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Social robots to foster vulnerable actors' well-being

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Social robots to foster vulnerable actors' multidimensional well-being

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to my beloved mother Lucia

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Chapter 1

Introduction and overview of the study

In this first chapter, I delve into the research problem, outlining my objectives and research questions (RQs). The aim is to provide a thorough introduction and overview of the entire study, including a general description of the background, identification of gaps, and the positioning of this thesis. I also outline the structure I will be following, to reinforce the logic and purpose behind the study.

1. Research problem

The world is facing an increasing number of vulnerable people as the population continues to age and more people are affected by various health and social problems (European Commission, 2022). The gradual aging of the population is leading to significant demographic changes with far-reaching consequences for health, families, work and many other sectors (McKinsey, 2022). According to Fisk (2022) many social issues can only be addressed through a comprehensive and multifaceted approach. With this in mind, service research challenges scholars to prioritize reducing the suffering of society's most vulnerable actors and improving their well-being (e.g., Ostrom *et al.*, 2021; Rosenbaum *et al.*, 2022). TSR seeks to nurture *"uplifting changes and improvements in the well-being of both individuals and communities"* (Anderson 2010, p. 9), particularly in contexts of vulnerability (Mick *et al.* 2012). In service research, vulnerability is often characterized as a disadvantage faced by consumers (Rosenbaum and Montoya, 2006) that reduces their own well-being (Tikkanen, 2020) and impedes their ability to participate in value co-creation processes, leading to a sense of powerlessness (Riedel *et al.*, 2022).

According to Rosenbaum and Wong (2012), the use of technology tools that can encourage social support, which can further foster well-being outcomes (Mele *et al.*, 2022a). In this perspective, the spread of innovative technologies holds the promise of enhancing the well-being of vulnerable actors (Mele *et al.*, 2022a). These have ramifications not only for the actors experiencing vulnerabilities but also for the care community, including professionals, caregivers, and families. The cumulative effect of these technologies on quality of life is considerable. Indeed, emerging technologies such as Artificial Intelligence (AI) and service robots are opening new horizons and scenarios, shedding light on the need to radically rethink service practices (De Keyser and Kunz, 2022). This is in line with Rosenbaum and Russell-Bennett (2021) who, in their recent editorial published in the *Journal of Services Marketing*,

emphasized the importance of exploring the effects of service technologies, such as digital services, services and social robotics on human well-being, as a future research priority in service studies. However, the influence of these technologies on human well-being remains under explored (Letheren *et al.*, 2020; Blaurock *et al.*, 2022a), thus addressing this gap is important since the debate on the use of social robots to revolutionize service provision (Wirtz *et al.*, 2018; De Keyser and Kunz, 2022) may provide insights into the impact of these technologies on actors experiencing vulnerability (Henkel *et al.,* 2020). Indeed, social robots can have positive psychological and physical outcomes by promoting social connections and offering social support. This has led service scholars to focus on the use of social robots in highly sensitive service contexts, such as health and elderly care. In these settings, they can aid, support, or even replace both formal and informal caregivers (Wirtz *et al*., 2018). With this background, I focus on a healthcare context as it can offer important steps forward for the advancement of vulnerable actors' well-being (Čaić *et al.*, 2018). This domain has a growing need for technology-enhanced service options, as technological advancements have the promise of enhancing human well-being (Odekerken-Schröder *et al.*, 2020; Becker *et al.*, 2022). The integration of social robots into healthcare has the potential to transform the current value service ecosystem and improve the support offered to patients, caregivers, and healthcare professionals (Lu *et al.,* 2020).

2. Research objectives and research questions

The overall research objective of this thesis is to explore how social robots impact vulnerable actors' well-being. This knowledge can enhance the potential of such innovative technological solutions in contributing to human well-being and social change in highly sensitive service contexts such as healthcare contexts.

The overarching research aim is explored and resolved through three specific research questions, which are based on the research problem discussed above in Section 1.

The specific research questions are:

RQ1: How social robots foster the well-being of vulnerable actors?

RQ2: What dimensions of vulnerable actors' well-being are affected by interactions with a social robot?

RQ3: What well-being indicators should be considered?

3. Positioning this thesis

The main goal of this thesis is to understand a) how social robots can foster the multidimensional well-being of vulnerable actors and b) how to assess the resulting well-being (dimensions and indicators). The thesis is situated within the broader field of research on service technologies and human well-being (Rosenbaum and Russell Bennett, 2021). The study does not focus on the technology component, but rather explores its role in promoting well-being and reducing vulnerability, with a focus on people who need support to cope with social, health, or economic problems (Virlée *et al.*, 2020). I consider and examine ***well-being*** as a multidimensional construct in line with the study of Keyes and Waterman (2003), ***vulnerability*** as a factor that reduces humans' quality of life, in line with the studies of Sharma *et al.* (2017). Therefore, its reduction is a means to increase well-being (Virlée e*t al.*, 2020). The definition of ***social robots*** follows the studies of Henken *et al.* (2020) who define them as actors with a transformative mission. They can reduce vulnerability and promote well-being (Henken *et al.*, 2017; Hill and Sharma, 2020; Odekerken-Schröder *et al.*, 2020).

With the goal of assessing and modeling the well-being of vulnerable actors (i.e. patients with dementia), this thesis heavily relies on literature from psychology, sociology, and medical science. Indeed, interdisciplinary approach was crucial due to the lack of studies in service research that tackle the challenge of assessing and modeling the well-being of vulnerable actors in sensitive service settings such as healthcare (e.g., Čaić et al., 2018; Mele *et al.,* 2022a) and elderly care (Kabadayi *et al.*, 2020). These studies understand well-being not as a single-faceted idea, but as a concept encompassing multiple elements, domains, and dimensions (Prakitsuwan and Moschis, 2021). Empirically, this thesis is the result of a collaborative research project that began in October 2021, involving Cooperativa Sole (a social enterprise that provides care services and innovative housing models for wellness and longevity), Vstone Co. Ltd. (a technology provider and manufacturer of Hiro, a social robot with a minimal design), and the research group of the University of Naples Federico II, of which I am a member. The goal of the project is to improve the well-being of vulnerable patients and, in part, the care community, by incorporating the Hiro robot into daily healthcare activities in two different pilot projects: a) Felice Pullè and b) the Residenze del Sole nursing homes. Specifically, the unit of analysis consists of patients with vulnerabilities (e.g., cognitive impairment, moderate-severe dementia, Alzeihmer's disease, physical disabilities, etc.) who were administered Hiro from April to October 2022 for the first pilot and from December 2022 to February 2023 for the second pilot. The goal, as anticipated, was to improve patients' physical, social, and psychological (emotional) well-being through interaction with the robot. This is in line with the findings of previous studies (e.g., Khaksar *et al.*, 2016; Čaić *et al.*, 2019;

Kipnis *et al.*, 2022), which suggest that the use of robotics in nursing homes can improve patients' quality of life, caregiver-patient interactions, and overall well-being in the healthcare service ecosystems. In summary, this study will show that technological contexts can provide support to vulnerable people, influencing not only their actions, but also those taken by their support network, such as formal and informal caregivers (Blocker and Barrios, 2015).

4. Structure of the thesis

This thesis consists of five chapters (Figure 1).
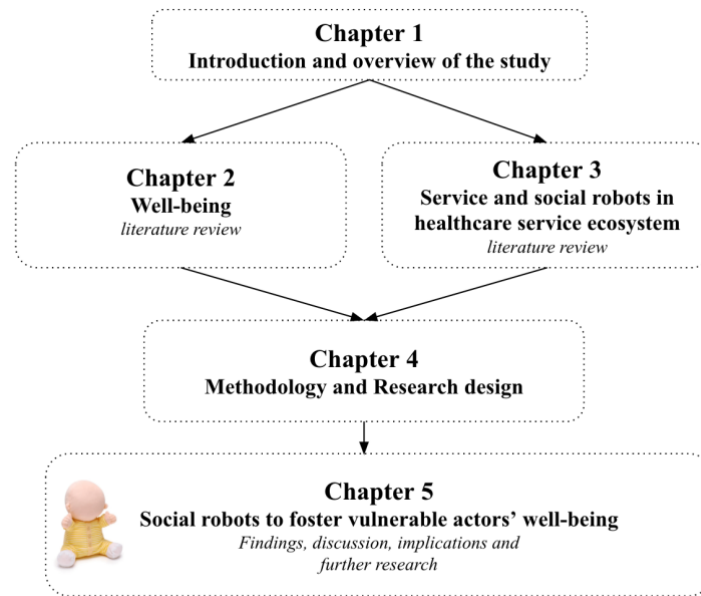
Fig.1: Structure of the thesis. Source: Author's elaboration

As above, this chapter introduces the research problem, objectives and RQs of this thesis. The aim is to improve the clarity and comprehensibility of the overall dissertation by providing a comprehensive introduction and overview of the entire study. It includes a general description of the background, identification of gaps and research questions, and presentation of the structure and process followed. This serves to underscore the reasoning behind the study. Chapter 2 provides, through a bibliometric analysis, a domain statement for well-being as a field of study and delineates certain issues fundamental to the field in service studies. In addition, it provides an overview of well-being construct in psychological studies and presents the most commonly used models, which moreover underlie service research studies. Chapter 3 aims to illustrate the role of service and social robots in the complex and highly sensitive healthcare service ecosystem. The main focus is on business and management literature. A bibliometric analysis was first conducted to analyze the literature state-of-the-art. Then,

through a systematic literature review, the role of social and service robots in the healthcare service ecosystems and their effects on vulnerable actors' well-being have been investigated in depth. Chapter 4 aims to illustrate and discuss the methodological approach chosen to bridge the theoretical insights identified in the previous chapters. An action-research approach was adopted to promote an experimental project, in collaboration with Cooperativa Sole, an Italian social enterprise and Vstone, a Japanese company, aimed at implementing and using the HIRO social robot in two nursing homes as research settings located in northern Italy. Chapter 5 aims to illustrate and discuss the main findings deriving from action-based studies. It provides an in-depth discussion of the results and combines them to obtain a more comprehensive overview of how the introduction of service and social robots impact the three dimensions of well-being and proposes a future research agenda for future studies. Implications for scholars and a set of suggestions for practitioners, along with the main limitations of the study, are discussed in this chapter.

	Well-being	Service and Social Robot in the healthcare service ecosystem	Social robots to foster vulnerable actors'well-being
Research design	Review	Review	Qualitative
Main theoretical lenses	Vulnerability and vulnerable actors Well-being in service research Well-being in psychology, sociology and medical science	Service technologies Smart technologies Service and social robots	Empirical research
Methodology	Bibliometric analysis (performance analysis and science mapping techniques) and content analysis of clusters	Bibliometric analysis (performance analysis and science mapping technique) content analysis of clusters	Action Research
Data	Documents from Web of Science and Scopus database	Documents from Web of Science and Scopus database	Participant observation Semi-structured interviews
Focus	well-being as multidimensional construct	social robots in the healthcare service ecosystems	how social robot impact vulnerable actors'well-being

Table 1: Overview of thesis chapters

Chapter 2
Well-being

_____

Vulnerability and vulnerable actors • Well-being in service research • Current state of well-being in service research • Depicting the conceptual structure • Depicting the intellectual structure • Well-being: a general overview • Well-being: pillars from psychology • Modeling and assessing well-being
• Challenges and future research directions

Chapter 2
Well-being

The purpose of this chapter is twofold: the first is to propose, through a bibliometric analysis, a domain statement for well-being as a field of study and delineates certain issues fundamental to the field in service studies. The second is to provide an overview of well-being construct in psychological studies and to present the most commonly used models, which moreover underlie service research studies.

1. Vulnerability and vulnerable actors

Vulnerability can be defined in a variety of ways. Its definitions cross many disciplines and are frequently disputed by academics (Baker *et al*., 2005), especially in social sciences (Johns and Davey, 2021). In the realm of service research, vulnerability is a state emerging from contexts and circumstances (Baker and Mason, 2012) and **a vulnerable actor is an individual (or group of individuals) who may face challenges in accessing, using or benefiting from services due to their social, economic, cultural or physical conditions** (Baker *et al,* 2005). Vulnerability has been defined as a state emerging from contexts and circumstances (Baker and Mason, 2012) and pertains to actors who require assistance to address their social, health, or economic issues (Virlée *et al.,* 2020; Ng *et al.,* 2022). Several service studies have proposed examples of vulnerable actors such as homeless teenagers (Hill, 2002), disadvantaged consumers (Santos and Laczniak, 2009), homeless individuals (Blocker and Barrios, 2015), fair treatment and fair access of customers during and to service, and fair exit opportunities (Fisk *et al.*, 2018), refugees (Cheung and McColl-Kennedy, 2019; Boenigk *et al.*, 2021), **patients** (Amine *et al.*, 2021; Mele *et al.*, 2022a) and more recently, refugees during pandemic (Finsterwalder *et al.*, 2021; Ng et al., 2022).

Hence, vulnerability may affect anyone at some point, which may be either temporary (e.g. fluctuating financial situation) or permanent (e.g. lifelong disabilities) (Johns and Davey, 2021). Baker (2005) defined vulnerability as *"[…] a state of powerlessness that […] occurs when control is not in an individual's hands, creating a dependence on external factors (e.g., marketers) to create fairness in the marketplace […] [and] where consumption goals may be hindered […]"* (p. 134). However, according to Pavia and Mason (2014), vulnerability arises from the interplay of personal (innate or learned), societal, and environmental factors. It often pertains to observable individual characteristics (e.g. age, ethnicity, gender), mental states (e.g.

cognitive function, bereavement), or physical conditions (e.g. disabilities, addiction), which are not necessarily mutually exclusive (Pavia and Mason, 2014). Beatson *et al.*, (2020) address vulnerable consumers, highlighting the importance of understanding their needs, behaviors and attitudes in service design and provision. In detail, consumers who experience powerlessness in achieving their consumption goals are often considered vulnerable, as pointed out by Baker *et al.* (2005) and Parkinson *et al.* (2017). Previous studies, such as Brennan *et al.* (2011), have shown that these vulnerable consumers are at a higher risk of negative outcomes resulting from aggressive marketing campaigns. In response, recent research has suggested using co-design strategies to support these vulnerable consumers in their interactions with service providers (Dietrich *et al.,* 2017; Beatson *et al.*, 2020). According to Rosenbaum *et al.,* (2017) when customers enter service exchanges with certain disadvantages, they become vulnerable, as service providers may discriminate against them or exploit their stigmatizing personal or social characteristics. Vulnerability can also arise when service customers lack expertise in the services they are acquiring (e.g., medical, financial, insurance) or are unable to access alternative services. In essence, consumer vulnerability is a result of various individual and external factors interacting within a context that may impede a consumer's consumption goals. Along similar lines, according to Baker *et al.* (2005), and Shultz and Holbrook (2009), consumer vulnerability arises from the interplay of individual states, characteristics, and external conditions.

Most studies in service research focus on consumers who suffered service exclusion, due to their vulnerability (Blocker and Barrios, 2015), which may stem from a lack of expertise in a particular service exchange (Rosenbaum *et al.,* 2017; Ng *et al.*, 2022). According to Ng *et al.*, (2022) service exclusion involves more than simply being denied access to services. Since resources can be integrated, utilized, and shared by actors during a service exchange, service exclusion may arise when an actor or process hinders access or restricts the use of the service by customers, thus worsening their resource situation by hindering the transfer of resources (Sangiorgi and Prendiville, 2017: Nars and Fisk, 2019). Such vulnerability decreases actors's well-being (Sharma *et al.,* 2017). Therefore, some service inclusion initiatives can decrease vulnerability as a means of enhancing people's well-being (Virlée *et al.*, 2020). Vulnerable actors are not merely victims of service exclusion, but rather, they are capable actors who can attain greater well-being on their own (Rosenbaum *et al.*, 2017).

In healthcare ecosystems, vulnerability is often observed due to chronic illnesses, long-term therapies, and inherent limitations (Kim, 2019; Virlèè *et al.*, 2020). Likewise, according to Anderson *et al.* (2013) individuals with mental illness are vulnerable actors, as they often have

limited medical knowledge and not take part in their own health care management. These vulnerable patients encounter additional obstacles such as social exclusion and information asymmetry, which may lead to their hesitation in utilizing services that could improve their well-being (Sharma *et al.*, 2017). Recent studies (e.g., Amine *et al.*, 2021; Mele *et al.*, 2022a) conceptualize *vulnerability* as a widespread occurrence characterized by a lack of resources. By utilizing a human-centered approach to smart service provision, they address patients as vulnerable actors in need of healthcare and care services (Khaksar *et al.*, 2017). Nevertheless, the use of smart technologies can benefit vulnerable patients by improving their well-being through increased active participation in disease management, reduced anxiety and disorganization, and improved cognitive adherence, disease acceptance, and routine adherence. In essence, smart technologies can serve as a lever to reduce vulnerability and foster well-being (Mele *et al.,* 2022a). Along similar lines, Henkel et al. (2020) have explored how social robots can play a transformative role as *entertainers, social enablers, mentors, friends* in improving well-being of vulnerable consumers who are experiencing negative effects of social isolation during the pandemic. These social robots are regarded as emotional and social actors (Čaić *et al.,* 2019) with a clear mission to mitigate the vulnerabilities and improve well-being (Odekerken-Schröder *et al.*, 2020).

2. Well-being in service research

In service research, recent studies identify well-being as a hot topic among academics, practitioners, and policy-makers (Donthu *et al.*, 2022) and one of the service research priorities (Ostrom *et al.*, 2021). Indeed, over the last decade, an increasing number of studies are focusing on well-being, addressing different perspectives and aspects (Berry *et al.,* 2020; Finsterwalder and Kuppelwieser, 2020; Mele *et al.*, 2022a, 2023). Incorporating a eudaimonic construct, service research scholars propose a holistic conceptualization of well-being (Galeone and Sebastiani, 2021; Mele *et al.*, 2023). Earlier studies in the field of service research (e.g., Rosenbaum *et al.,* 2011; Ostrom *et al.*, 2014) described and looked at different aspects of well-being such as c*o-creation, employee well-being, vulnerable consumers, social support, access, service literacy, service design, and service systems* (Anderson and Ostrom, 2015). The rise of transformative service research (TSR) has rekindled interest to improve the well-being of customers and service entities. This stream of literature prioritizes the tracking of indicators related to the improvement or decline of well-being, which may include measurements of objective and subjective physical health, mental health factors such as resilience, stress levels,

and exhaustion, financial stability, experiences of discrimination and marginalization, levels of literacy and inclusion, access to resources, capacity building, and efforts to reduce inequality, among other considerations (Rosenbaum *et al*., 2011; Anderson *et al*., 2013; Ostrom *et al*., 2015). This recently developed field aims to explain how service and consumer entities contribute to the fostering of well-being outcomes (Previte and Robertson, 2019). In sum, the core feature that sets TSR apart from other forms of service-oriented work is its emphasis on promoting well-being. The goal is to address and enhance the well-being of people, such as customers and employees, (micro-level), service organizations (meso-level), and industries as a whole (macro-level) (Prentice *et al.*, 2021). Typically, complex and broad-reaching social issues that are contested by different actors are at the core of transformations in service systems (Skålén *et al.,* 2015). In sum, from a TSR perspective, well-being assists in bettering people's lives (Kabadayi *et al.*, 2020) in terms of individuals (e.g. consumers and employees), service organizations, and industries. Moreover, according to Dodds and Palakshappa (2022), TSR is devoted to understanding vulnerable people and the role services play to ensure their participation, inclusion, and well-being (Finsterwalder *et al.,* 2021). One of the key drivers behind the organizational source is the growth of customer knowledge through the provision of information and resources (Davey and Grönroos, 2019). Offering activities that encourage social support, interactions, and engagement is another crucial element. These sources include people's co-production behaviors (e.g., Mende and Van Doorn, 2015) and co-creation activities (e.g., Sweeney *et al.*, 2015; McColl-Kennedy *et al*., 2017) that result in well-being outcomes for themselves. In addition to sources driven by organizations and individuals, well-being also originates from sources driven by the collective, the service system, and the situation (Rahman, 2021). For instance, groups like families, social networks, communities, and nations are examples of collective sources (Anderson *et al.*, 2013). In addition, a source of well-being is provided by the service system as the configuration for value creation that consists of people, technology, value propositions, organizations, and information (Maglio and Spohrer, 2008). The realization of well-being is also influenced by situation-driven factors, one of which may be, for example, the provision of crucial services to vulnerable and disadvantaged people (Sanchez-Barrios *et al.*, 2015).

Notwithstanding the increasing interest and recent advancements, the construct of well-being in service research has been tackled from various viewpoints and in relation to different entities. In addition, to the best of the author's knowledge, no research has investigated the theoretical constructs and tenets. Therefore, this chapter aims to form a retrospective overview of well-being through a bibliometric analysis and content analysis of clusters.

