverse)* *There are people around me to help if I experience problems*
Sense of autonomy	Sheldon and Hilpert (2012)	*I have control over my life* *There is not much room for me to take decisions in my daily life (Reverse)*
Sense of hopelessness	Beck *et al.* (1974)	*If something can go wrong for me it will certainly happen* *The future seems hopeless to me, and I can't believe that things are changing for the better*
Health-related anxiety	Beck *et al.* (1988)	*I often fear having a severe disease* *I often fear something bad will happen*
Healthcare-related anxiety	Jaakkola *et al.* (2009)	*I feel nervous when in contact with health care* *I feel uncomfortable in health care environments*
Usage of new technology	Bruner *et al.* (2007)	*I like using new technology* *I gladly purchase products or services online*
Satisfaction with healthcare services	Fornell (1992)	*I am satisfied with my health care provider*
Trust in healthcare services	[New item]	*I trust health care*
Respect in healthcare services	Swedish National Patient Survey	*When I am in contact with health care services I feel treated with respect and dignity regardless of my gender, sexual identity, ethnicity, religion, sexual inclination, disabilities or age*

(*continued*)

Table A1.

Category/construct	Source(s)	Items
Preference healthcare continuity	[New item]	
	cf. Jung *et al.* (2003)	*It is important to me to meet the same staff when in contact with health care*
Impulsivity	Caspi *et al.* (1997)	*I often act before thinking*
Indecisiveness	See Rassin *et al.* (2007)	*I feel it is generally tough to have to make choices*
Switching behavior	[New item]	*I often switch service provider when I purchase products or services*
Trust in others	Yamagishi and Yamagishi (1994)	*People are generally honest*
Social factors		
Ongoing stressors	Troxel *et al.* (2003) in Smith *et al.* (2017)	*I experience stress due to: [relationships, personal finance, work school, or other]*
Engagement in social activities	Smith *et al.* (2017)	*I have taken part in the listed social activities in the last 12 months: [courses, private parties, theater, sports event, etc.]*
Demographics		*Gender, age, living arrangements, education, employment*

Note(s): [New item]: These survey items were developed during the project; see Methods

Appendix 2

Table A2. Identified segment characteristics in demographics, composite scales and selected individual items

Construct/variable	Segment 1: Proactives	Segment 2: Searchers	Segment 3: Traditionalists	Segment 4: Vulnerables	Total	*F*	*p*
Proportion of sample (%)	45	24	25	6	100		
Demographics							
Average age (years)	54	45	46	45	49		
Females (%)	54	57	36	40	52		
College degree (%)	57	47	50	35	51		
Unemployed (%)	1.1	5.9	1.5	2.1	2.4		
Retiree (%)	34.2	22.3	19.7	16.7	26.7		
Composite scales							
Quality of life ($\alpha = 0.90$)	5.96 (0.87)	4.91 (1.22)	5.38 (0.95)	4.05 (1.08)	5.44 (1.14)	80.6	0.000
Cocreation ex-clinic ($\alpha = 0.77$)	5.23^{a} (0.93)	5.20^{a} (0.78)	4.32 (0.85)	3.40 (0.68)	4.88 (1.02)	103.4	0.000
Cocreation in-clinic ($\alpha = 0.85$)	6.06 (0.76)	5.51 (0.89)	4.77^{a} (0.97)	4.43^{a} (1.40)	5.50 (1.07)	112.6	0.000
Cocreation. Info. seeking ($\alpha = 0.72$)	4.93^{b} (1.56)	5.05^{b} (1.19)	4.43^{a} (1.36)	3.93^{a} (1.34)	4.77 (1.37)	13.3	0.000
Sense of competence ($\alpha = 0.74$)	5.80 (0.62)	4.91^{a} (0.80)	5.02^{a} (0.60)	4.17 (0.84)	5.29 (0.84)	141.1	0.000
Sense of relatedness ($\alpha = 0.74$)	5.74 (0.70)	4.90 (0.82)	5.18 (0.78)	4.41 (0.93)	5.32 (0.87)	79.0	0.000
Sense of autonomy ($\alpha = 0.71$)	6.12 (0.68)	5.06^{a} (0.95)	5.48 (0.78)	4.93^{a} (0.92)	5.63 (0.92)	92.2	0.000
Health anxiety ($\alpha = 0.72$)	2.53^{a} (1.40)	3.99 (1.55)	3.18^{b} (1.44)	2.88^{ab} (1.57)	3.07 (1.57)	41.5	0.000
Healthcare anxiety ($\alpha = 0.89$)	2.45 (1.21)	4.65 (1.35)	3.30^{a} (1.49)	3.00^{a} (1.34)	3.23 (1.59)	111.5	0.000
Individual items							
I experience my health as good	5.70 (1.08)	5.01^{a} (1.33)	5.28^{a} (1.05)	3.96 (1.34)	5.32 (1.24)	39.8	0.000
I am satisfied with my health care provider	5.30 (1.43)	4.86^{ab} (1.39)	4.91^{b} (1.37)	4.29^{a} (1.34)	5.03 (1.43)	10.0	0.000
I trust health care	5.01^{a} (1.38)	4.66^{b} (1.34)	4.82^{ab} (1.27)	4.60^{ab} (1.30)	4.85 (1.35)	3.5	0.015
When I am in contact with health care I feel treated with respect and dignity	5.92 (1.26)	5.23^{a} (1.38)	5.55^{a} (1.22)	5.15^{a} (1.46)	5.61 (1.33)	14.0	0.000
I avoid contact with health care as much as possible	3.54^{a} (1.96)	4.31 (1.68)	3.69^{a} (1.67)	3.40^{a} (1.48)	3.76 (1.82)	8.4	0.000
When I am unwell I try self-treatment before contacting health care	4.79^{b} (1.63)	4.79^{b} (1.27)	4.46^{ab} (1.45)	4.15^{a} (1.44)	4.67 (1.51)	4.4	0.004
I like using new technology	5.61 (1.26)	5.25^{a} (1.22)	5.27^{a} (1.29)	4.56 (1.49)	5.37 (1.30)	11.4	0.000

(*continued*)

Table A2.

Construct/variable	Segment 1: Proactives	Segment 2: Searchers	Segment 3: Traditionalists	Segment 4: Vulnerables	Total	F	p
I seek other treatments than those recommended by hath care	2.55^{a} (1.55)	3.34 (1.63)	2.29^{a} (1.32)	2.48^{a} (1.34)	2.67 (1.55)	17.6	0.000
It is important to me to meet the same staff when in contact with health care	5.61^{b} (1.47)	5.61^{b} (1.28)	4.97^{a} (1.51)	4.69^{a} (1.61)	5.39 (1.48)	13.3	0.000
Multiple selection (scale 0–1 summed)							
I experience stress due to: relationships, personal finance, work school, or other	0.48 (0.66)	1.37^{a} (1.14)	0.89 (0.88)	1.69^{a} (1.22)	0.87 (0.98)	54.9	0.000
I have taken part in some of the following social activities (list)	5.01^{b} (2.23)	4.19^{ac} (2.39)	4.69^{bc} (2.37)	3.60^{a} (2.66)	4.65 (2.37)	8.6	0.000

Standard errors reported in parentheses

Statistically *non-significant* differences between two segments are marked with superscript letters

Alpha (α) refers to the Cronbach alpha of the construct. F and p values relate to the between group comparison