More specifically, based on the overarching goal and the opportunity to use both quantitative and qualitative approaches, this chapter aims to answer to the following research questions:

RQ1. *Which are the research constituents (authors, journals, and publications) of well-being in service literature?*

RQ2. *What is the conceptual and intellectual structure of well-being research in service science?*

The data sources considered for the study were the core collection of Web of Science the world's leading database of published articles and citations (Goyal and Kumar, 2020) and Scopus as the largest knowledge repository and covers a wide range of publications across several academic fields. The advanced search capabilities of the two databases enable the selection of all potential sources of bibliographic data for this analysis, including authors, journals, and citations. According to Echchakoui (2020), to obtain a comprehensive and thorough bibliometric analysis, Bibliometrix enables the merging of the Scopus and WoS databases. In stage 1, relevant articles were identified based on a series of keywords, including *"well being", "well-being", "wellbeing", "wellness","QOL", "quality of life", "quality-of-life"*. This initial search resulted in a set of 2,145 articles. Then, in stage 2 the analysis was limited to a) the English language, b) original articles, c) selected sources. To select academic papers pertinent to service research, I searched for articles from academic journals covered by the SERVSIG literature alert, as these are recognized as reference points for service-related work (Kunz, 2022). These service-specific journals were *Journal of Service Research, Journal of Service Management, Journal of Services Marketing, Journal of Service Theory and Practice, Service Industries Journal, Cornell Hospitality Quarterly, and Service Science*. Then, a data cleaning was performed to avoid data errors such as duplicates and incorrect entries in line with Donthu *et al.,* (2022). The final sample was 263 documents for further review. The stages of article retrieval and further analysis are displayed in Fig. 2.

The bibliometric analysis was carried out using Biblioshiny -Bibliometrix R-package, an application providing a web interface for bibliometrics to calculate descriptive statistics, bibliometric measures, and undertake scientific mapping (Aria and Cuccurullo, 2017). The visual representation was carried out using VosViewer the so-called "visualization of similarities" which provides a map in which the relatedness of items can be explained by the distance between them (Van Eck and Waltman, 2010).
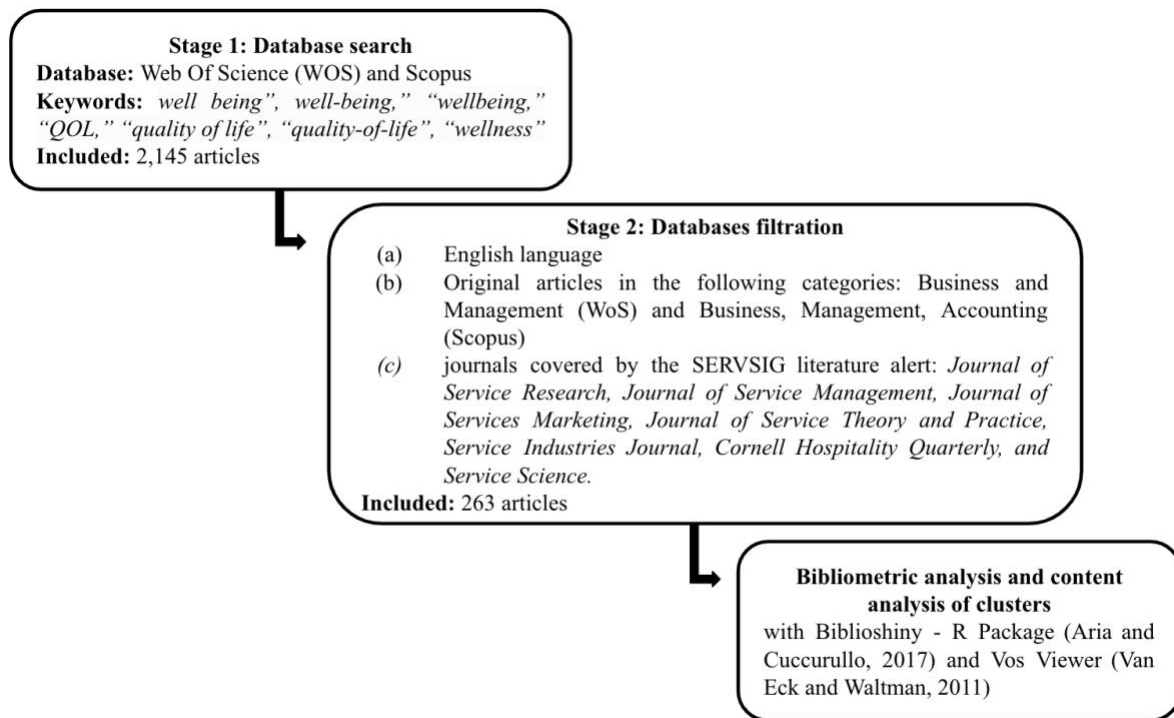
Fig. 2: Data retrieval process. Source: Author's elaboration.

3. Current state of well-being in service research

Table 2 reports on the sample's main descriptive information and statistics. The 263 publications were written by a total of 650 authors, with a mean of 0,4 publications per author, with an average citation count of 25,12 in the period 2008-2022.

Description	Results
Main information about the collection	
Timespan	from 2008 to 2022
Sources (Journals, Books, etc)	7
Documents	263
Average years from publication	3,02
Average citations per documents	25,12
Average citations per year per doc	5,39
References	15371
Document types	
article	260
proceedings paper	3
Document contents	
Keywords Plus (ID)	834
Author's Keywords (DE)	959
Main information about authors	
Authors	650
Single-authored documents	25

Documents per Author	0,405
Authors per Document	2,47
Co-Authors per Documents	3,2
Collaboration Index	2,63

Table 2: Key information regarding well-being sample
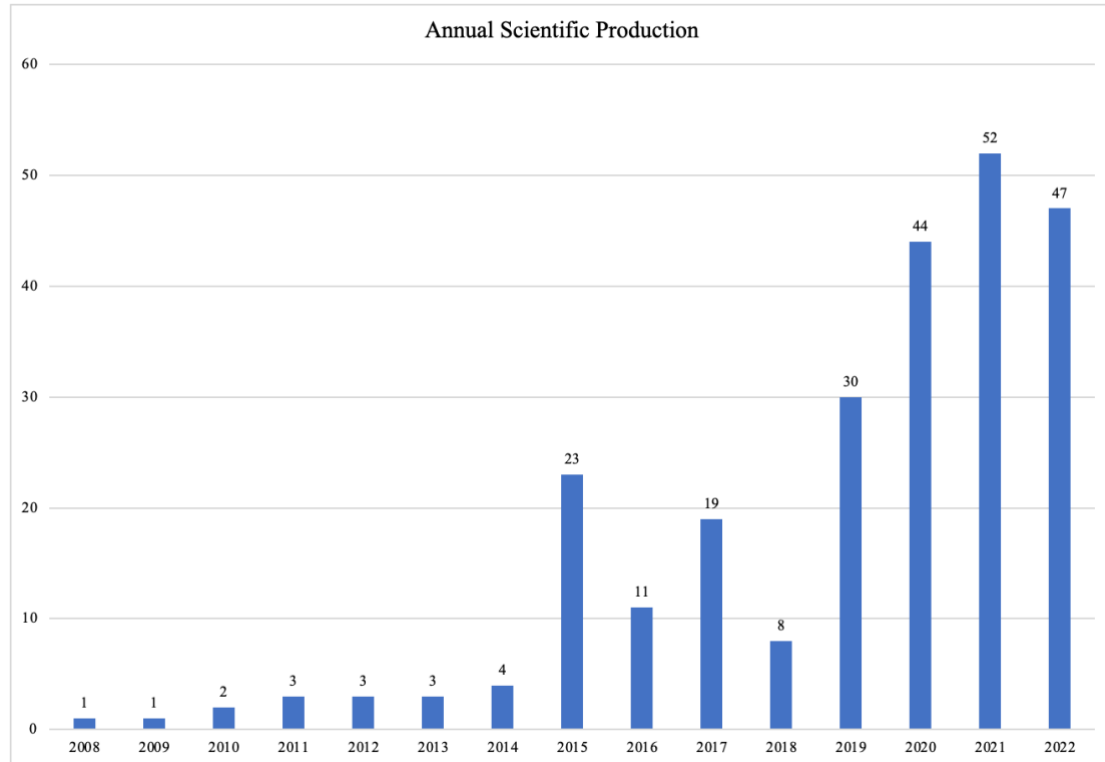
Fig. 3: Temporal distribution of well-being documents in 2008-2022.

Figure 3 illustrates the progression of publications available in the WoS database over the period 2008-2022 which reveals an annual growth rate of, on average 31,65%.

Key Journals
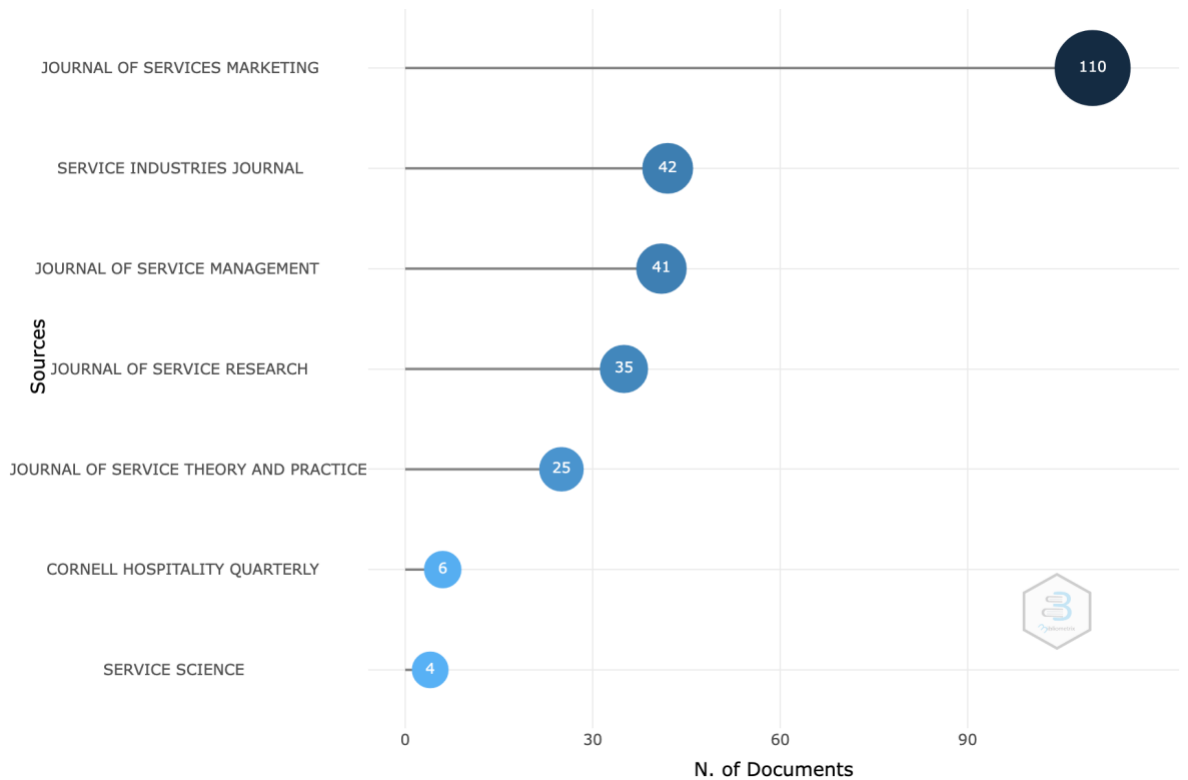
Fig. 4: Top well-being publishing journals (2008-2022)

Figure 4 presents an overview of the key well-being-publishing service journals dealing with, along with their respective impact factors. Specifically, the *Journal of Services Marketing*, *Service Industries Journal, Journal of Service Management, Journal of Service Research, and Journal of Service Theory and Practice* are the most productive, and influential, in their published well-being research. The *Journal of Services Marketing* tops the list (110 publications), followed by the *Service Industries Journal and Journal of Service Management*, with 42 and 41 published articles, respectively. Overall, this analysis also shows that well-being is on the rise due to the growing number of papers published in high-quality service journals.

Key Authors

As noted, a total of 650 authors wrote the selected well-being publications. The average number of authors per paper is 2.47. As above, Table 3 shows the 15 most influential CJ authors, sorted by their respective total number of well-being publications and their citations. The author Rosenbaum M.S. (Hawaii Pacific University) has published 14 papers, followed by Fisk R.P. affiliated at Texas State University, and Russell-Bennett R. (Queensland University of Technology) who have each published 10 and 9 articles respectively.

In terms of total citations, Fisk R.P. leads with 136 citations, followed by McColl Kennedy J.R., affiliated with the UQ Business School, and Alkire L., Texas State University (cited 117 times). Finally, Rosenbaum M.S. (Hawaii Pacific University) ranks third with 115 and 8,21 average citations per document. Nevertheless, this analysis noticed that most of the authors in the selected database have a maximum of well-being articles to their name, implying that younger or newer service researchers tended to pick well-being as an area of research interest.

#	Authors	Latest Affiliation	TP	FTP
1	Rosenbaum M.S.	Hawaii Pacific University	14	6,09
2	Fisk R.P.	Texas State University	10	2,66
3	Russell-Bennett R.	Queensland University of Technology	9	2,87
4	Finsterwalder J.	University of Canterbury	7	2,42
5	Gruber T.	Centre for Service Management	7	2,49
6	Kabadayi S.	Fordham University	7	2,00
7	Alkire L.	Texas State University	6	1,81
8	Mccoll-Kennedy J.R.	UQ Business School	6	1,44
9	Mulcahy R.	University of the Sunshine Coast	6	1,52
10	Bianchi C.	Universidad Adolfo Ibañez	5	3,33
11	Chou C.Y.	College of Management, National Taiwan Normal University	5	1,83
12	Leo W.W.C.	Murdoch University	5	1,50
13	Patricio L.	University of Porto	5	1,02

Authors	Latest Affiliation	TC	AC
Fisk R.P.	Texas State University	136	13,6
Mccoll-Kennedy J.R.	UQ Business School	117	19,5
Alkire L.	Texas State University	117	19,5
Rosenbaum M.S.	Hawaii Pacific University	115	8,21
Sweeney J.C.	University of Western Australia	100	25
Ostrom A.L.	Arizona State University	73	18,2
Finsterwalder J.	University of Canterbury	71	10,1
Bitner M.J.	Arizona State University	55	55
Brown S.W.	Arizona State University	55	55
Burkhard K.A.	Arizona State University	55	55
Demirkan H.	Arizona State University	55	55
Goul M.	Arizona State University	55	55
Rabinovich E.	Arizona State University	55	55

14	Hammedi W.	University of Namur	4	1,33
15	Henkel A.P.	University of the Netherlands	4	1,00

Smith-Daniels V.	Arizona State University	55	55
Previte J.	University of Queensland	52	17,3

Table 3: Key well-being authors in terms of publications and citation

Key Articles

The number of total citations of a document represents its impact or influence (Khan *et al.*, 2021). Table 4 presents the most cited well-being articles in the period 2008-2022. The listed top five most cited documents were published between 2010-2020. All the articles were published in A-ranked service journals. The most cited document is titled "*Moving Forward and Making a Difference: Research Priorities for the Science of Service*" by Ostrom *et al.*, (2010), which has amassed 881 total citations. In this article, the authors led the identification of the following 10 overarching research priorities, including *"improving well-being through transformative service",* introducing to the research community one of the most important theories in the service domain (Dodds *et al.,* 2022). Second, the paper titled "*Health Care Customer Value Cocreation Practice Styles*" (McColl Kennedy *et al.,* 2012) has accumulated 572 total citations. The articles by Rosenbaum and Massiah (2011) and Sweeney *et al.,* (2015) rank third and fourth, respectively. Focusing on service robots, customers, and service employees, Lu *et al.* (2020) come in fifth, with 131 total citations. The authors analyzed the literature on service robots in the top 50 business journals and identified how they relate to customers and employees focusing especially on the "actual behaviors, the well-being, and potential downsides and (ethical) risks for customers and service employees" p. 361.

#	Author(s)/Year	Motivation	Journal	TC	TC per Year	Normalized TC
1	Ostrom, A. L., Bitner, M. J., Brown, S. W., Burkhard, K. A., Goul, M., Smith-Daniels, V., ... & Rabinovich, E. (2010)	"improving well-being through transformative service" p. 4	Journal of Service Research	881	67,769	1,9665
2	Janet R. Mccoll-Kennedy., Steven vargo, Tracey S. dagger, Jilian C. Sweeney, Yasmin Van Kasteren (2012)	"Research on health and well-being is encouraged by both service researchers and policy makers alike (Berry and Bendapudi 2007), with the impact of service on well-being being emphasized as a global research priority for the next decade (Ostrom et al. 2010)." p. 370	Journal of Service Research	572	52	2,8792
3	Mark S. Rosenbaum; Carolyn Massiah (2011)	"The paper shows how a servicescape's naturally restorative dimension can promote	Journal of Service Management	268	22,333	2,4512

		relief from mental fatigue and improve customer health and well-being." p. 471				
4	Jillian C. Sweeney; Tracey S. Danaher, and Janet R. McColl-Kennedy (2015)	"Transformative service research is particularly relevant in health care where the firm and customer can contribute to individual as well as societal well-being. This article explores customer value cocreation in health care, identifying a hierarchy of activities representing varying levels of customer effort from complying with basic requirements (less effort and easier tasks) to extensive decision making (more effort and more difficult tasks)." p. 318	Journal of Service Research	215	26,875	4,3377
5	Vinh Nhat Lu; Jochen Wirtz; Werner H. Kunz; Stefanie Paluch; Thorsten Gruber; Antje Martins; Paul G. Patterson (2020)	"more empirical research is needed, especially on the long(er)-term usage of service robots on actual behaviors, the well-being and potential downsides and (ethical) risks for customers and service employees". p. 361	Journal of Service Theory and Practice	131	43,667	7,1781
6	Blocker and Barrios (2015)	"discussion highlights the implications of transformative value for human agency and ways to design services that promote well-being among vulnerable populations." p. 265	Journal of Service Research	125	15,625	2,5219
7	Raymond P. Fisk, Alison M. Dean, Linda Alkire (née Nasr), Alison Joubert, Josephine Previte, Nichola Robertson, Mark Scott Rosenbaum (2018)	"Service inclusion represents a paradigm shift to higher levels of understanding of service systems and their fundamental role in human well-being." p. 834	Journal of Service Management	106	21,2	3,0394
8	Gabriela Beirão, Lia Patrício, Raymond P. Fisk (2017)	"value cocreation factors are identified (resource access, resource sharing, resource recombination, resource monitoring, and governance/institutions generation). These factors enable actors to integrate resources in multiple dynamic interactions to cocreate value outcomes, which involve both population well-being and ecosystem viability." p. 227	Journal of Service Management	101	16,833	3,247
9	Kristina Heinonen, Tore Strandvik (2021)	"markets and service offerings, imposed service innovations afford opportunities to implement transformation and enhance well-being." p.101	Journal of Service Management	86	43	6,5765
10	Martin Mende and Jenny van Doorn (2015)	"Although many consumers turn to financial counseling to improve their financial well-being, the effectiveness of these counseling services remains nebulous and the exact mechanisms through which they improve consumer well-being require further research." p.351	Journal of Service Research	86	10,75	1,7351
11	Hulda G. Black and Andrew S. Gallan (2015)	Service networks form to address issues for those in need, and value is conceived differently by the various constituents in the network. To represent this reality, a core service interaction, the reason for the construction of the network, is evaluated based upon a typology of value-creating interaction styles" p.826	Service Industries Journal	82	10,25	1,6544
12	Sven Tuzovic and Sertan Kabadayi (2020)	This article develops an overarching framework and research agenda to investigate the impact of social distancing practices on employee well-being.	Journal of Service Management	79	39,5	6,0412

13	Lin Guo; Eric J. Arnould; Thomas W. Gruen, and Chuanyi Tang (2015)	"This study investigates the process of customer organizational socialization in these programs, how it may promote co-production behaviors, and thus enhance consumers' well-being as well as satisfaction with the organization." p. 549	Journal of Service Research	76	7,6	1,5944
14	Mark S. Rosenbaum, (2008)	"The author shows that customers can obtain six types of social support from other customers: intimate interaction, social participation, physical assistance, feedback, guidance, and material aid. In terms of health benefits, intercustomer support provides customers with group cohesion and enhanced well-being" p.179	Journal of Service Research	73	4,867	1
15	Raymond P P. Fisk, Laurel Anderson, David E. Bowen, Thorsten Gruber, Amy Ostrom, Lia Patrício, Javier Reynoso, Roberta Sebastiani (2016)	"The authors suggest a number of approaches for service researchers to join this new movement and help improve the well-being of billions of impoverished people." p. 43	Journal of Service Management	72	10,286	2,7986

Table 4: Key well-being publications

3.1 Depicted the conceptual structure of well-being

This paragraph aims to represent the conceptual (or knowledge) structure by examining the research front of well-being in service research (Callon *et al.*, 1983). It is organized as follows: firstly, a thematic diagram (thematic map) with content analysis of clusters is presented. Next, a keyword analysis with an overlay visualization - and subsequent thematic evolution - is proposed.

3.1.1 Thematic diagram

To map the conceptual structure of well-being in service science and to identify the main topics, a strategic diagram on the cleaned authors' keywords was employed. This diagram is also called a thematic map (Cobo *et al.*, 2011) and it helps plot the themes identified through community detection in a bi-dimensional matrix in which the two axes are functions of centrality and density, respectively. Centrality refers to the importance of the theme in the research field, while density represents a measure of the theme's development. Thus, it allows defining of four typologies of themes according to the quadrant in which they are placed. Themes in the upper-left-hand quadrant, such as **social support**, are highly developed and isolated themes or niche themes. They have well-developed internal links (high density) but unimportant external links and less important for the field (low centrality). Themes in the lower-left-hand quadrant are emerging or declining themes, they have both low centrality and density, meaning that it is weakly developed or marginal. These themes are not consolidated in the literature and can develop in different directions. **Technology and service** is an emerging theme but it is also

moving toward the *motor theme* quadrant. Therefore, it is developing as an important and relevant topic. **Vulnerability** is a motor theme, characterized by both high centrality and density. It is in the upper-right-hand quadrant, both well-developed (high-density rank) and very important (high centrality), having very strong external and internal ties. Finally, **TSR and transformative value, healthcare services and well-being, value co-creation** and **service design** are in the lower-right-hand quadrant. They are characterized by high centrality and low density. They are basic and transversal themes, important for a research field and pertain to general topics transversal to the different research areas. Each theme uncovered employing community detection, can be visualized as a bubble on the thematic diagram (see Figure 5). The terms in the bubble are the ones with the highest number of occurrences within a theme. The bubble size is proportional to the occurrences of terms in the cluster, and the bubble position on the map is based on Callon's centrality and density of the cluster itself (Callon *et al*, 1983). These clusters reveal areas in which studies have been published as "the conceptual subdomain of a research field" (Pohlmann and Kaartemo 2017, p. 54). Finally, following the recommendations of Mukherjee *et al*., (2022), to enrich the science mapping analysis, qualitative content analysis is integrated. In this way, each cluster is described based on the most cited articles.
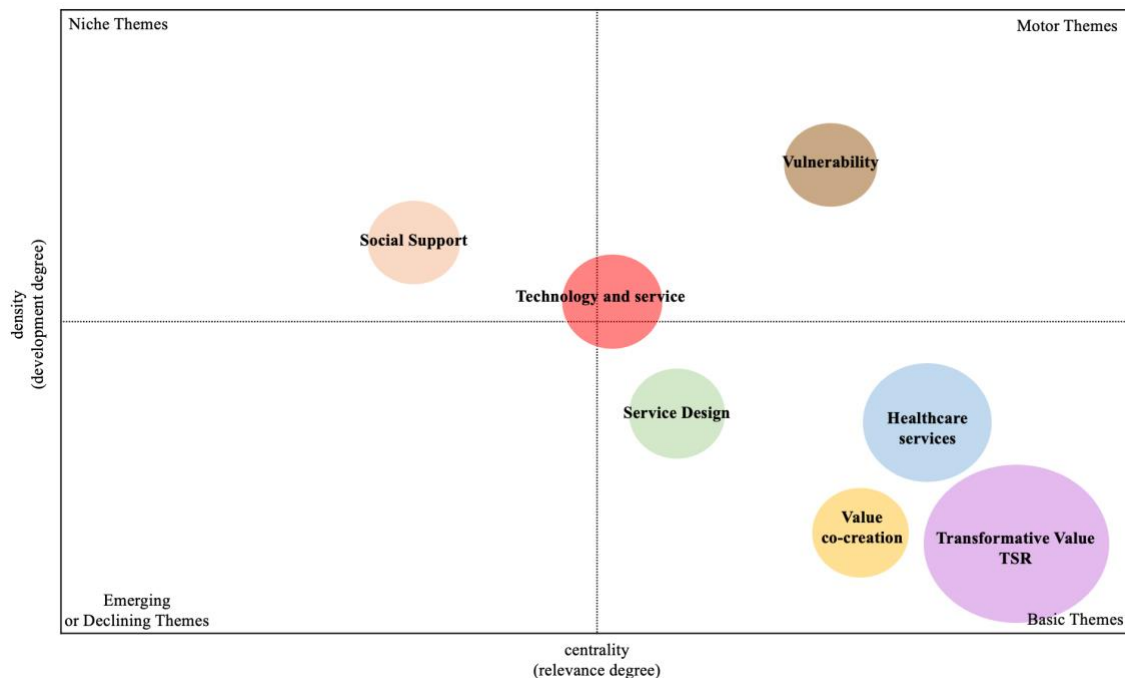
Fig. 5: Thematic diagram. Source: Author's elaboration.

3.1.2. Content analysis of clusters

In order to explore the well-being domain in service research, bibliometric observations are supplemented with qualitative content analysis of each cluster (Kumar *et al.*, 2022) resulting in a condensed and broad description of the phenomenon (Mayring, 2004). Krippendorff (1989, p. 103) defined content analysis as *"the use of a replicable and valid method for making specific inferences from a text to other states or properties of its source"*. Content analysis is recognized as appropriate for systematically assessing the symbolic content of any kind of recorded communication (Hellkula, 2011).

The results are presented below: 1) *transformative value*, 2) *value co-creation,* 3) *healthcare services and well-being*, 4) *technology and service*, 5) *vulnerability*, 6) *service design*, 7) *social support*.

#Cluster 1: Transformative value

Transformative value plays a significant role in well-being (Bilstein *et al.,* 2022; Tsiotsou and Diehl, 2022). Over time, value creation has changed from being interactive to being dynamic, dialectic, transformative, multi-actor, and multi-level (Blocker and Barrios, 2015; Tsiotsou, 2021). Blocker and Barrios defined transformative value as *"a social dimension of value creation that generates uplifting change for greater well-being among individuals and collectives"* (p.265). Transformative value is a key concept in TSR because it influences well-being as it relates to one's physical or mental health, financial security, sense of community, literacy, inclusion, access, capacity development, and reduced suffering (Anderson *et al.*, 2013). Likewise, one of TSR's fundamental premises is that service consumption results in the transformative value creation (TVC). This term refers to "uplifting changes" intended to enhance the quality of life for people, families, communities, society, and the environment (Anderson *et al.*, 2013). However, because it refers to a variety of actors, including workers, families, communities, and society at large, transformative value is polycentric rather than monocentric (limited to consumers) (Tsiotsou and Boukis, 2022). According to a TRS approach, TVC is defined as the social and ecological outcomes of service offerings that benefit people, society, and the environment (Anderson and Ostrom, 2015). Examples of these outcomes include increased **life satisfaction** and **quality of life**, as well as **hedonic and eudaimonic well-being** (Rosenbaum *et al.,* 2011; Blocker and Barrios, 2015; Tang and Blocker, 2022). In addition, according to Parkinson *et al.* (2019), TVC is a cumulative process that develops over time due to direct value co-creation interactions between customers and service providers, customers and other customers, and customers and service technologies. As

a result, TVC turns out to be a process that generates long-term changes that enhance well-being and achieve sustainability, going beyond the service experience (Mudler *et al.*, 2015).

#Cluster 2: Healthcare services and well-being

An outstanding example of a TSR context that is crucial to both social and individual well-being is healthcare (Groven *et al.*, 2021), i.e. a service with highly sensitive and emotional content, in which unintended consequences might be particularly challenging, as people's physical, psychological and financial well-being, even their lives, are at stake (Patricio *et al.,* 2018; Berry *et al.,* 2020). From the service provider's perspective, examples of unintended consequences may be caregiver burnout, workflow inefficiency, interruptions, distractions, etc. In short, elements that contribute to stress and hinder well-being (Vogus *et al.*, 2020). Moreover, the COVID-19 pandemic has starkly highlighted the need for healthcare as a labor- and skill-intensive service that is essential to individual and societal well-being (Berry *et al.*, 2020). A society's physical, mental, and economic well-being are closely tied to the quality and effectiveness of its healthcare system. In this specific context, well-being at the individual level can relate to both the well-being of the patient and the well-being of healthcare employees (caregivers, medical staff etc.) (Mele *et al.*, 2022a). Nevertheless, other individuals, such as the patient's family members, may also be indirectly involved in one or more stages of the healthcare delivery process. Thus, in addition to well-being at the individual level, healthcare also has the potential to improve collective well-being at an ecosystem level (e.g., of the family, caregivers, community of care) (Anderson et al., 2013). Consequently, a healthcare service provider could foster the well-being of both individuals and communities due to the inherent purpose or promise of its services (Rosenbaum *et al.*, 2011). Therefore, as this thesis has emphasized throughout, it is intriguing to learn how a health service provider can enhance well-being outcomes (Kabadayi *et al.*, 2020)

Finally, the concept of well-being is particularly relevant in healthcare services studies by linking often to the concept of vulnerability (Mele *et al.*, 2022a). In fact, according to Leroi-Werelds (2019), healthcare is a pivotal area that can improve the well-being of vulnerable patients and the overall populations. According to Sweeney *et al.,* (2015), co-creating value is crucial to provide high-quality healthcare services. By working together, patients and physicians can co-create value by combining their resources and expertise to foster patients' well-being (McColl-Kennedy *et al.*, 2012; Mele *et al.*, 2022a). This cluster also includes some studies that have addressed the issue of **well-being in later life and elderly care** (e.g., Bast *et al.*, 2021, Ge *et al.*, 2022). A comprehensive approach to enhancing the well-being of older

individuals emphasizes considering individual areas of life instead of a universal approach to increase satisfaction in one specific area. By doing so, it is possible to determine the domains that have the largest impact on overall well-being in old age, including healthcare and social connection (Prakitsuwan and Moschis, 2021).

#Cluster 3: Value co-creation

A key concept in well-being studies is service research is **value co-creation** (McColl-Kennedy *et al.*, 2017). According to Chen *et al.* (2021), value co-creation influences both the subjective well-being - of the directly involved actors - as well as other beneficiaries' well-being. Mele *et al.*, (2023) propose a comprehensive perspective on value-based well-being grounded in the S-D logic, by proposing *Value-based Well-being (*VaWe), framework. Well-being can be linked to four value outcomes: use value, option value, bequest value, and existence value associated with resources, including their current or possible future uses. Well-being arises from values that encompass (1) the individual or community, (2) the present or future, and (3) proximal or broader contexts. In this view, Mele *et al.* (2023) argue that *subjective well-being* is not solely derived from utilitarian and hedonic values (Sharma *et al.*, 2017) but can also emerge from ethical, environmental, and social values, which are dependent on the current and/or potential utilization of resources by individuals and/or others (beneficiaries), in narrow and/or broader settings (space). This suggests reciprocal effects among diverse beneficiaries and well-being categories (Rahman, 2021). For instance, Sweeney et al. (2015) found that when customers engage more in value co-creation (e.g., by engaging in more caring activities), their well-being increases. Similarly, analyzing financial well-being, Guo *et al.*, (2013) argue that when customers proactively co-create using learned knowledge and skills, their (financial) well-being improves. Moreover, McColl-Kennedy *et al.*, (2012) argue that customers engage in value co-creation activities also to improve healthcare services to benefit organizations, community groups, or society. According to Sharma *et al.*, (2017), customers can play three different types of co-creative roles: a) co-producer, b) strategic partner, and c) community citizens. Hedonic and eudaimonic well-being outcomes are present in all three roles. Firstly, the concept of co-production encompasses the participation of customers in the direct delivery of services (McColl-Kennedy *et al.*, 2012; Sharma and Conduit, 2016). It can be characterized as the involvement of customers in the transformative process where they collaborate to transform inputs (such as present health conditions or consumer knowledge) into higher-value outputs (e.g., improved health or consumer knowledge). Secondly, by participating as a strategic partner for the organization and other customers - and thus taking part in the co-

creation process - customers experience a sense of competence and shared purpose, freedom, and pleasure. Finally, the third role is community citizens. This increases the well-being of individuals (who, for example, feel they have gained mastery in understanding the system) more broadly and creates a sense of social contribution and connection with society because of the valuable results produced by co-creating services at the social level.

#Cluster 4: Vulnerability

Vulnerability in service research refers more specifically to individuals who require assistance to solve their social, health, or financial problems (Cheung and McColl-Kennedy, 2019; Virlée *et al.,* 2020; Mele *et al.*, 2022a). Several service studies have proposed examples of people experiencing vulnerabilities such as homeless teenagers (Hill, 2002), disadvantaged consumers (Santos and Laczniak, 2009), homeless individuals (Blocker and Barrios, 2015), fair treatment of customers during service, fair access to service, and fair exit opportunities (Fisk *et al.*, 2018), refugees (Nars and Fisk, 2018; Cheung and McColl-Kennedy, 2019; Boenigk *et al.*, 2021), patients (Mele *et al.*, 2022a) and more recently, refugees during pandemic (Finsterwalder *et al.*, 2021). Following this perspective, most traditional research sheds light on customers who are vulnerable and therefore excluded from service contacts, communities, or society (Blocker and Barrios, 2015; Azzari and Baker, 2022). TSR recognizes the importance of managing the vulnerability of both service providers and customers (Anderson and Ostrom, 2015). In this sense, a vulnerable customer is someone who experiences vulnerability and/or is disadvantaged in some way due to individual status, individual characteristics, and/or external conditions (Rosenbaum *et al.*, 2011).

Mele *et al*., (2022a) conceptualize *vulnerability* as a widespread occurrence characterized by a lack of resources. Adopting a transformative, human-centered approach to smart service provision, they concentrate on vulnerable patients that require health and care services (Khaksar *et al.,* 2017). Due to chronic diseases, long-term therapies, and innate limitations, vulnerability is frequently observed in healthcare settings. However, the use of smart technologies can improve the well-being of vulnerable patients by increasing their active participation in disease management, reducing anxiety and disorganization, and enhancing cognitive adherence, disease acceptance, and routine adherence. In sum, smart technologies can act as a lever to reduce vulnerability (Mele *et al.*, 2022a).

According to Leino *et al.* (2021), any person can experience contextual vulnerability, which is a relevant and context-specific condition (Baker *et al.*, 2005). These criteria imply that everyone has the possibility of feeling vulnerable, which means that situations such as

exclusion from services or failure to meet basic needs can lead to feelings of vulnerability. For instance, the definition of "*vulnerability*" is clarified in the context of dementia care, where vulnerability is associated with one or more diagnoses that impair the ability to express feelings or experiences. Dementia emerges as a specific form of vulnerability because of its nature as a relatively permanent state or condition. The vulnerability of people with dementia may vary depending on the situation and circumstances, but certain cognitive and behavioral disorders may make it permanent (Bast *et al.*, 2021). According to Sharma *et al.* (2017), this vulnerability decreases people's quality of life (well-being). In this light, the valuable contributions of Fisk *et al.* (2018;2020) pointed out that because service systems are essential to sustaining human well-being and vulnerable customers often face **service exclusion**, there is a need for design aimed at **service inclusion** (Fisk *et al.*, 2018, 2020). According to Fisk et *al.* (2018), service inclusion should be based on four pillars: *"enabling opportunities (providing access to services and the capacity to receive and co-create valued services), offering choice (between various service offerings and choosing not to use services), relieving suffering (fair access to necessary services that meet basic human needs), and fostering happiness (**hedonic well-being from services**)"* (p. 844).

More recently, service studies (Kamran and Uusitalo, 2019; Stavros *et al.,* 2021) have investigated vulnerability in the financial services context. In this view, vulnerable customers might be in difficult circumstances that result in non-optimal decision making and the effects on their well-being might be even more severe. However, in such cases besides financial well-being to be at risk is also psychological well-being due to the impact of stress, including its effects on cognition and effective decision-making (Johns and Davey, 2019). In this sense, financial well-being is the *"perception of being able to sustain current and anticipated desired living standards and financial freedom"* (p. 228) as defined by Bruggen *et al.,* (2017).

Boenigk *et al.,* (2021) introduced Transformative Service Initiatives (TSI) "as activities of organizations (public, private, nonprofit) or volunteers that serve people experiencing vulnerabilities and improve their well-being". TSI are all the activities of organizations (profit and nonprofit) or individual volunteers that deal with people in vulnerable conditions and aim to increase their physical, social, and psychological well-being. For example: support in educational, social, healthcare services.

#Cluster 5: Technology and service

In their recent editorial work, Rosenbaum and Russell-Bennett (2021) identified service technology and human well-being as one the future service research opportunities, assuming

that there are two different streams of research in service literature. The first seeks to understand how technologies such as robotics, artificial intelligence, digital service cloud, and big data impact service industrialization and productivity (Wirtz *et al.*, 2018). From this perspective, scholars have also focused on the role of technologies and the impact they have on frontline employees in service industries (Odekerken-Schröder *et al.*, 2021). The second stream of research, in contrast, seeks to understand how services, service providers, and service ecosystems function to lessen human suffering, foster human well-being, and impact the human experience (Azzari and Baker, 2020; Mele *et al.*, 2022). More in general, authors have investigated the service technologies that cover both physical objects like robots, machines, and monitoring tools as well as various platforms and devices like websites or mobile applications for the electronic distribution of information, including data and content (Ostrom *et al.,* 2021). Artificial Intelligence, service robotics, augmented reality, and digital services are some examples. Similarly, in research based on the role of technology in collaborative consumer communities, Guillemot and Privat (2019) have shown that the use of digital tools increases community well-being by highlighting the development of social ties, solidarity, and social equality as indicators of well-being. At the same time, technology also reduces the negative effects such as difficulties in social interactions and social inequalities. Scholars have addressed different types of service technologies. For instance, De Keyser *et al.,* (2019) investigated the Frontline Service Technology (FST) defined by van Doorn *et al.*, (2017) as *"the incorporation by service organizations of technological elements into the customers' frontline experience"* (p. 43). A recent strand of research has investigated how smart technologies (e.g., smart devices, service, and social robots) impact human well-being (Henkel *et al.*, 2020; Lu *et al.*, 2020; Mele *et al.*, 2022a). According to Ostrom *et al.* (2021), companies can aid customers in their quest for well-being by employing smart technologies such as self-tracking devices and wearables. In this perspective, Tikkanen *et al.*, (2023) sheds light on the role of smart technologies (i.e., smart wearables) in promoting well-being, by delving into how these technologies can function as tools for consumer agency, as a vital aspect of advancing well-being (Ostrom *et al.* 2021). Smart wearables can support individual and contextual agency for well-being by enabling consumers to acquire knowledge and take action (Tikkanen *et al.*, 2023). In detail, they propose a framework that categorizes technology use for well-being into four types: *(1) self-improvement, (2) justification, (3) adaptation, and (4) activism*. Firstly, smart wearables can assist consumers in developing trust in their senses and intuition, thereby underscoring the significance of self-improvement in well-being. Secondly, they can facilitate the participation and engagement of various actors, such as friends, family, and medical

professionals, in the consumer's well-being efforts. Thirdly, smart wearables are designed to help users focus on their individual health and fitness goals, promoting introspection. Finally, smart technologies can be leveraged as resources to bring about structural change and enhance the surrounding environment for consumers, enabling greater environmental mastery, which is a component of psychological well-being (Ryff and Singer 2008).

However, despite the great hype, research on service technology and human well-being is still scarce (Rosenbaum and Russell-Bennet, 2021, Lima and Belk, 2022). Several service studies call for advancing research, shifting the focus from technology's promises and predictions to the real consequences of technology, which are often unintended and unpleasant (Choi *et al*., 2021).

#Cluster 6: Service Design

Service design can be defined as the intentional configuration of the elements of a service to enable certain desired outcomes (Anderson *et al.*, 2018). It can be examined at multiple levels e.g., the design of a single service versus a system of services (Patrício *et al.,* 2011). Service design is a key concept in TRS studies, where the field of "transformative service design" is emerging (Patrício *et al.,* 2018; Fisk *et al.*, 2020; Furrer *et al*., 2020). According to Reynoso *et al.*, (2015), a variety of service design elements can bring about positive improvements in the form of increased customer well-being. This also applies to vulnerable customers who are constrained by their environment's difficulties (Nasr and Fisk, 2019). Fisk *et al.* (2018) stressed the importance of designing inclusive service systems and proposed a holistic approach to service design that takes into account the service concept, the service system, and the service encounter and is based on enabling opportunities, providing options, alleviating suffering, and encouraging happiness. Therefore, according to Fisk *et al*., (2018) designing service inclusion could have a significant, transformative effect on people's well-being. Likewise, investigating the healthcare service context, Patricio *et al.*, (2020) propose a **human-centered service design** approach that leverages technology potential to advance healthcare systems toward human-centered care. By balancing the different goals of multiple healthcare actors, this kind of service design approach thus pursues well-being at individual, dyadic and systemic levels (Virlee *et al*., 2020).

#Cluster 7: Social support

Social support is critical to well-being, especially in the midst of trying circumstances or life events (Odekerken *et al.*, 2020). Along similar lines, Rosenbaum *et al.,* (2021) stressed that

social support has a profound impact on human well-being, especially on their general health and quality of life. The explanation for this is that social support helps people avoid feeling or lessening the full impact of unpleasant symptoms (such as stress, despair, and loneliness), which are often brought on by going through major life changes and crises (Yao *et al.*, 2015). Cho (2019) defined it as the process of giving or receiving resources via interpersonal connections. Social support manifests itself in terms of information exchange and emotional support, important resources in the process of value co-creation (Parkinson *et al.*, 2019). According to conventional wisdom, social support can be divided into two types: instrumental social support, which comes in the form of resources, advice, and behavioral support; and emotional social support, which results from close relationships and interactions with family members (Xie *et al.*, 2020). Moreover, recent studies have addressed online *social support*. Zheng *et al.,* (2016), for example, investigated how online health communities increase well-being of socially excluded patients. In the field of health services, receiving social support online should positively affect patients' physical, psychological, existential, and supportive quality of life. For instance, on social networks, patients can inform themselves, discuss their diseases with other members, and get advice or comfort from people with the same condition. Along similar lines, Odekerken-Schröder *et al.,* (2020) stressed that social support initiatives can address the specific needs of people facing different types of loneliness (as a well-being reducer).

3.1.3. *Keywords analysis and thematic evolution*

As the thematic diagram, this analysis aims to depict the conceptual or knowledge structure of well-being in service research (Callon, 1983). Thus, here the focus is on well-being themes as determined by keyword co-occurrence analysis. "Keyword co-occurrence [analysis can] indicate several noteworthy trends" (Kumar *et al.,* 2021 p. 282). A network of concepts can be built in a research field by using the relationships that can be established between different keywords. According to Wang *et al.,* (2019) each research field or topic can be described by a group of terms (Leydesdorf 1989; He 1999), and "keywords converging into a cluster represent a common theme" (Mukherjee *et al.*, 2022 p.105). Moreover, unpacking knowledge clusters can provide nomological clarity about the constructs and the networks that connect them in the field (Mukherjee *et al.*, 2022). As the most crucial words in manuscripts, the authors' keywords were chosen to represent the conceptual structure of well-being in service research (Donthu *et al.,* 2021). A total of 959 keywords were identified in 263 papers. Table 5 shows the top

keywords used in well-being research. "Well-being" is the most frequently used keyword, with 102 occurrences, which indicates that this word alone is used as a termed concept in the literature. The other four most frequently used keywords are "transformative service research" and "transformative value" (84 occurrences), "healthcare services" (36 occurrences), "value co-creation" (32 occurrences), and "vulnerability" (16 occurrences).

#	Keyword	Occurrences
1	well-being	102
2	transformative service research transformative value	84
3	healthcare services	36
4	value co-creation	32
5	vulnerability	16

Table 5: Top five keywords of well-being based on the occurrence

Figure 6 presents the co-occurrence analysis of the most frequent themes between 2008 and 2022. The network's circle diameters display how frequently certain keywords are searched. A larger diameter indicates a keyword that is more searched, and a smaller diameter indicates a keyword that is less searched. Additionally, the thickness of the connected line demonstrates how strongly the two keywords are related. For instance, word combinations such as *"well-being"* and *"transformative service research"* exhibit stronger links and more frequent co-occurrence. Similarly, there is a strong link connecting *"healthcare"* and *"social support"* and *"vulnerability"*. Figure 9 also shows keyword clusters with changes over time. The analysis of the so-called overlay network reveals how research has evolved in terms of keywords and which keywords are the oldest and newest (Van Eck and Waltman, 2010). The overlay map - where the shading of the color of the nodes denotes the average year of publication - shows four clusters with different colors. In greater detail, the oldest words related to the concept of well-being are contained in the purple cluster, which is also evident in the thematic map (Figure 8). This cluster includes social support and service design, which refers to intentionally configuring the elements of a service to achieve desired outcomes (Anderson *et al*., 2018). Social support is demonstrated through information exchange and emotional support, which are crucial resources in the process of value co-creation (Parkinson *et al*., 2019). The dark green cluster, which is mainly related to the years 2019-2020, includes keywords that pertain to healthcare, co-creation, and BoP. The light green cluster from 2020 serves as a bridge between

the older and newer topics found in the yellow cluster from +2021. The concept of well-being, previously linked to healthcare and service design, shifts its focus towards relatively new concepts such as customer experience, customer engagement, and AI technology. This map (Figure 6) is consistent with the thematic map (Figure 5), which highlights basic themes such as co-creation, social support, service design, and healthcare from 2018-2020, and driving themes such as vulnerability, technology, and customer constructs from 2020-2022.
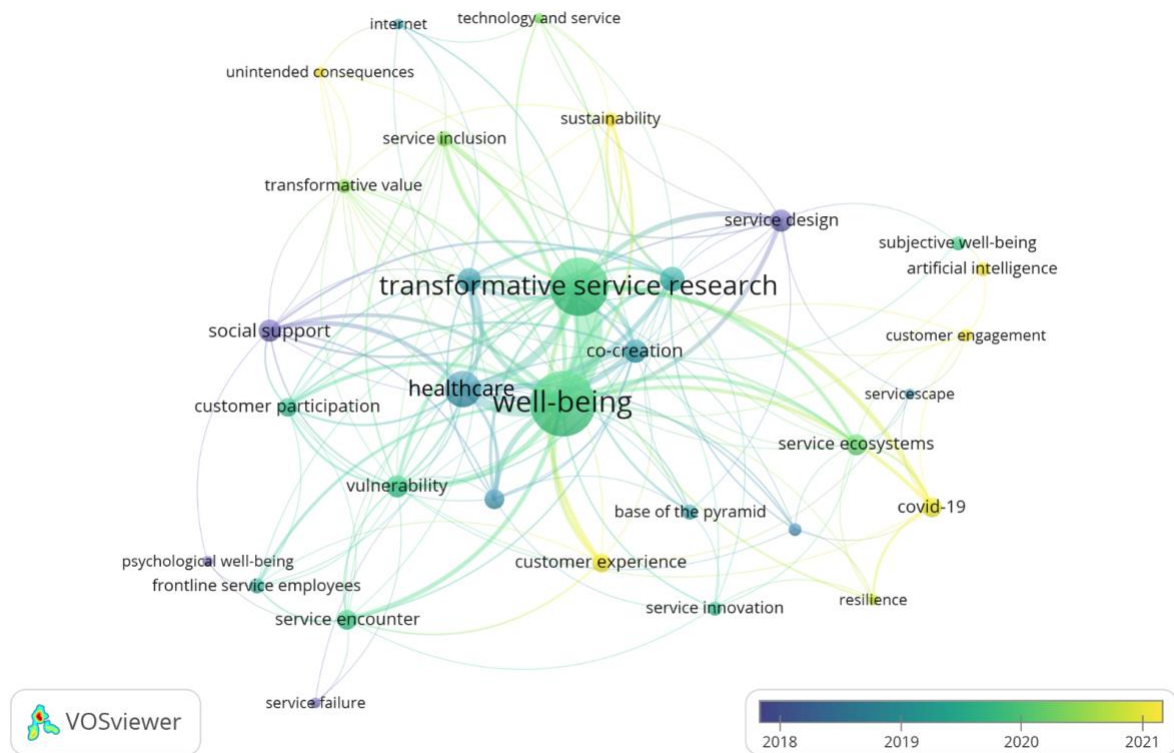
Fig. 6: Co-occurrence network. Source: Author's elaboration.

3.3 Well-being in service research: final remarks

The clusters were subjected to bibliometric and content analyses, revealing that service research has investigated various aspects of well-being for both customers and service providers. Themes most closely related to well-being are vulnerability (e.g., Cheung and McColl-Kennedy, 2019), co-creation of value (e.g., Sharma *et al.*, 2017), and, more recently, the use of service technologies (e.g., Henkel *et al.*, 2020). The majority of studies, whether empirical or conceptual, have explored philosophical and psychological positions, including eudaimonic and hedonic well-being. There is a significant gap in service research when it comes to assessing and modeling well-being. Only a small number of studies in this field have examined this issue (e.g., Čaić *et al.*, 2018, 2019; Kabadayi *et al.,* 2020; Mele *et al.*, 2022a), all of which view well-being as a complex, multidimensional concept that encompasses

multiple domains and dimensions. For instance, Čaić et al. (2018) focus on subjective well-being, drawing on Diener et al.'s (1997, 2003) theories, while Mele *et al.* (2022a) examine psychological, physical, and social dimensions of well-being based on Cooke et al.'s (2016) study. Kabadayi *et al.* (2020) propose a framework for the experience of caring for the elderly that considers five dimensions of well-being: emotional, physical, social, economic, and spiritual, building on Depp and Jeste's (2006) work. In summary, the existing literature on well-being assessment, including studies by Kabadayi *et al.* (2020) and Mele *et al.* (2022a), relies solely on psychological models and research. This emphasizes the importance of adopting an interdisciplinary perspective to comprehensively understand the concept of well-being.

4. Well-being: a general overview

Recently, well-being has received increased attention from academics, practitioners, and policymakers (Ostrom *et al*., 2021). The construct of well-being has been investigated differently in many fields such as philosophy (Crisp, 2006; Burr and Floridi, 2020), psychology (Ryff, 1989; Diener *et al.* 1999; Ryan and Deci, 2001), medical science (Haraldstad et al., 2019), sociology (Veenhoven, 2008) and economics (Stiglitz *et al.,* 2009).

Philosophy has a long tradition of seeking to understand the concept of well-being. According to conventional wisdom, well-being refers to what is *non-instrumentally good for a subject* (Crisp, 2006; Woodard, 2013). A simplified typology for well-being theories was introduced by Parfait (1984) that organized diverse well-being theories into a) hedonic theories (e.g., all that matters for well-being is the amount of pleasure and pain experienced by an individual), b) desire-fulfilment theories (e.g., if desires remain unfulfilled or frustrated leads to well-being decrease, c) objective list theories (e.g., achievement, friendship, pleasure, knowledge, and virtue). Whereas desire-fulfilment and hedonic theories are related to subjective attitude, the third stream refers to objective one.

More recently, scholars have focused on integrating different disciplines to foster an increased understanding of well-being. According to Bishop (2015), *"both philosophers and scientists are roughly right about well-being, and then figure out what it is they are all roughly right about"* (p. 2). One of these sciences is psychology. From a psychological point of view, an integrated conceptualization reflects the multidimensional status of well-being, spanning positive emotions, social relationships, and physical health (Keyes and Waterman, 2003). More in general, research on well-being is broadly approached from one of two perspectives: hedonic and eudaimonic (Diener, 2000; Ryan and Deci, 2001). Similar to philosophical hedonism,

hedonic well-being refers to pleasure and happiness and is often operationalized as satisfaction and positive affect or the absence thereof (Ryan and Deci, 2001). Eudaimonic claims that well-being consists of achieving one potential, as determined by human nature. The eudaimonic form defines well-being along a set of dimensions that promote meaning and self-realization (e.g. environmental mastery, personal growth, and positive social relations (Ryff, 1989) to advocate fully functioning individuals. In other words, two philosophical perspectives—the hedonic and the eudaimonic—serve as the foundation for how psychology conceptualizes well-being (Lent, 2004). Hedonic well-being encompasses the affective aspects of health in terms of pleasure or pain (Ryan and Deci, 2001). An individual's hedonic well-being, for instance, could be represented by their display of positive affect or absence of negative affect (Deci and Ryan, 2008). In contrast, the eudaimonic perspective defines well-being as reaching one's full potential in domains like personal expressiveness (Waterman, 1993). Eudaimonic well-being, which places more emphasis is thus expressed through the achievement of growth, meaning, and the pursuit of purpose in life (Lent, 2004). One aspect of an individual's eudaimonic well-being, for instance, could be the capacity to self-manage a health condition.

Two additional well-being conceptualizations that have gained widespread recognition are subjective well-being (SWB) and psychological well-being (PWB), which are based on the hedonic and eudaimonic perspectives, respectively. Positive or negative emotions and life satisfaction are examples of affective responses and cognitive evaluations that make up subjective well-being (Diener, 1984). Self-acceptance, environmental mastery, positive interpersonal relationships, life purpose, personal growth, and autonomy are all concepts that define psychological well-being (Ryff, 1989; Ryff and Keyes, 1995). All these aspects are presented in detail in the following section *"1.2: Well-being: pillars from psychology"*.

In **medical studies**, well-being is mainly understood as Quality Of Life (QOL), as Alexandrova (2017, p. 168) notes, *"the stand-in for well-being is health-related quality of life"*. Quality of life (QOL) and variations like quality-adjusted life years (QALYs) or disability-adjusted life years (DALYs) are used similarly to economic constructs (i.e., as inputs to calculations that help determine the efficiency of policy decisions and allocate health care resources) (Haraldstad *et al.,* 2019). Similar to psychology, the medical sciences also rely on a variety of more specialized well-being measures that can be tailored to particular illnesses or patients as well as occasionally include caregiver well-being.

In **sociology**, well-being refers to subjective overall sense of satisfaction with life, which is socially constructed and shaped by several factors (e.g., cultural norms, social relationships, economic resources) (Veenhoven, 2008). According to Michalos (2014), subjective well-being

is the gap between perceptions of "*life-as-it-is*" with notions of *"how-life-should-be"*. It is a multidimensional concept that encompasses not just a subjective matter (e.g., happiness, meaning, purpose) but also reflects material aspects of life, broader societal structures and processes (Veenhoven, 2008).

In **economics**, Gross Domestic Product (GDP) per capita has been a widely used measure of national well-being, but its use as a surrogate indicator has faced significant criticism, particularly from development economics, which rejects the preference satisfaction view of well-being. Both objective and subjective measures of well-being are crucial for understanding people's quality of life (Stiglitz *et al*., 2009).

4.2 Well-being: pillars from psychology

Psychology researchers tend to disagree on what constitutes well-being. No international consensus definition exists, although scholars agree that a common definition is needed (Martela and Sheldon, 2019). In the absence of a consensus, many synonyms, descriptions, and lists of well-being indicators are used interchangeably, thus making it difficult to compare well-being research studies. For example, health and well-being are often described as the same thing. However, according to the Cambridge definition, humans who are unhealthy are not necessarily precluded from a state of well-being; rather, their state is determined by how they feel about their health. This illustrates an underlying premise, i.e., that well-being can only be assessed subjectively.

Psychology studies have traditionally focused on the main theories of well-being: subjective well-being (SWB) and psychological well-being (PWB) (Ryff, 1989). According to Diener (2000, p. 34), SWB is "people's cognitive and affective evaluations of their lives". In detail, Diener (1984) proposes a tripartite model composed of Bradburn's (1969) *"hedonic balance"* model in which well-being is maximized by a high ratio of positive to negative affections. Diener's model (1984) included also a cognitive component on the degree to which one's life is viewed as satisfying or close to ideal. In other words, SWB focuses on three main components: a cognitive aspect involving global appraisals of life satisfaction and two emotional components, including positive affect and negative affect, as shown in Fig. 7.
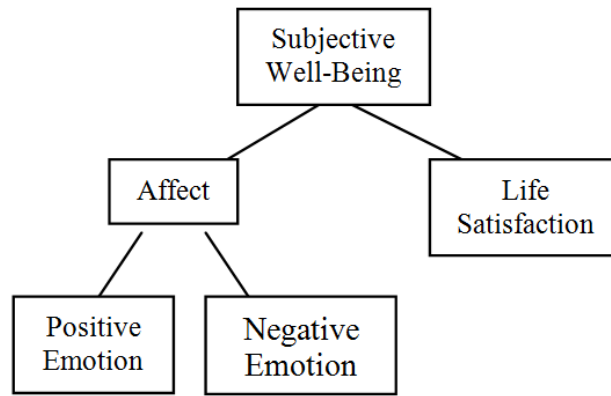
Fig. 7: Diener subjective well-being (1984). Source: Diener, (1984).

The PWB tradition originated as a complementary approach to the subjective well-being perspective (SWB). While the SWB perspective does not specify a single conception of well-being, preferring instead to leave such matters to the individual, the PWB perspective takes a more theoretical approach to well-being, arguing that focusing only on affect and life satisfaction neglects important aspects of positive psychological functioning (Ryff, 1989). In particular, Ryff's (1989) definition of psychological well-being combines insights from three areas of psychological theory: **personal growth models, life span development perspectives, and positive mental health.** Ryff's PWB perspective, which was derived from the aforementioned theoretical perspectives, was designed to offer an empirically reliable conception of well-being. Six dimensions make up this conception: (1) *self-acceptance*, which is shown in positive attitudes toward oneself and one's past life; (2) *positive relationships* with others; (3) *autonomy*, which is shown in traits like self-determination, independence, self-regulation of behavior; (4) *environmental mastery*, which is the capacity to select and/or create environments that are appropriate for one's mental condition; (5) *purpose in life*, which is the presence of beliefs that give the person a sense of direction and meaning in life; (6) *personal growth*, which takes the form of realizing one's potential as well as expanding as a person (Figure 8).

Fig. 8: PWB: Ryff's model (1989). Source: Ryff (1989)

However, this conception of human potential as a unique individual in nature was challenged by Keyes (1998), who defined the *"social well-being"*. Social well-being encompasses the extent to which individuals feel they make a valuable social contribution, consider society meaningful and intelligible, feel a sense of social belonging, maintain positive attitudes toward others, and believe in the potential for society to evolve positively. Thus, the author asserted that a different aspect of human potential is to become a better member or citizen of the community. However, in that individuals are challenged to accept the majority of their own personalities as well as to become better community members and more accepting of others, Keyes' conception (1998) of social well-being reflects dimensions resembling Ryff's dimensions of psychological well-being. Keyes (1998) also argued that to fulfill one's potential, human beings should be challenged to contribute things of value and worth to our communities and societies.

More recently, according to Seligman (2011), the majority of psychological models incorporate hedonic or eudaimonic theories (SWB as hedonic, PWB as eudaimonic). In his own model, the PERMA model, the author integrated hedonic (the experience of pleasurable emotional states and the fulfillment of desires) and eudaimonic elements (the presence of meaning and the realization of one's potential). The acronym PERMA comes from the author's list of the five building blocks of well-being: *Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment.* Each of these five elements is intrinsically rewarding and serves as a useful goal in any endeavor (Figure 9). Firstly, *positive emotion* encompasses hedonic feelings such as happiness, pleasure, and comfort and serve as a marker for flourishing. *Engagement* refers to a deep psychological connection to a particular activity or organization. Csikszentmihalyi (1999) defined full levels of engagement as a *flow state* as a single-minded immersion, an

optimal state of concentration on an intrinsically motivating task. *Relationships* include feelings of integration with society or community, feelings of being cared for by loved ones, and satisfaction with one's social network. Supportive social relationships have been linked to lower depression and psychopathology, better physical health, and other positive outcomes. *Meaning* refers to having a sense of direction and purpose in life, as well as feeling a connection to something greater than oneself. Finally, *Accomplishment* refers both to a feeling of self-fulfillment and recognition from others. It can be defined objectively, but they also depend on an individual's drive, ambition, and personality.
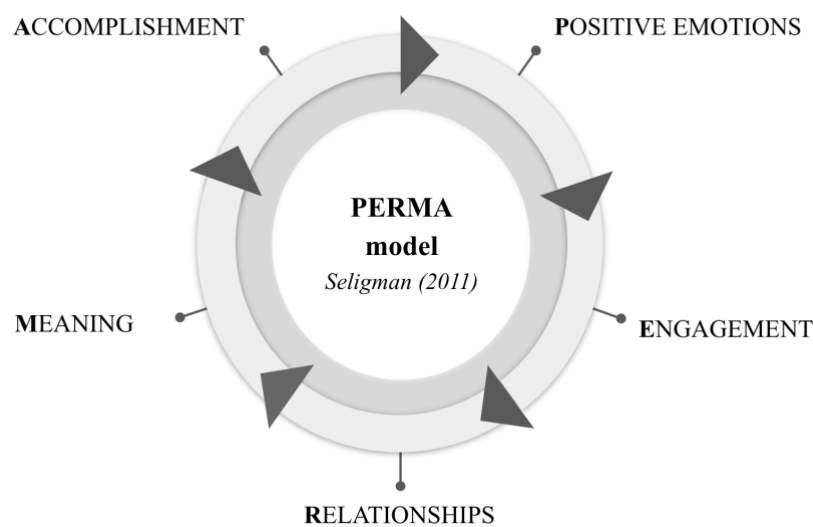
Fig. 9: Perma Model Seligman (2011). Source: Author's elaboration.

The theories and models just stated are the ones predominantly used in the literature, however, as Forgeard *et al.*, (2011 p. 97) suggest "*we do not have a single indicator that tells us how our car is doing - but rather have a number of indicators such as an odometer, a speedometer, a fuel gauge, etc. -, we do not have a single indicator of how people are doing*". Therefore, simple consensus-building regarding what constitutes and does not constitute well-being is a contentious issue that is rife with individual biases and beliefs. According to Biswas-Diener *et al.* (2009), there are no universal indicators of well-being. There are different perspectives with different ends. Therefore, it is up to researchers to theorize, test and decide which models and indicators of well-being are *most meaningful* for their purpose.

5. Modeling and assessing well-being

This chapter has presented an overview of the concept of well-being in service research, exploring its theoretical roots and associated current issues. However, to fit the purpose and unit of analysis of this thesis introduced in Chapter 1, this section focuses on how the well-being of vulnerable actors (i.e., the elderly with dementia) can be investigated and modeled, reporting studies (i.e., well-being models and indicators) that represent pillars of research in psychology, sociology and medical sciences.

The modeling and assessment of well-being may vary depending on culture, historical circumstances, and individual perspective, so relative indicators are tailored to the specific needs and conditions of a given individual, population or community (e.g., Ryff, 1989; Diener, 1984).

In this thesis, **the interdisciplinarity has been necessary because very few studies in service research address the issue of assessing and modeling well-being for vulnerable actors** in highly sensitive service settings such as healthcare (e.g., Čaić *et al.*, 2018; Mele *et al.*, 2021) and elderly care (Kabadayi *et al.*, 2020). These studies conceive of well-being not as a one-dimensional concept, but as one that includes multiple elements, domains, and dimensions (Prakitsuwan and Moschis, 2021). For example, Čaić *et al.,* (2018) consider aspects of subjective well-being, building on the theories of Diener *et al.* (2003). Mele *et al.* (2022a) analyze three dimensions (psychological, physical and social) of well-being based on the studies of Cooke *et al.* (2016). Kabadayi *et al.* (2020) propose the framework of the experience of caring for the elderly, in which five dimensions of well-being are considered: emotional, physical, social, economic and spiritual, drawing on the work of Depp and Jeste, (2006).

Below are the most relevant theories of well-being given the purpose of this thesis, the scope of the study, the research context and most importantly the unit of analysis, namely vulnerable actors.

5.1 Multidimensional well-being

Well-being has been represented in the scientific literature through a multiplicity of perspectives as shown in section 4. of this chapter. This representation has included a wide range of facets, which have been identified as dynamic, emphasizing the highly complex nature of well-being (Kelley-Gillespie, 2009). The most frequently adopted perspectives have been subjective (SWB) and psychological (PWB), but physical, eudemonic, affective, cognitive, psychosocial, multidimensional, mental, social, relational, occupational, and socioemotional perspectives have also been included (Kelley-Gillespie, 2009). Several studies have explicitly used the term *"multidimensional well-being"* to highlight its complex nature, and have listed

several dimensions of well-being included in their studies. Some of these components overlap and influence each other. There is no set boundary where one dimension ends and the next begins. For instance, drawing from Hettler's (1976) six dimensions of wellness, Strout and Howard (2012) identified six dimensions of well-being in the elderly: (1) social well-being, (2) physical well-being, (3) psychological well-being, (4) cognitive well-being, (5) spiritual well-being, and (6) environmental well-being.

However, since the patients involved in this research are patients with dementia, as suggested by Kitwood (2007) the dimensions that are taken into consideration are **a) psychological, b) physical, and c) social well-being** as conceptualized by Keyes and Waterman (2003).

Psychological well-being

Psychological well-being includes attention to emotional and behavioral problems associated with illness, such as depression and anxiety, and the use of measures that improve a person's mental well-being. It refers to all activities that promote emotional relationships, sensory and mental stimulation (games and hobbies), stress and anxiety management techniques, and a welcoming and reassuring environment that helps the person maintain his or her identity and dignity. Assessment of psychological well-being considers the feelings and emotions the person experiences in daily life (Keyes and Waterman, 2003).

Physical well-being

Physical well-being is not only the absence of disease but includes improvements in habits and lifestyle that can help avoid preventable ailments. This dimension refers to all activities that help maintain or improve an individual's physical health, such as adequate nutrition, regular exercise, and injury prevention (Keyes and Waterman, 2003). These measures are important in improving the person's quality of life and in the case of patients with dementia, the management of disease symptoms, such as agitation, euphoria, and confusion, as well as the prevention and treatment of concomitant diseases (Emmons, 1991; Vaillant and Mukamal, 2001). Physical well-being is also related to caregiver intervention or the ability of a caregiver to provide good care in addition to how care is provided. This could include the administration of medication and the performance of daily motor activities (Sabatini *et al.*, 2020).

Social well-being

Social well-being focuses on promoting relationships and social inclusion, as well as participation in community activities (Keyes and Waterman, 2003). It includes social

interactions in the daily activities of the vulnerable person, including relationships with formal and informal caregivers. This translates into activities that promote socialization and social integration, such as participation in support groups, and may also include pet care, dolls (doll therapy), and other activities that create a sense of belonging and purpose. These activities can also improve memory and increase confidence and trust (Kitwood, 1997). Indicators of social well-being generally include sense of belonging and social environmental factors, such as recreation and leisure/social activities, community interactions and family/social networks/relationships, and support, including affection, positive interaction, socialization, psychosocial support, informational support, and emotional support/reassurance. Finally, Eustis *et al.* (1993) suggested that the quality of the caregiver-patient relationship is an important indicator of social well-being.

Indicators of well-being in psychology are quantitatively assessable measures of a person's well-being (e.g. psychological, emotional, social, etc.). They can include many variables such as *life satisfaction, happiness, self-esteem, resilience, emotional stability and mental health*. A summary of indicators of the three dimensions addressed in this study are shown in Table 6. These indicators refer mainly to vulnerable actors, the subject of the research study.

Well-being	Indicators	Authors
Psychological (emotional) well-being	• positive affect (e.g. pleasure, enjoyment, contentment) • positive experience and associated emotion (e.g. humour) and "affect balance" • stress and anxiety reduction • satisfaction with services/care •showing aspects of personal growth, meaning-making or spirituality (i.e. a sense of transcending the challenges of dementia)	Kitwood (1997) Keyes and Waterman (2003) Steverink, (2014, 2015) Araujo et al., (2017) Clarke et al., (2020) Cooke et al., (2016)
Physical well-being	• health status • exercise/physical fitness • comfort • stimulation	Gunzelmann et al., (2006) Kitwood (1997) Li & Porock, (2014) Keyes and Waterman (2003) Steverink, (2014, 2015) Cooke et al., (2016)
Social well-being	• social support, relationships, interactions • sense of belonging and social environmental factors (e.g., recreational and leisure/social activities) • positive interaction, socialization, psychosocial support, emotional support/reassurance. • daily activities/recreation/leisure; opportunities	Eustis et al., (1993) Kitwood, (1997) Seligman (2011) Keyes and Waterman (2003) Steverink, (2014, 2015) Cooke et al., (2016)

| | for fun, humor, enjoyment, and creativity; • interaction/relationship between caregiver and care recipient •social confidence | Vernooij-Dassen et al., (2016, 2018) Clarke et al., (2020) |

Table 6: Indicators of psychological, physical and social well-being. Source: Author's elaboration

5.2 Personhood and well-being of vulnerable actors

The rise of positive psychology and related bodies of literature, including quality of life (QoL), patient-centered care, and patient activation, reflect a paradigm shift in healthcare and well-being research. The focus of this stream of literature is on creating a well-being context that goes beyond efforts to merely reduce impairments (Kitwood and Bredin, 1992). With the help of the Bradford Dementia Group, Tom Kitwood conceptualized **personhood and well-being** in dementia (Kitwood and Bredin, 1992). Instead of using medical or behavioral methods, they created a social-psychological theory of dementia care (Kaufmann and Engel, 2016). The concept of *personhood* emphasizes **the importance of recognizing and valuing the personhood of individuals with vulnerabilities as dementia.** Despite cognitive and functional impairments, people with dementia should still be treated as individuals with unique experiences, feelings, and perspectives, and not reduced to their diagnosis or simply seen as a collection of symptoms (Kitwood and Bredin, 1992).

In addition, Kitwood's model appears to be the most widely used in psychological, medical and gerontological studies of the well-being of people with dementia (Hennelly and O'Shea, 2022).

In detail, this model describes five basic needs that achieve dementia patients' well-being: *comfort, identity, attachment, occupation, and inclusion*. Definitions of five dimensions are shown in Table 7.

Five basic needs to achieve well-being (Kitwood, 1997)	Definition
Comfort	Comfort in dementia care refers to creating an environment that is supportive and respectful, which acknowledges and responds to the **emotional and psychological well-being** of the person with dementia. Comfort encompasses all aspects of the person's experience, including their physical, social, and spiritual needs, and seeks to promote a sense of belonging and purpose. (Kitwood, 1997)

Identity	As Kitwood (1997) stated, "*To have an identity is to know who one is, in cognition and in feeling. It means having a sense of continuity with the past; and hence a 'narrative,' a story to present to others*"(p. 43). Due to declining cognition, persons with dementia need others to "hold their story" and to respond to them as "thou, in the uniqueness of their being" (Kitwood, 1997). Identity is **a sense of continuity between the person one has been in the past and the person in time.** Allowing care recipients to freely be themselves is essential in the Person-Centered Care approach.
Attachment	Attachment refers to the **deep emotional bonds** that exist between people, and the importance of these bonds in promoting well-being, security and a sense of belonging. In dementia care, attachment is seen as fundamental to the person's sense of self and their connection to others. Attachment helps to promote comfort, security and continuity in relationships, and it is essential in providing a supportive and respectful environment that acknowledges and responds to the person with dementia's emotional and psychological and social well-being. (Kitwood, 1997)
Occupation	Occupation refers to the activities, tasks, and roles that make up a person's daily life, and the ways in which they give meaning and purpose to their experiences. In dementia care, occupation is seen as a fundamental aspect of the person's well-being, and it is essential in promoting a sense of purpose. Occupation includes both structured activities, such as work and leisure pursuits, and unstructured activities, such as **everyday tasks and routines**, and it provides a means for the person with dementia to maintain their identity and to connect with others. (Kitwood, 1997)
Inclusion	Inclusion refers to the concept of being part of a community and being valued and accepted as a member of that community. In dementia care, **inclusion involves promoting opportunities for social interaction.** (Kitwood, 1997)

Table 7: Tom Kitwood (1997) five basic needs to achieve well-being. Source: Author's elaboration.

Kitwood's (1997) model of dementia focuses on the concept of "*dementia as a lived experience"* and the importance of caring for the person beyond vulnerabilities. Kitwood argues that dementia should not only be viewed as a mental illness, but as a condition in which people's identity, relationships and attachment are affected and altered. His model emphasizes the importance of creating a living environment that supports dignity and well-being.

In conclusion, it is important to note that indicators of well-being may change over time as vulnerability progresses, and that well-being may also be influenced by factors such as the availability of support from caregivers, the quality of care received, and the social and emotional support available (Keyes and Waterman, 2003).

6. Challenges and future research directions

This chapter aims to use bibliometric and content analysis as a means to depict the rich conceptual and intellectual structure and to identify emerging trends of well-being in service research. As extensively described, several scholars are debating the broad subject of well-being and its several nuances. Studies in service research, especially TSR, have mainly applied theoretical perspectives that have focused not only on the affective and psychological processes of individuals but also on several social aspects (i.e., social support, service inclusion/exclusion, and social well-being). More specifically, some service scholars seek to figure out how services, service providers, and service ecosystems can operate in ways that decrease human suffering, enhance human well-being and ultimately improve the overall human experience (e.g., Fisk *et al.,* 2018; Azzari and Baker, 2020). According to this viewpoint, the theme of design services for humanity has caught service scholars' attention (Fisk *et al.,* 2020; 2021). Researchers must therefore focus on developing new methods and principles that go beyond the design of dyadic service interactions. They must take a different approach, seeing service design as an enabler of value co-creation for well-being and the human experience as a whole. In this way, service designers adopt a human-centered and participative approach, designing for and with people.

Furthermore, this chapter revealed that service research, but especially transformative service research (TSR), has recently highlighted the need for service research that focuses on how to improve human well-being and services in different contexts, with specific attention to healthcare services (Anderson *et al.,* 2013; Ostrom *et al.,* 2015). As a result, in the context of healthcare services, customer and employee (caregivers) well-being outcomes have become crucial factors for service-providing organizations (Patricio *et al.,* 2020; Mele *et al.*, 2022a; Mele *et al.*, 2023). According to Rosenbaum *et al.,* (2011), since it focuses on improving

people's health and well-being, healthcare assistance has the power to enhance both individual and social well-being (Anderson *et al.*, 2013). Therefore, research opportunities might pursue further explorations of fostering both individual and social well-being in different healthcare settings (nursing homes, hospitals, daily care centers, medical centers, etc.). Such studies could adopt broader perspectives to go beyond dyadic interactions, such as by adopting an ecosystem perspective.

Finally, service scholars are seeking to link human well-being to emerging technologies, as an interesting area of research (Rosenbaum and Russell-Bennett, 2021; Mele *et al.*, 2022a). However, this field of service research lacks a deeper understanding of an integrative approach to understanding how technology and human well-being intersect. Service researchers need to understand that themes like technology and artificial intelligence do not preclude themes linked to transformative services research, which aims to foster well-being and improve the human condition. Addressing this topic could help to investigate the effects of digital technology on customers, communities, and even humanity at large. Therefore, it could be deepened to broaden the overall understanding of well-being in service research.

Research opportunities might pursue further explorations of smart technologies (artificial intelligence, service and social robots, augmented reality, etc.) in several service settings, such as healthcare, hospitality, and retail. Additional research can look into the effects of technology on social, organizational, and customer vulnerability in terms of positive and negative outcomes. With regard to assessing and modeling well-being, next steps in this line of research may include: co-producing new and/or selected key tools that are matched to meaningful activities, engaging vulnerable people in measuring sensitive outcomes; and exploring the potential of technological solutions to capture well-being outcomes (Tikkanen *et al.*, 2023).

Future studies could also examine the cultural aspects of technology use in fostering well-being. To summarize, there are still a lot of unexplored paths that academics need to explore. These are just a few examples of potential future directions.

Chapter 3

Service and Social Robots

in the Healthcare Service Ecosystem

Service technologies and human well-being • Smart technologies: a general overview • Smart technology in the healthcare context • The value of service and social robots in services • Current state of service and social robot in business and management research •Depicting conceptual structure • Service and social robots in the healthcare service ecosystem: A systematic literature review • Unanticipated and unintended consequences of service robots • Future research directions

Chapter 3

Service and social robots in the healthcare service ecosystem

This chapter aims to illustrate the role of service and social robots in the complex and highly sensitive healthcare service ecosystem. A bibliometric analysis was first conducted to analyze the literature state-of-the-art. Then, through a systematic literature review, the role of social and service robots in the healthcare service ecosystem and their effects on human actors' well-being have been investigated in depth.

1. Service technologies and human well-being

Kunz *et al.*, (2019) define service technologies as the networked technological interfaces or devices that enable and enhance customer-firm interactions and relationships. Similarly, according to Rosenbaum and Russell-Bennet (2021), service technologies are related *"to the electronic distribution of information, including data and content, through multiple platforms and devices such as websites or mobile applications, as well as physical devices such as robots, machines, and monitoring tools"* (p. 262). Digital media, mobile devices such as smartphones and smartwatches, and smart technologies such as artificial intelligence (AI), robotics, Internet of Things (IoT), virtual reality (VR), and augmented reality (AR) are just a few examples of service technologies that enhance business capabilities and fundamentally alter the customer experience (Kunz *et al.*, 2019) and impact on human well-being (Lima and Belk, 2022). Future service technologies are developing rapidly, generating a wide range of new opportunities for businesses, customers, and users. Given how quickly technology is transforming today's services, it is crucial to reconsider how managers can identify, address, and uphold customer centricity in the face of real-world challenges. Therefore, these technologies have the potential to drastically alter how users co-create value (Kristensson, 2019).

However, although the most recent research on service technologies focuses on emerging technologies and prospects, the concept itself is not new. For decades, several studies have focused on how technology supports service processes (e.g., Hoffman and Novak, 1996). For instance, Bolton and Saxena-Iyer (2009) conceptualized the *interactive services* as services involving some sort of customer-business interaction in contexts with any level of technology (i.e., a high-tech or low-tech context). More recently, significant contributions are conceptual and concentrate on creating the theoretical underpinnings of these technologies. For instance, Larivière *et al.*, 2017, introduced the *"Service Encounter 2.0"* as *"any customer-company interaction that results from a service system that is composed of interrelated technologies*

(either company-or customer-owned), human actors (employees and customers), physical/digital environments and company/customer processes" (p. 239). In this way, service technologies act as a substitute for interaction among frontline employees (FLEs). Additionally, the use of interactive service technology in service systems has impacted the way that interactive value is created (Larivière *et al.*, 2017). Kristensson (2019) suggests a framework for comprehending, assessing, and predicting how future service technologies can result in value co-creation. The implementation of service technologies can increase the likelihood of satisfying and retaining customers, resulting in value creation for companies (Keiningham *et al.*, 2017). This creates a win-win scenario for both organizations and customers, where both parties benefit from improved service experiences.

Along similar lines, Lima and Belk (2022) investigate the use of human enhancement technologies (HET) in promoting *"superintelligence, super longevity, and super well-being"* (p. 885). These technologies include tools that actively enhance human functions, such as smart glasses worn by doctors to transmit real-time patient data during office visits or telemedicine sessions. Integrating HET with service providers' interactions with customers has the potential to enhance service employee skills, leading to exceptional customer experiences (Grewal *et al.,* 2020).

However, there are two fields of investigation in service research that appear to be opposed: technology versus humanity (Azzari and Baker, 2020). One research stream focuses on the impact of technology on front-line employees, service industrialization, and the service industry at large (Wirtz *et al.,* 2018; Huang and Rust, 2021; 2022). Another research area, particularly centered on TSR, explores how technology affects service providers, service ecosystems, and services as a whole and how they can benefit humanity by promoting well-being and reducing human suffering (Fisk, 2022; Kabadayi and Tsiotsou, 2022). However, Rosenbaum and Russell-Bennet (2021) argue that the two research fields are closely connected, particularly in light of the COVID-19 pandemic and ongoing conflicts, which continue to impact individuals, organizations, communities, countries, and the planet as a whole. As a result, technology and humanity, two seemingly disparate areas of research, may intersect.

Focusing on AI and well-being opportunities, recent studies have investigated the challenges and opportunities that AI may present to subjective and community well-being, as well as its potential benefits and drawbacks (Musikanski *et al.,* 2020). On the one hand, according to Floridi *et al.,* (2018), the concerns AI presented to well-being are (1) undervaluing human abilities, (2) undermining human autonomy, (3) decreasing human control, and (4) eliminating human responsibility. On the other hand, there are a number of potential advantages for certain

industries and communities, such as healthcare, hospitality and retail, among others (Loureiro *et al.,* 2022). In addition, AI may also be used to assist tackle social, economic, and environmental issues that endanger individual and social well-being. The idea of AI for social benefit, often known as AI for Good, is being developed through a number of academic papers (e.g., Taddeo and Floridi, 2018, Hermann, 2022) and industry-led projects (e.g., Microsoft). The idea was developed through a series of cross-disciplinary workshops and is based on the *"ongoing work, whether in urban informatics, sustainability, health, or public welfare, paving the way for the use of AI for social benefit"* (Hager *et al.* 2019, p. 15). Artificial intelligence (AI) is not merely a technology that has to be regulated. It is a potent force that is changing environments, social interactions, and everyday routines. Thus, it is crucial for human well-being that this power be used as a force for good (Floridi *et al.,* 2020).

2. Smart technologies: a general overview

Building on the digitalization of information, the most recent technological - and organizational - innovation wave focuses on smart technologies. As Ostrom *et al.* (2015) predicted, smart technologies lead to disruptive changes in services. More precisely, SMART is an acronym and refers to *"Self-Monitoring, Analysis, and Reporting Technology"*. A technology is defined as "smart" when it is capable of carrying out duties and achieving goals that previously required human intelligence and capabilities (Mele *et al.*, 2022b). Smart technologies are characterized by intense data flow, interactions within a network of actors, and data visibility, as identified by Gonçalves *et al.* (2020). Similarly, Marinova *et al.* (2017) define them as a range of resources, including hardware, software, and information, that can assist front-line employees and customers in co-creating value through their interactions on the frontlines. Over time and with adaptation, these technologies can provide customers with personalized and attractive services.

Since the first industrial revolution, there have been several surges that have shaken and changed society, economy, and culture. These waves have had a significant impact on how human beings live, think, communicate, and work. They have also had a significant impact on the environment and the socioeconomic metabolism of our society (Kunz *et al.*, 2022).The widespread adoption of smart technologies has facilitated increased connectivity, greater computational processing, and complex decision-making involving large amounts of data. As a result, it is disrupting people's lives and society (Huang and Rust, 2018).

The concept of smartness

Although still in its infancy, more recently the concept of *smartness* has gained attention in business and management studies. The conceptualization of this concept lacks agreement, and the current literature often uses the term interchangeably with *"intelligence"* (Rokonuzzaman *et al*, 2022). For example, Mele *et al.*, (2022b) offered a deeper understanding of smartness in service provision and service experience, assuming that its full potential lies *"in the delivery of smart technology-enabled value propositions (i.e., smart service provision) and the experience of smart technology-enabled solutions (i.e., smart service experience)."* (p. 889). The former refers to the provision of connected objects that can sense their environment and their condition, allowing for real-time data collection, continuous communication, and interactive feedback (Wünderlich *et al*. 2015). The latter refers to smart customer experiences enabled by smart technologies. In this perspective, Hoyer *et al.* (2020) note that smart technologies, particularly those powered by AI, have significantly altered the customer experience. For instance, IoT-based RFID chips are one such technology that can revolutionize the shopping experience by allowing customers to easily access information about product availability and other relevant details.

Based on previous studies on smart services and smart service systems (e.g., Beverungen *et al.*, 2019), Henkens *et al.*, (2021) define *smartness* concerning service systems, enabled by smart products that are composed of digital components such as sensors, Internet of Things (IoT) connectors, and Artificial Intelligence (AI). To provide a comprehensive understanding of smartness characteristics, I contend that it is essential to first define key terms such as *smart services, service systems,* and *smart service systems.*

First, the increasing adoption of AI-based and other smart technologies has given rise to a wide range of smart services that are extensively employed across diverse industries (Wünderlich *et al.,* 2015). *Smart services* refer to the use of specialized competencies in actions, processes, and performances made possible by smart products (Beverungen *et al.,* 2019). This concept encompasses services that integrate Internet of Things (IoT) devices to facilitate service delivery in various contexts, including smart cities (Chouk and Mani, 2019). Second, drawing on Maglio and Lim (2016) defined *service systems* as configurations of people, information, organizations, and technologies that operate together for mutual benefit. Finally, *smart service systems* are those in which smart products serve as boundary objects, integrating the resources and activities of the involved actors for mutual benefit (Beverungen *et al.*, 2019).

Henkens *et al.*, (2021) identified four smartness characteristics: a) awareness, b) connectivity, c) actuation and d) dynamism. *Awareness* refers to perceiving data about the smart service system and its environment. Examples include smart cars, which can sense data about

themselves and their surroundings. *Connectivity* refers to connecting actors in the system through the IoT, such as smart digital assistants like Amazon Alexa. *Actuation* refers to the ability to take independent action based on computational processes. *Dynamism* describes the capability of intelligent service systems to learn and adapt. Examples include the Nest Learning Thermostat which learns preferred temperature and energy usage patterns.

2.1 Smart technologies in healthcare

Although a lack of conceptual clarity and uncertain definitions regarding smart technologies persist in service studies (Neuhofer *et al.,* 2015; Mele *et al.*, 2022a), the effects of smart technologies on the healthcare context have been widely studied by service and marketing scholars. Different theoretical perspectives consider computational components, i.e., cognitive capabilities that enhance human skills (Spohrer and Banavar, 2015). In this perspective, the focus is on improving healthcare services through the ability of technologies to collect broad data in real-time (Oldenburg *et al.,* 2015), automate healthcare activities and tasks (Fruehwirt and Duckworth, 2021), support decision-making (Osei-Frimpong *et al.,* 2018), and acquire relevant clinical insights for specific health conditions (Aggarwal *et al.* 2020).

In a study of elderly care networks, Čaić *et al.,* (2018) shed light on the potential of technologies (i.e., service robots) to improve both patients' quality of life and assist human caregivers with both mechanical and social tasks (e.g., motivation, encouragement, and conversation). As a result, smart technologies can impact both patients' well-being, and caregivers reducing their burden of assisting (Mele *et al.*, 2022b). However, because they complement and enhance - rather than replace - human capabilities, they also enable processes of integrating summative and emergent resources (Russo Spena and Mele, 2020). According to this viewpoint, smart technologies affect actors by making resources more accessible, facilitating better decision-making by integrating large-scale real-time data and multiple interactive responses, extending engagement in ways that help users adopt long-lasting changes, and enhancing human actors' agency so they can better monitor, update, and refine their decisions or execution efforts (Mele *et al.,* 2020). Smart technologies can sense environmental conditions and constraints, collect data in real-time, and transmit interactive feedback (Wunderlich *et al.,* 2015). They support the processing of enormous amounts of data, aid in failure detection, and influence how information is translated into specific actions, encouraging connectivity and responsiveness (Larivière *et al.* 2017; Huang and Rust, 2018). For instance, smart objects (such as a smartwatch) give people several opportunities to gather daily health information about their well-being (such as the number of steps taken, calories burned, amount of sleep received, and

pulse rate), as well as to receive individualized recommendations about their state of health (De Keyser *et al.*, 2020). Similarly, AI-based apps assist healthcare professionals in their daily tasks (Wünderlich *et al.,* 2015; Baker *et al.,* 2017), allowing for the simplification and acceleration of repetitive and non-repetitive health activities while ensuring resource savings and improved health service quality (van Doorn *et al.,* 2017; Chatterjee *et al.,* 2021). For instance, deep learning algorithms and AI applications are promising tools to reduce issues with diagnoses and treatments by doctors.

In addition, greater advances in the technological field have had several important positive outcomes for patients. The development of complex interactions between interdependent actors, supported by smart technologies, allows the patient to obtain more detailed information about healthcare status and/or to maintain or improve psychosocial health by providing social contact (van Doorn *et al.,* 2017). Berry *et al.* (2022), suggest that technology could also be used to automate administrative tasks to free up formal caregivers' time to spend more time interacting directly with patients, as what matters to patients is being heard, having trust, being able to share their stories, and being a partner in their care. The same goes for family caregivers (*informal caregivers*) who may sometimes put off or give up their ambitions. Thus, although caregiving has many benefits, it can also seriously harm the overall caregivers well-being (Kelleher *et al.,* 2020; Berry *et al.*, 2022).

In this perspective, according to Wirtz *et al.,* (2018) service and social robots are a promising technology that, when combined with big data, cloud computing, and artificial intelligence, may produce valuable outcomes and innovations for the overall healthcare service ecosystem. New, technologically advanced service choices are needed in the healthcare industry, and technological advancements are expected to improve people's well-being. Particularly, service and social robotic technologies are prospective tools for enhancing human well-being by offering reliable, stable, and consistent service provision (Čaić *et al.*, 2019).

3. The value of service and social robots in services

The primary force behind the advancement of service robots is Artificial Intelligence (Paluch and Wirtz, 2020). Despite predictions by business magazines and reports such as McKinsey (2018, 2019) and Deloitte (2018) of a previous wave of service robots, such an invasion did not occur. However, service scholars have observed the acceleration in the implementation of these solutions concerning COVID-19 (Schepers and Streukens, 2022). Indeed, the pandemic confirmed the theory highlighted by Huang and Rust (2021) - *AI as a service* - giving rise to improved support for healthcare workers and their psychological safety (Ostrom *et al.*, 2021).

For instance, AI could also provide a significant positive and negative impact on service employees with the eventuality of replacing human actors. Recent studies on COVID-19 (Odekerken-Schröder *et al.,* 2020) and healthcare services (Holland *et al.,* 2021), emphasize the importance of service and social robots in supporting not only difficult tasks in hospitals or healthcare facilities but also at home.

In recent years, there has been a growing interest in human-robot interaction in service research, as evidenced by the increasing number of studies on this topic (Paluch *et al.,* 2021; Pitardi *et al.,* 2022). In particular, scholars have specifically examined the impressive performance and potential of service and social robots. They are defined as *"system-based autonomous and adaptable interfaces that interact, communicate and deliver service to an organization's customers"* (Wirtz *et al.*, 2018, p. 909). The particular feature of service robots powered by AI - that differentiates them from other types of technologies - is their ability to communicate, interact and deliver the service to consumers (Choi *et al.*, 2020). As service agents, service robots are changing the nature of service interaction (Paluch *et al.*, 2021) and service encounters (Pitardi *et al.,* 2022). In this view, they are also facilitating the reduction of embarrassing service encounters because they are unable to judge, form opinions and make morals, due to their lack of feelings and agency (Wirtz *et al.*, 2018; Pitardi *et al.*, 2022). In detail, embarrassing service encounters are a common customer situation where other people's presence might detract from the overall customer experience (Pitardi *et al.*, 2022) and this social emotion of embarrassment is often experienced when a transgression is noticed or thought to have been noticed by others. Embarrassment in service encounters is triggered when other individuals are present, as people have to worry about how others see or perceive them. In this regard, a valuable contribution to service literature comes from van Doorn *et al.,* (2017) that introduced the concept of Automated Social Presence (ASP), which makes consumers feel that another social entity is present (e.g., a robot). In detail, aspects of human interactions can be mimicked by service technologies with a high level of ASP. For instance, smart objects, such as Amazon Alexa, mimic human-to-human interactions to give off the impression of social presence. Or, for example, a service robot could support a caregiver to transport a patient or obtain more detailed information about his healthcare status.

Focusing on the healthcare context, Čaić *et al.*, (2018) stress the importance to increase patients' networking capabilities and support human caregivers in not just mechanical tasks but also with a social nature (e.g., motivation, and conversation). In this view, service robots can be also defined as ***social robots*** when they co-create value with human actors at service encounters. Specifically, social robots have been defined as fully or partially automated

technologies that can co-create value with people through their social characteristics (Čaić *et al.,* 2019). In the social robotics literature, no universally agreed-upon definition for social robots exists. In the field of HRI, social robots play a unique role and are classified as *proximate interaction,* in which humans and robots interact as peers or companions (Henschel *et al.*, 2021). To clarify concepts, table 8 shows the main definitions of service and social robots. The definitions of social robots are in line with studies of robotics, indeed a recent study published in the *Journal of Social Robotics* described them as *"embodied systems that can be perceived as a social entity and are capable of communicating with the user"* (Naneva *et al*., 2020 p. 1179).

Service Robots	Social Robots
"Service robots are system-based autonomous and adaptable interfaces that interact, communicate, and deliver service to an organization's customers." Wirtz et al., 2018, (p. 909).	Social robots are robots that interact with humans and each other in a socially acceptable fashion, conveying intention in a human-perceptible way, and are empowered to resolve goals with fellow agents, be they human or robot Duffy et al., 1999 (p. 897).
"Service robots are technologies providing customized services by performing physical as well as nonphysical tasks with a high degree of autonomy." Jörling et al. 2019 (p. 405)	"Social robots can operate as partners, peers, or assistants, meaning that they are able to exhibit flexibility and adaptability to allow social interaction with a wide range of humans" Fong et al., 2003, (p. 143).
"Service robots represent something in between, with technological features but also the ability to engage in human interactions." Belanche et al., 2020 (p.89)	"Social robots, i.e., robots deliberately designed to interact with humans in a social way, open up a new paradigm for humans to communicate, interact, and relate to robotic technologies" Baraka et al., 2020 (p.98)

Table 8: Key definitions of service and social robots

The emergence of service and social robots represents a shift in the nature of service interactions. In contrast to earlier service technologies, robotic entities have some influence on service relationships and contexts. For instance, self-service technologies (e.g., vending machines and kiosks) cannot interact with customers beyond the pre-programmed options they offer. Customers simply interact with the technology to receive a product or service. In contrast, robots can interact with human actors in more complex ways, such as answering questions, providing recommendations, or emotional support. They have the potential to develop relationships with customers that go beyond a simple transactional interaction (Paluch *et al.*, 2021). Furthermore, the presence of robots in service contexts may also affect the social environment, potentially influencing customers' perceptions of the quality of the service or the overall experience (Pitardi *et al.*, 2022; Söderlund *et al.*, 2021).

They span different sectors, including healthcare (Čaić et al., 2019), hospitality, tourism (Choi *et al*., 2019), and retail contexts, among others (Blaurock *et al.,* 2022). Along similar lines, Wirtz *et al.*, (2018) stressed that service robots can perform straightforward cognitive and analytical tasks - due to the underlying computing capability - such as renting a vehicle or, for instance, buying bus tickets. On the other hand, they can be involved in emotional-social tasks, thus assuming the feature of social robots. Within this category, Odekerken-Schröder *et al.* (2020) placed a focus on companion robots as robots that *make themself useful*, (i.e., can do a range of activities to serve humans), and act socially, (i.e., social skills to engage with people in a socially acceptable manner). By fostering social connections and providing social support, social robots often have beneficial psychological consequences (e.g., reduced feelings of loneliness). For instance, in service contexts such as elderly care, they can assist, support or even substitute both formal and informal caregivers (Wirtz *et al*., 2018), having the potential to enhance the quality and efficiency of care provision.

In sum, the progression of this technology is impacting service processes, and investigating their effects on human behavior, well-being, and potential drawbacks has become a priority in the overall business and management research, as discussed in the following sections.

4. Current state of service and social robot in business and management research

The state of the art in a research field can be ascertained using a variety of qualitative methods, such as systematic literature reviews, expert panels, and academic surveys (Lu *et al.,* 2020). Despite enabling a deeper understanding of a research domain, these strategies all share the same weaknesses: these methods take a lot of time and can be biased in interpretation. Therefore, using a quantitative-analytical approach through a bibliometric analysis is preferred. This paragraph aims to describe the service and social robots state-of-art in business and management literature. Therefore, in this section, a performance analysis - based on bibliometric indicators - is shown. This bibliometric approach aims to evaluate different scientific actors through bibliographic indexes based on publications and citation data. In sum, it enables the identification of trends in the development of the field and the most prominent authors, institutions, and countries, as well as discerning the most prolific journals in the domain (Donthu *et al.,* 2021).

The data for this analysis was sourced from two databases, Web of Science and Scopus. The search keywords included *"service robot*"*, OR *"social robot*"* (* = wildcard plural). The combination of these search words was used with the "or" notation. The initial search returned 11,807 results. This number was then reduced using the inclusion criteria for a) original articles,

b) English language, c) "business and management" and "business, management, and accounting" categories on WoS and Scopus, respectively d) time frame until 2022. Duplicates were removed after manual screening of documents. This exercise reduced the number of articles to the final collection of 148 entries. Figure 10 presents the search strategy. The performance and science mapping analysis was carried out by using Biblioshiny -Bibliometrix R-package (Aria and Cuccurullo, 2017).
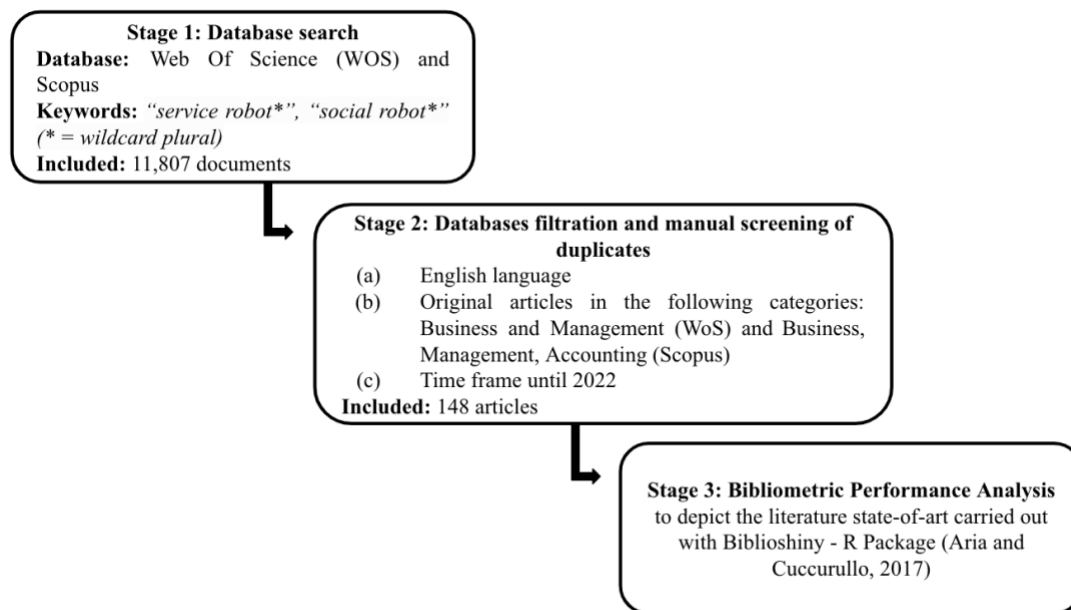
Fig. 10: Data retrieval process. Source: Author's elaboration.

The sample's main descriptive information and statistics are shown in table 8. The 148 articles were written by a total of 407 authors - with a mean of 2,75 publications per author - and published in 50 journals with an average citation count of 35,46 in the period 2014-2022.

Description	Results
Main information about the collection	
Timespan	from 2014 to 2022
Sources (Journals)	50
Documents	148
Average years from publication	2,27
Average citations per documents	35,46
Average citations per year per doc	8,567
References	8362
Document types	
Original articles	148
Document contents	
Keywords Plus (ID)	475
Author's Keywords (DE)	561

Main information about authors	
Authors	407
Single-authored documents	9
Documents per Author	0,364
Authors per Document	2,75
Co-Authors per Documents	3,39
Collaboration Index	2,88

Table 8: Key information regarding service and social robots sample
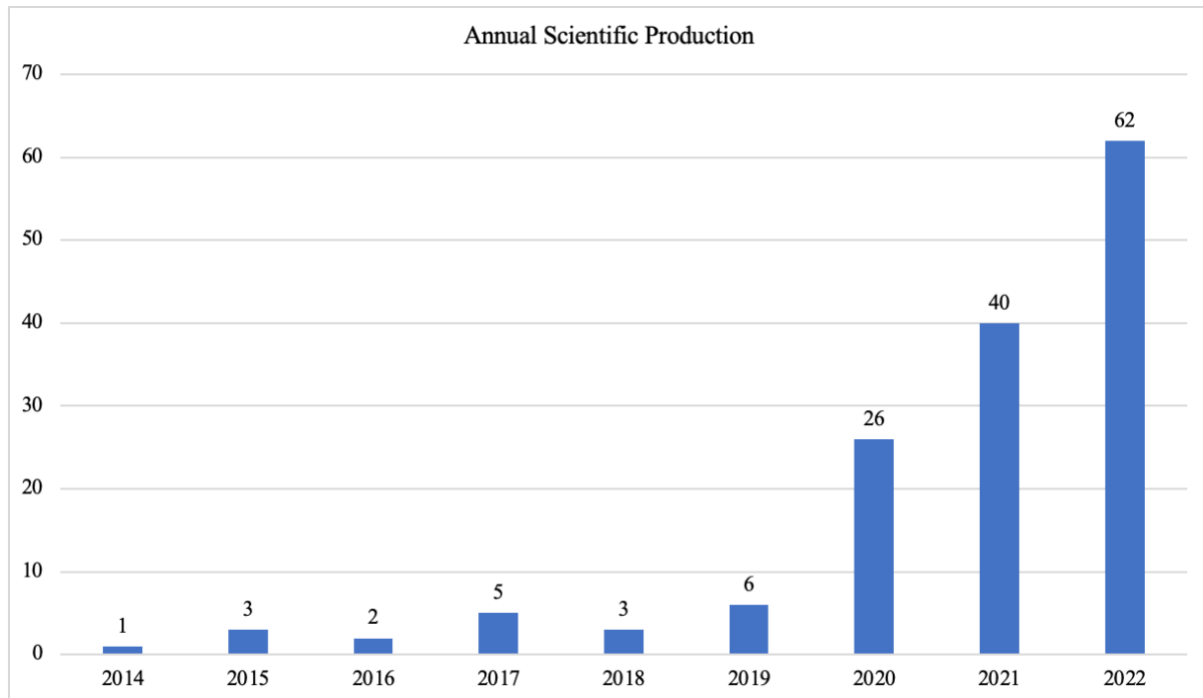
Fig. 11: Temporal distribution of documents in 1987-2022

Figure 11 illustrates the temporal distribution of documents based on WoS and Scopus databases over the period 2014-2022. The first publications appeared in 2014-2015. The number of published papers has grown exponentially in the past three years, especially in 2022. The annual growth rate until 2022 is 67,51%. Some scholars associate the rise of service robots (2020-2022) with the spread of COVID-19, through social distancing measures (Merdin-Uygur and Ozturkcan, 2023).

Key Journals

Table 9 presents the journals that publish the most articles in the service and social robots field. The highest-publishing journal in the field is *the International Journal Of Contemporary Hospitality Management*, which has contributed 17 articles on the topic. It is followed by *the Journal of Service Management*, and *Technological Forecasting And Social Change*, both of

whom have contributed 15 and 13 articles, respectively. Of the 15 journals listed, it appears that four belong to service research while another four belong to the hospitality and tourism sectors. Therefore, researchers who intend to investigate this field of research may consider these as target journals. Also, many reputed journals have published in the area as 15 of the top 15 journals are ranked either A or A* by the Australian Business Deans Council.

#	Sources	ABCD	No. Articles
1	*International Journal Of Contemporary Hospitality Management*	A	17
2	*Journal Of Service Management*	A	15
3	*Technological Forecasting And Social Change*	A	13
4	*Journal Of Retailing And Consumer Services*	A	9
5	*Journal Of Service Research*	A	8
6	*Journal Of Business Research*	A	7
7	*Journal Of Hospitality Marketing & Management*	A	7
8	*Tourism Management*	A	6
9	*Electronic Markets*	A	5
10	*Psychology & Marketing*	A	5
11	*Service Industries Journal*	A	5
12	*International Journal Of Emerging Markets*	A	3
13	*Journal Of Services Marketing*	A	3
14	*Tourism Management Perspectives*	A	3
15	*Information & Management*	A	2

Table 9: Top publishing journals (2014-2022)

Key Authors

Table 10 presents the most prolific contributing authors to the service and social robots field. The most prolific authors in terms of publications and citations in the field are Werner Kunz, affiliated with the University of Massachusetts Boston, and Stepanie Paluch, affiliated with RWTH Business School, who have published 5 articles on the topic and have received 131 and 145 citations, respectively. However, Dominik Mahr (Maastricht University), Schepers Jeroen J.L. (Eindhoven University of Technology), and Jochen Wirtz (National University of Singapore) all have published five articles each. In terms of total citations Grewal Dhruv (Babson College) ranks among the top 3 most cited. This indicates that the number of publications has not only grown across the years but also those publications' impact has grown.

#	Authors	Latest Affiliation	TP	FTP		Authors	Latest Affiliation	TC
1	Kunz W.H.	University of Massachusetts Boston	5	1,29		Paluch S.	RWTH Business School	145

	Author	Affiliation		
2	Mahr D.	Maastricht University	5	1,62
3	Paluch S.	RWTH Business School	5	1,07
4	Schepers J.	Eindhoven University of Technology	5	1,75
5	Wirtz J.	National University of Singapore	5	1,87
6	Belanche D.	Universidad de Zaragoza	4	1,08
7	Casalò L.V.	Universidad de Zaragoza	4	1,08
8	Flavian C.	Universidad de Zaragoza	4	1,08
9	Odekerken-Schroder G.	Maastricht University	4	1,12
10	Čaić M.	Aalto University	3	0,92
11	Chuah S.H.W.	Taylor's University	3	1,08
12	Grewal D.	Babson College	3	0,59
13	Gruber T.	Loughborough University	3	0,54
14	Kim Y.K.	University of Tennessee	3	1,25
15	Mele C.	University of Naples "Federico II"	3	0,70

Author	Affiliation	
Grewal D.	Babson College	137
Kunz W.H.	University of Massachusetts Boston	131
Mende M.	Rockwood School of Marketing	126
Van Doorn J.	University of Groningen	126
Patterson P.G.	University of New South Wales	119
Gruber T.	Loughborough University	117
Lu V.N.	The Australian National University	117
Martins A.	The University of Queensland Business School	117
Wirtz J.	National University of Singapore	117
Hulland J.	University of Georgia	66
Noble S.M.	University of California at San Francisco	66
Ostrom A.L.	Arizona State University	66
Petersen J.A.	Pennsylvania State University	66
Čaić M.	Aalto University	61

Table 10. Key service and social robots authors in terms of publications and citation

Key Articles

Table 12 presents the most cited articles. According to the table, the most cited article in the field is "*Brave new world: service robots in the frontline*" published in the Journal of Service Management by Wirtz *et al,* (2018), which has been cited 526 times, receiving an average 87,66 citations per year since its publication. The article began by defining service robots, outlining their key characteristics, and contrasting their traits with those of front-line employees. It gave insight into the kinds of tasks that robots will dominate in service provision and the tasks where humans and robots are likely to work together. The article also gives a general overview of ethical and social issues raised by robots at the micro, meso, and macro levels. This article is

followed by van Doorn *et al.,* (2017), and Davenport *et al.*, (2020) which have been cited 405 and 334 times, respectively. The former *"Domo arigato Mr. Roboto: Emergence of automated social presence in organizational frontlines and customers' service experiences"* This article offers a conceptual framework and verifiable hypotheses based on the idea of automated social presence (ASP). Future infusion of technology will engage customers on a social level and enable relationships between service robots and humans. Technology will be incorporated into a variety of service experiences, they predicted. While the latter *"How artificial intelligence will change the future of marketing"* by Davenport *et al.,* (2020) explores how AI might affect customers' behavior and provides a multidimensional framework for understanding how it will affect marketing in the future. The authors emphasize the significance of variables such as intelligence levels, task types, and AI integration into physical robots. Interestingly, a majority of the papers with the highest citation rates appeared in service journals. This demonstrates how popular the subject is becoming and the number of special issues that have been addressed with AI-based technologies. This forms an opportunity for future researchers.

#	Author(s)/ Year	Motivation	Journal	TC	C/Year	NTC
1	Wirtz et al., (2018)	"This article provides a definition of service robots, describes their key attributes, contrasts their features and capabilities with those of frontline employees, and provides an understanding for which types of service tasks robots will dominate and where humans will dominate." (p.907)	*Journal of Service Management*	526	87,667	1,7514
2	Van Doorn et al., (2017)	"It introduces the novel concept of automated social presence (ASP; i.e., the extent to which technology makes customers feel the presence of another social entity) to the services literature" (p. 43).	*Journal of Business Research*	405	57,857	3,1991
3	Davenport et al., (2020)	"In the future, artificial intelligence (AI) is likely to substantially change both marketing strategies and customer behaviors. Building from not only extant research but also extensive interactions with practice, the authors propose a multidimensional framework for understanding the impact of AI involving intelligence levels, task types, and whether AI is embedded in a robot." (p.24)	*Journal of the Academy of Marketing Science*	334	83,5	5,1385
4	Mende et al., (2019)	"Interactions between consumers and humanoid service robots (HSRs; i.e., robots with a human-like morphology such as a face, arms, and legs) will soon be part of routine marketplace experiences. It is unclear, however, whether these humanoid robots (compared with human employees) will trigger positive or negative consequences for consumers and companies" (p.535)	*Journal of Marketing Research*	272	54,4	2,8783

5	Bolton et al., (2018)	" The purpose of this paper is to explore innovations in customer experience at the intersection of the digital, physical and social realms. It explicitly considers experiences involving new technology-enabled services, such as digital twins and automated social presence (i.e. virtual assistants and service robots)."(p.776)	*Journal of Service Management*	221	36,833	0,7358
6	Belanche et al., (2020),	"The current article seeks to complement research on robots' human-likeness with investigations of the factors that service managers must choose for the service robots implemented in their service setting." (p.203)	*Services Industries Journal*	156	39	2,4
7	Čaić et al., (2018),	"The proposed typology identifies six roles of socially assistive robots in an elderly person's value network (enabler, intruder, ally, replacement, extended self, and deactivator) and links them to three health-supporting functions by robots: safeguarding, social contact, and cognitive support." (p.178)	*Journal of Service Management*	154	25,667	0,5128
8	Kuo et al., (2017)	"The purpose of this study is to identify the factors that influence the development of service robots, and to apply a service innovation strategic mindset to the hotel industry in Taiwan." (p.1305)	*International Journal of Contemporary Hospitality Management*	144	20,571	1,1374
9	De Kervenoael et al., (2020)	"Social robots have become pervasive in the tourism and hospitality service environments. The empirical understanding of the drivers of visitors' intentions to use robots in such services has become an urgent necessity for their sustainable deployment." (p.1)	*Tourism Management*	137	34,25	2,1077
10	Lu et al., (2020)	"The analysis of the identified studies yielded multiple observations about the impact of service robots on customers (e.g. overarching frameworks on acceptance and usage of service robots; characteristics of service robots and anthropomorphism; and potential for enhanced and deteriorated service experiences) and service employees (e.g. employee benefits such as reduced routine work, enhanced productivity and job satisfaction; potential negative consequences such as loss of autonomy and a range of negative psychological outcomes; opportunities for human–robot collaboration; job insecurity; and robot-related up-skilling and development requirements). (p.361)	*Journal of Service Theory and Practice*	135	33,75	2,0769
11	Huang and Rust (2021)	"The authors develop a three-stage framework for strategic marketing planning, incorporating multiple artificial intelligence (AI) benefits: mechanical AI for automating repetitive marketing functions and activities, thinking AI for processing data to arrive at decisions, and feeling AI for analyzing interactions and human emotions" (p.30)	*Journal of the Academy of Marketing Science*	118	39,333	4,6049
12	Qiu et al., (2020)	"This study investigated the influence of service robot attributes on customers' hospitality experience from the perspective of relationship building" (p.247)	*Journal of Hospitality Marketing & Management*	113	28,25	1,7385

13	Van Pinxteren et al., (2019)	"To enhance trust, firms add human-like features to robots; yet, anthropomorphism theory is ambiguous about their appropriate implementation. This study therefore aims to investigate what is more effective for fostering trust: appearance features that are more human-like or social functioning features that are more human-like. (p.507)	*Journal of Services Marketing*	110	22	1,164
14	Choi Y et al., (2020)	"Hotel industry started to adopt service robots, which are considered a future workforce. However, no attempt was conducted to examine the dimensionality of service quality of service robots. This paper aims to understand the influence of human–robot interaction from the viewpoint of hoteliers and guests." (p.613).	*Journal of Hospitality Marketing & Management*	94	23,5	1,4462
15	Fernandes et al., (2021)	"Customers increasingly orchestrate their everyday activities with the support of technology, with services increasingly adopting AI-based applications. (p.180)	*Journal of Business Research*	91	30,333	3,5512

Table 12: Key service and social robots publications

The performance analysis revealed that most of the studies were published in top service journals. Similarly, the most cited authors and those who contributed the most to the topic also seem to be researchers from the service sector (e.g., Werner Kunz, Stefanie Paluch, Dominik Mahr, Jeroen J.L Schepers, and Jochen Wirtz). Furthermore, the majority of highly cited articles come from the hospitality, tourism, and healthcare industries. Therefore, given the objective of this thesis and its positioning, I find it useful to explore the topic further by presenting a systematic literature review on robots in the healthcare service ecosystem.

4.1 Depicting the conceptual structure

The goal of this paragraph is to depict the conceptual structure of service and social robots research in business and management. The conceptual structure function of the bibliometrix R-package is used in multiple correspondence analysis (MCA) to draw a conceptual structure of the field and K-means clustering to identify a collection of documents that share a common theme (Aria and Cuccurullo, 2017). Following, a thematic map featuring a content analysis of various clusters is presented.

4.1.1 Thematic Diagram

In order to chart the conceptual structure of service and social robots and pinpoint the major themes, a thematic diagram utilizing cleaned authors' keywords was employed (Figure 12). Thematic map (Cobo *et al.,* 2011) is useful for visualizing the themes identified through community detection in a two-dimensional matrix, with centrality and density as the two axes.

Centrality refers to the importance of the theme in the research field, while density measures the theme's level of development (Cobo *et al.*, 2011). Centrality refers to the extent of interconnectedness between themes across keyword clusters, whereas density gauges a keyword's significance within a cluster, or its contribution to the underlying theme (Cobo *et al.*, 2011). The clusters **Artificial Intelligence**, **Anthropomorphism, Service Encounters** are in the lower-right-hand quadrant. They are *basic themes*, characterized by high centrality and low density. important for a research field and pertain to general topics transversal to the different research areas. **Emotions**, is on the right of the thematic map, with a very high density and centrality. This means that it is a *motor theme* in the literature. Finally, the small cluster **Care robotics** exhibits a quite low degree of centrality and low density, positioning it as an *emerging theme*.
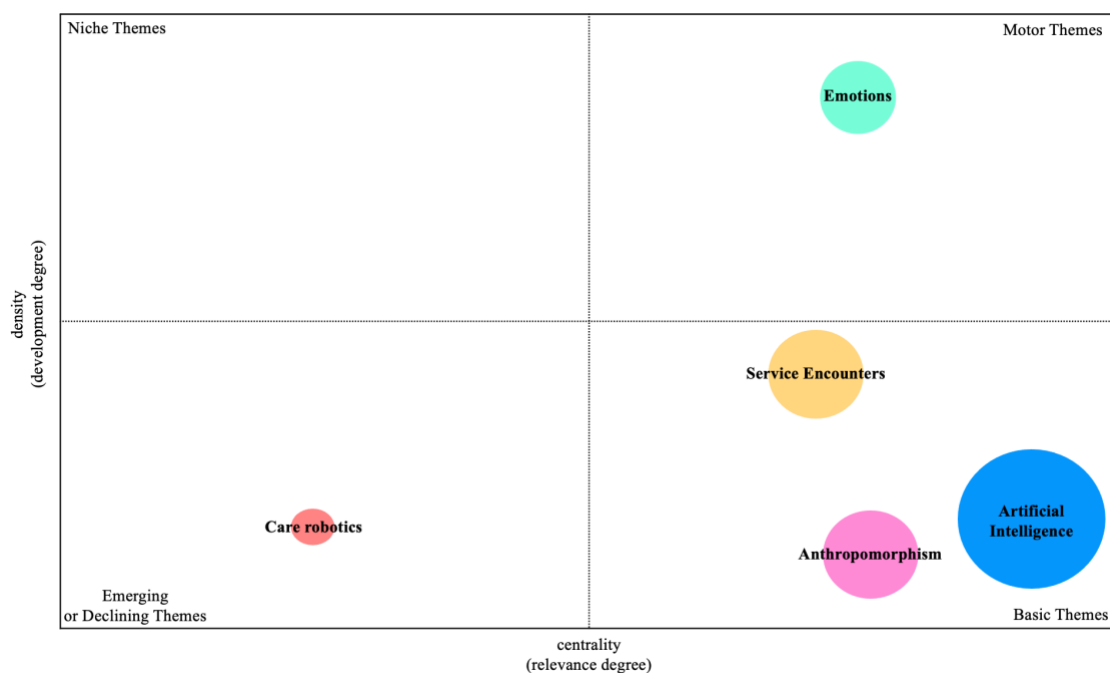
Fig. 12: Thematic Diagram. Source: Author's elaboration

4.1.2 Content Analysis of clusters

Qualitative content analysis, as defined by Krippendorff (1969), involved using a replicable and valid method to make specific inferences from text to other states or properties of its source. This method was deemed appropriate for systematically assessing the symbolic content of recorded communication (Hellkula, 2011). The results of the analysis are condensed into five clusters, including *1) artificial intelligence, 2) anthropomorphism, 3) service encounters, 4) emotions and 5) care robotics.*

#Cluster 1: Artificial Intelligence

Traditionally, McCarthy *et al.* (1955, p. 1) assess that *"every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it"*. Thus, the elementary definition broadly describes AI as the capability of a machine to act as intelligently as humans. It can emulate human cognitive tasks and mimic human behavior and thus demonstrates the capacity to learn and interpret external data to fulfill tasks through flexible adaptation (Kaplan and Haenlein, 2019). AI can take different forms, such as a) Machine Learning (ML), as the ability to automatically refine computational methods, b) Natural Language Processing (NLP), designed to understand languages, and c) Image Processing, which follows the inspection and algorithmic analysis of images (Brynjolfsson and McAfee, 2014).

Recent advancements in smart technologies have attracted interest from both scholars and practitioners (Kumar et al., 2020). The ever-increasing significance of technology in service and marketing has led to calls for papers in top-ranking journals via several special issues covering subjects related to AI-based solutions and other smart technologies. In recent years many studies on AI have been published in service journals (Huang and Rust 2021, 2022; Wirtz *et al.*, 2022) showing that AI in the service context is taking on a focal role, due to its characteristic to be able to adapt to changing needs, foster customer engagement, enhance customer experience such as service quality and reduce costs in every part of several stages of the service process (Davenport *et al.*, 2020). The peculiarity of AI, as an element destined to shape the service context, lies in its applicability to any field, configuring itself as a pervasive technology.

Huang and Rust (2018) propose that AI can assist human actors in service tasks, as intelligent machines with the abilities to learn, connect, and adapt are becoming more prevalent in service contexts (Huang and Rust, 2021). These capabilities differentiate AI from other technologies, making it a source of innovation and service revolution (Huang and Rust, 2021). Huang and Rust (2018) also introduce the concept of intelligent machines, which are capable of learning and possess *"the four intelligences framework"* - mechanical, analytical, intuitive, and empathetic intelligence - to reshape service. They suggest that AI may replace jobs involving lower intelligence tasks.

According to Mele *et al.*, (2019), AI has a particular ability *"to learn and adapt continuously due to mistakes and input from actors (with whom it interacts) and contexts (in which it is embedded)"* (p.185*)*. It is important to highlight that AI doesn't replace human capabilities and

skills but it works to integrate and augment human capabilities. Wearing S-D lenses, this peculiarity boosts the resourceness of AI, it can enable summative and emergent resource integration processes (Mele *et al.,* 2018; 2019). More recently, Huang and Rust (2021) provide a strategic framework for using AI to engage customers in service, boosting the original one (Huang and Rust, 2018). They assess that Artificial Intelligence develops from mechanical, thinking, and feeling. Mechanical intelligence presents a minimal level of learning and adaptation as it refers to commodity service, standard routines, and simple, repetitive tasks. Thinking intelligence refers to intelligent machines that learn and adapt systematically among data. Finally, feeling intelligence refers to the feelings-based interactions between humans and machines. It learns and adapts based on the experience in an empathetic way. In these terms, the most correct definition of *experience* refers to a set of data that are contextual and specific to the human subject.

Thanks to advances in Artificial Intelligence, the market for service robots is growing. They are increasingly being used in place of human service providers in the business world and increasingly involved in service encounters (Paluch *et al.,* 2021; Pitardi *et al*., 2022). In particular, service research has shown that the use of service robots and AI has the potential to revolutionize many service industries, but there are also risks and challenges that need to be addressed (Wirtz *et al.,* 2018; De Keyser and Kunz, 2022).

#Cluster 2: Anthropomorphism

The theory of anthropomorphism investigates how individuals perceive service robots as being similar to humans and how this affects their interactions (Borau *et al.*, 2021). Blut *et al.*, (2021) defined it as a psychological process that aims to facilitate social connections between people and non-human entities. Service robots are particularly susceptible to anthropomorphization, more so than other technologies (De Keyser and Kunz, 2022).

Previous research in the field has primarily looked at how service robots are accepted, used, and applied in customer service (De Keyser *et al.*, 2019; Chuah and Yu 2021). For instance, Wirtz *et al.*, (2018) investigated how design and characteristics of service robots can influence interactions with customers. They note that service robots come in different forms i.e., virtual agents (chatbots), embodied agents whose appearance can range from machine-like, to human-like and to humanoid. In their meta-analysis, Blut *et al.* (2021) found that anthropomorphizing service robots has a strong and positive impact on customers' intentions to use them. Indeed, they suggest that there exists a correlation between anthropomorphism and social presence, which can be defined as the degree to which machines, such as robots, create a sense of being

in the presence of a social entity (van Doorn *et al.* 2017). Consequently, in service settings, robots that are perceived to possess more human-like traits may offer customers a greater sense of social presence, leading to enhanced social interactions. Along similar lines, other service scholars (i.e., van Pinxteren *et al.*, 2019; Choi *et al.*, 2020) have examined how different aspects of robot interaction, such as text-, voice-, movement-, and touch-based interactions as well as the level of anthropomorphic appearance, affect consumer responses. However, according to Mende *et al.*, (2019) as anthropomorphism increases, *"consumers will experience discomfort – specifically, feelings of eeriness and a threat to their human identity"* (p. 539). In other words, humanoid robots that can mimic human behavior, but fall short of fully replicating it, can elicit a sense of unease or disquiet in people. This is because the discrepancy between the robot's intended human-like qualities and its actual imperfect and nonhuman characteristics can be jarring to humans' senses (Letheren *et al.*, 2021). To address this issue, Mende *et al.*, (2019) recommended that when introducing these Humanoid Service Robots (HSRs) to consumers, they should be reminded that the robot is a machine and not a human. Additionally, consumers should be reassured that they can always seek out human connections if they desire, thus mitigating any unintended consequences. In sum, the design of a robot with human-like characteristics can have a significant impact on how it is perceived. Recent studies (e.g., Lv *et al.*, 2022; Seo, 2022) address the so-called **uncanny valley effect** and describe the phenomenon where robots that are designed to look *almost human* can be perceived as eerie or creepy (Letheren *et al.*, 2021). Humanized robots can bring about both positive and negative consequences, as the increased likeness to humans also increases the associated risks. In particular, Lv *et al.*, (2022) investigated the "double-edged sword effect of anthropomorphic service robots" addressing the issue of mitigating the negative aspects. Robots with distinct human-like attributes, such as logic and reasoning facilitated by AI, undermine the distinctiveness of consumers' self-perception as humans, which in turn can lead to additional negative consequences (Lv *et al.*, 2022, Liu *et al.*, 2022). While the argument presented suggests that anthropomorphic service robots can have negative effects on humans' self-perception, it is worth noting that this is a contested issue, and there may be other perspectives to consider (Van Pinxteren *et al.*, 2019; De Keyser and Kunz, 2022). Additionally, since the field of service robots and their impact on society is still relatively new, there is still much that is not fully understood, and ongoing empirical research is needed to better understand the potential risks and benefits of these technologies (Lv *et al.*, 2022, Seo, 2022). Therefore, it is important to continue conducting new empirical studies to further explore the effects of anthropomorphic service robots on human beings and society at large.

#Cluster 3: Service Encounters

In recent times, scholars have acknowledged that service encounters have undergone rapid transformation due to the advancements in technology (Bitner and Wang, 2014; Wu *et al.,* 2021). This has caused a shift in the traditional "low-tech, high-touch" context (Bitner *et al.,* 2000), leading to the emergence of *digital service encounters* (Heinonen, 2008) or *service Encounter 2.0* (Larivière *et al.*, 2017). These terms refer to customer-company interactions resulting from a service system that combines various technologies, human actors, physical/digital environments, and company/customer processes (Larivière *et al.,* 2017). Today's service encounters are more technology-dependent and involve interactions with multiple technologies (Maar *et al.*, 2022). De Keyser *et al.* (2019) have identified various archetypes of technology-infused service encounters, including those where technology replaces the frontline employee. This trend is particularly prevalent with the rise of AI-based assistants (i.e., service robots and chatbots). In service encounters, service robots can supplement, replace, or enhance the networking among various actors (Lu *et al.,* 2020, Puntoni *et al.,* 2021). According to Pitardi *et al.*, (2022) the introduction of service robots significantly alters the nature of service encounters, especially where customer errors may result in embarrassing circumstances. Because they are seen as having little agency and therefore unable to think, feel, or act, service robots can lessen customers' anticipated embarrassment. Along similar lines, Holthöwer and van Doorn (2022) stress that *"robots do not judge"* (p.1). In other words, the use of robots for service provision in place of humans could alleviate apprehension about potential social judgment, as automated presence eliminates the human social element that prompts the perception of being judged by others (van Doorn *et al.*, 2017). However, despite the increasing dependence on service robots, their acceptance by customers is not always immediate and their usage can give rise to doubt and negative emotions (Čaić *et al.,* 2019; Mende et al., 2019).

#Cluster 4: Emotions

More recently, service robots have had a strong connection with the theme of emotions.

According to Wirtz *et al.* (2018), the characteristics of service robots are key to how humans (customers, patients, service providers, caregivers, etc.) will perceive and react to the integration of robots in servicescapes (Kipnis *et al.*, 2022). Theoretically, according to a few studies (e.g., van Doorn *et al.*, 2017; Mende *et al.*, 2019), people may anticipate robots to have certain qualities that meet a diverse range of functional, socio-emotional, and relational needs

in complex, emotionally charged service contexts like healthcare. Although human- AI-powered service robots interaction in emotionally charged contexts has been little explored, the topic of emotion is emerging in recent studies (Kipnis *et al.*, 2022). Scholars have shown that customer interactions with service robots can have an impact on their emotions, both positively and negatively (Pitardi *et al.*, 2022). For example, in case of embarrassing service encounters customers may prefer service robots to human employees (Pitardi *et al.*, 2022) or they may also feel surprised, amused, and amazed when interacting with service robots (Shank *et al.*, 2019). Emotionally communicative service robots, which can offer incredibly engaging and interactive service experiences, have been explored by Becker *et al.* (2022). The authors specifically identified four essential emotional communication strategies for service interactions: a) alleviate, b) mimic, c) infuse, and d) prevent). Firstly, for the alleviation strategy, service robots have to determine which emotional display will most likely reduce the patient's negative emotional state. Secondly, service robots have to choose whether to mimic the patient's emotions after determining that they are in a positive emotional state (mimic strategy). Thirdly, service robots have to choose which emotion to exhibit based on the emotional contagion after spotting a chance to infuse positive emotions (infuse strategy). Finally, if service robots anticipate that interaction will cause unfavorable patient emotions, they have to choose an appropriate emotional message beforehand to either prevent or lessen these negative emotions, such as frustration, stress and anxiety. With this in mind, research suggests that social robots may have different effects on patients' emotions, depending on context, design, and encounters. People may experience greater frustration when the robot makes mistakes or behaves unexpectedly (Wirtz *et al.,* 2018). In summary, the topic of emotions is an emerging theme that spans topics such as service interaction, service provision, service design etc (Henkel *et al.*, 2020; De Keyser and Kunz, 2022). A deeper understanding of the emotional effects of service robots is needed in light of the increasing use of these technologies in a wide range of service contexts, especially when it comes to interactions that cause unintended and unexpected consequences.

#Cluster 5: Care robotics

Cluster 5 is the smallest cluster and frames an emerging theme, related to care robotics. It encompasses *"all machines that operate partly or fully autonomously performing care-related activities for people with physical and/or mental handicaps"* (Goeldner *et al.,* 2015 p. 115). Thus, care robotics refers to the use of robots and robotic technology in healthcare and elderly care settings to assist with tasks related to caregiving (Khaksar *et al.,* 2016; Ge and Schleimer,

2022). Indeed, according to Tan *et al.,* (2021) they are mainly intended for the healthcare context and more precisely to the elderly due to the accelerated aging of populations and long-term care (Khaksar *et al.,* 2016, Caic *et al.,* 2019). In general, these robots can be programmed to perform a range of tasks, such as assisting with mobility, providing companionship, and even dispensing medication (Tan *et al.,* 2021). Examples of these are Paro, mainly intended for patients with dementia and Care-O-Bot, a caregiving robot that recognizes and engages with the individuals it serves, while also keeping a record of its interactions. This data can be reviewed by healthcare professionals and caregivers to assess various aspects of the patients' well-being, such as their daily water intake (Goeldner *et al.*, 2015). Care robots serve a range of purposes, including monitoring emotional states and interactions, providing physical assistance and rehabilitative support, and completing routine tasks to allow caregivers to focus on more meaningful care activities (Søraa *et al.*, 2021). Additionally, these autonomous systems can perform sophisticated tasks such as precise medication administration and advanced rehabilitative exercises for the elderly. These robots promote independence, preserve privacy and dignity, and enable the elderly to maintain their routines and manage daily activities, particularly when they are not yet significantly vulnerable (Khaksar *et al.,* 2016; Tan *et al.*, 2021). Moreover, care robotis can facilitate social engagement for older individuals. For example, an Australian study observed over 10,000 behavioral reactions from dementia patients when interacting with voice- and face-activated social robots over five years, leading to improved care quality, emotional well-being, and social engagement (Goeldner *et al.*, 2015). Despite being care robots, the issue of data collection, privacy, and security that is commonly associated with service and social robots still remains persistent. As stated by Tan *et al.*, (2021), the extent of data that a robot can collect and handle increases the likelihood of that data being exploited for unintended purposes, such as those that may cause harm to the user or other parties.

4.1.3 Thematic evolution
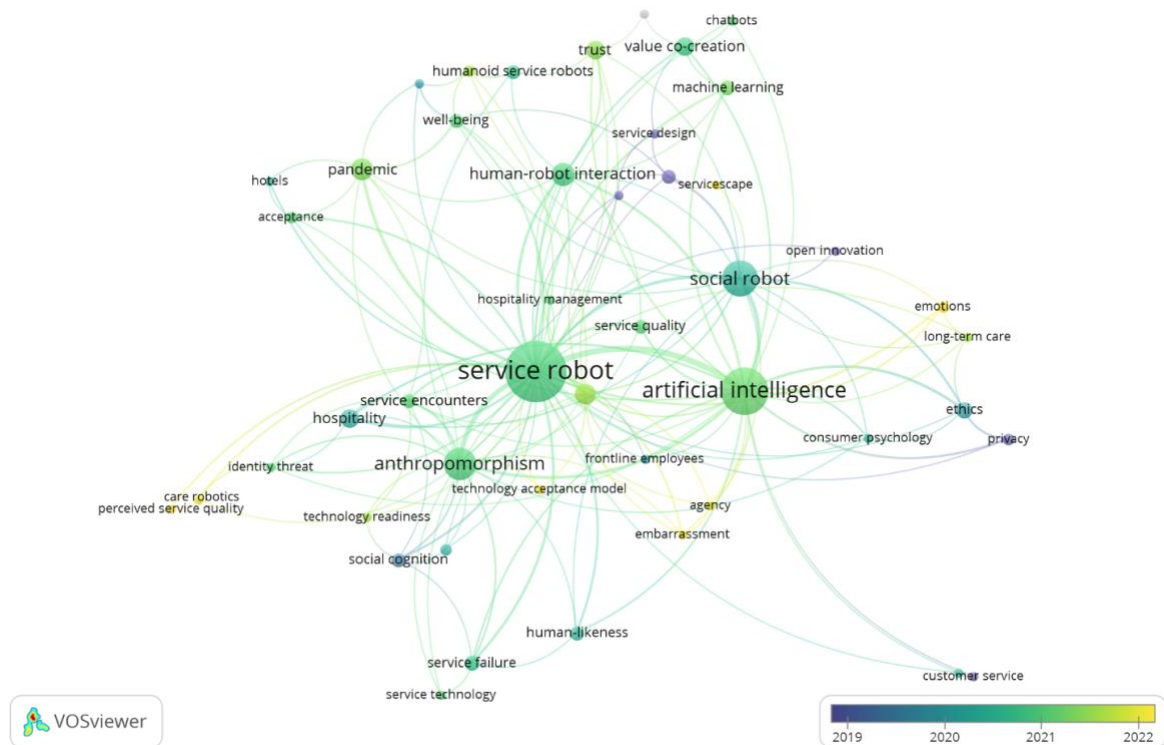
Fig. 13: Co-occurrence network (Overlay visualization). Source: Author's elaboration from VosViewer.

Figure 13 shows how authors' keyword clusters change over time. The analysis of the so-called overlay network reveals how research has evolved in terms of keywords and which keywords are the oldest and newest (Van Eck and Waltman, 2014). The overlay map - where the shading of the color of the nodes denotes the average year of publication - shows four clusters with different colors. In greater detail, the oldest words related to the concept of service and social robots are in the purple clusters (2019). They include *social cognition, service design, and privacy*. The dark green, which is mainly related to the years 2020-2021, includes keywords that pertain to *hospitality, value co-creation, and ethics*. The light green cluster from 2020-2021 include themes already addressed above such as *anthropomorphism*, *artificial intelligence, and service encounters*. New themes (2022) are *emotions, embarrassment, agency.* This map (Figure 13) is consistent with the thematic map (Figure 12), which highlights basic themes such as *artificial intelligence, anthropomorphism, service encounters* from 2019-2021, and driving themes such as *emotions, care robotics* and more in 2022.

5. Service and social robots in the healthcare service ecosystem

After conducting a bibliometric and content analysis of clusters, to better investigate service and social robots in the healthcare service ecosystems in service studies, a SLR was conducted.

However, before presenting the results of literature review, it is necessary to present a brief overview on healthcare service ecosystems.

5.1 Healthcare service ecosystem

The concept of ecosystems in the business and management literature traces its roots to Moore (1993), a full proponent of an *ecological* approach to understanding the contexts in which businesses both compete and cooperate. A business ecosystem is defined by Moore (1993 p.76) as *"an economic community supported by a base of interacting firms and individuals—the organisms of the business world"*. This definition reveals that the ecosystem refers to a study of the mutual relationships between firms and the surrounding business environments, such as the biological environment. More recently, a large number of terms related to the ecosystem concept have emerged, often used overlappingly or interchangeably. They place the term ecosystem alongside such as *"innovation ecosystem", "platform ecosystem", "technology ecosystem"* etc. (Thomas and Autio, 2020).

Thus, over time the ecosystem concept has evolved and more recently it is increasingly being applied to service systems, particularly in the context of service research. Drawing from the S-D logic foundations, the service ecosystem is the broader social, cultural, economic, and political context (Vargo and Lusch, 2004). Vargo and Lusch (2017) emphasize the role of the service ecosystem as a relatively autonomous and self-regulating system of resource-integrating actors who are linked by shared institutional logic and mutual value creation through service exchange. Specifically, four elements help define a service ecosystem: relative independence, a self-regulating system of resource-integrating actors, shared institutional logic, and mutual value creation through service exchange. In sum, S-D logic perspective recognizes the involvement of multiple actors and layers in the process of creating value, and emphasizes the dynamic and iterative nature of the process.

In healthcare, this concept has been used to explain complex, interacting, and multidimensional social, human, and organizational systems (Brodie *et al.,* 2021). In January 2023, a brief search of the WoS and Scopus databases yielded 1,921 studies on *"ecosystem*"* and *"healthcare"* with the majority published in journals of medicine, computer science, and engineering. However, while technical and digital aspects of healthcare ecosystems have received significant attention in these fields, social and human dimensions have received relatively less focus (Brodie *et al.*, 2021). Although studies on healthcare ecosystems have been published across various disciplines, research in business and management journals has gained momentum in recent years with 203 articles published. These studies place greater emphasis on healthcare and well-

being, and pay more attention to the social, human, and organizational elements of healthcare service ecosystems.

Frow *et al.* (2019) offered a mid-range theory to characterize the well-being of a healthcare service ecosystem. They describe it as *"a holistic, dynamic, positive state that is contextually determined and is characterized by: practices that achieve aligned configurational adaptation; institutional arrangements intentionally guided by a shared worldview; ecosystem levels that iteratively strengthen, co-evolve, and self-regulate; ecosystem resilience and capacity to adapt to disruptions; emerging through the adoption of flexible practices that integrate resources; and resulting in co-creation of shared value"* (p. 2667). More recently, Brodie *et al.* (2021) provide a novel perspective on the COVID-19 crisis and its impact on healthcare, by adopting a service ecosystem framework. This perspective allows for a better understanding of the complex and multi-layered nature of the healthcare ecosystem during turbulent times. In detail, three levels in the ecosystem of the coronavirus crisis' health services are discussed: the micro level, which includes individual actors such as patients; the meso level, which includes internal actors such as hospitals and healthcare organizations; and the macro level, which includes governmental actors such as healthcare authorities. While previous research has mostly focused on the technical and digital aspects of healthcare, Brodie *et al.* 's (2021) study sheds light on the importance of understanding the social and human dimensions of the healthcare ecosystem. The healthcare ecosystem perspective, which prioritizes co-creation as a phenomenological experience, highlights how diverse actors can collaborate to manage crises and improve outcomes in the face of adverse consequences. This perspective shows how, particularly during turbulent and uncertain times such as the COVID-19 pandemic, activities can be reoriented, resources can be combined and recombined, and new opportunities and resources can be introduced into ecosystems. The interactions between all ecosystem actors, including patients, healthcare providers, organizations, and institutions, are a primary source of innovation and value co-creation within healthcare service ecosystems (Beirao *et al.*, 2017).

Recent research (e.g., Sebastiani and Anzivino, 2021; Mele *et al.*, 2022a) highlights the integration of digital technologies in healthcare service ecosystems. These studies suggest that the use of such technologies creates a new ecosystem of services based on novel and dynamic interactions between actors. This redefines the patient-caregiver relationships and enhances patient involvement in the co-creation of value. Smart technologies meet the diverse needs of stakeholders, including patients, their families, physicians, and other service providers (Anderson *et al.,* 2018). In particular, social and service robots are increasingly being

introduced into health service ecosystems, particularly in response to the challenges posed by the COVID-19 pandemic. These robots are designed to assist and support healthcare workers and patients, particularly those with vulnerabilities (e.g., limited mobility or social interaction). They are believed to offer several benefits, including reducing the risk of infection transmission, improving the quality and efficiency of care, and promoting patient autonomy and empowerment (Blaurock *et al.*, 2022). Social and service robots can be used in a variety of settings, such as hospitals, nursing homes, and home care (Henschel *et al.,* 2021). They can be programmed to perform a variety of tasks, such as monitoring patients, assisting with activities of daily living, providing social and emotional support, and delivering medications and other supplies (Pantano and Scarpi, 2022). Some robots are also designed to interact with patients and their families, providing them with information, education and entertainment.

The next section presents the systematic literature review of service and social robots in healthcare service ecosystems that provides a more comprehensive picture of what has been addressed so far.

5.2 A systematic literature review

Following guiding articles (Paul *et al.*, 2021; Paul and Barari, 2022), a systematic review technique is conducted to achieve the objective of identifying and listing the various topics of service and social robots in service research. To perform a systematic literature review (Snyder *et al.*, 2019), the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement was employed. It is an evidence-based analysis that identifies, selects, and critically appraises relevant research on a specific topic using a minimum set of items (Moher *et al.*, 2010). According to this method, the selection process was performed in four steps: (1) the identification of relevant research by briefly searching through the selected databases; (2) a screening of abstracts; (3) a full-text assessment; and (4) decision-making concerning papers' eligibility (Fig. 12).

The two most widely used databases for systematic analyses, Web of Science (WoS) and Scopus, were used to identify as many eligible studies as possible. The search strategy was based on the following keywords: "service robot*" OR "social robot*" AND "health*", (*= wildcard plural) as keywords for the topic (WoS), article title, abstract, and keywords (Scopus). The query was based on these words with an asterisk to include plurals and other words such as *"service robots", "social robots", "health care", and "healthcare".*

The documents were searched in the following categories: "Business and Management" in WoS, and "Business, Management, and Accounting" in Scopus. Specifically, only journal

publications are included in a systematic literature review. To gather relevant evidence of the topic in service research and to preserve the review's quality, the journals considered were as follows: *Cornell Hospitality Quarterly, Service Science, Journal of Service Research, Journal of Service Management, Journal of Services Marketing, Journal of Service Theory and Practice, and Service Industries Journal.* These academic journals are covered by the SERVSIG literature alert, as these are widely regarded as sources for service-related work (Kunz, 2022). The scope of the study did not include papers presented at conferences, books, or reports because refereed journal articles present the state-of-the-art and have the greatest impact (Paul and Barari, 2022). In addition, only English-language journal articles were chosen for the review and analysis.

After the implementation of this search strategy, 83 papers were selected. The reference lists of the eligible articles included were also manually searched. Subsequently, some duplicates (n=43) were removed, and the remaining 40 documents were further analyzed by reading the abstracts. This led to excluding 3 documents because they were not in line with the scope of the review. The final 37 papers were thoroughly examined. The content of the documents was checked during the "full-text screening" stage, evaluating their applicability according to the inclusion criteria mentioned above. The full text was retrieved online from databases (Web of Science and Scopus), if not available, from external sources. Hence, further 2 articles were excluded because, even though the application of specific selecting criteria and the same keywords, they were not in line with the main research topic/aim. Thus, the final dataset included 35 research papers published in academic journals between 2017-2022.

All pertinent articles were examined thematically, following Paul and Barari (2022). The thematic analysis adopted an inductive strategy intended to define the phenomenon under investigation.
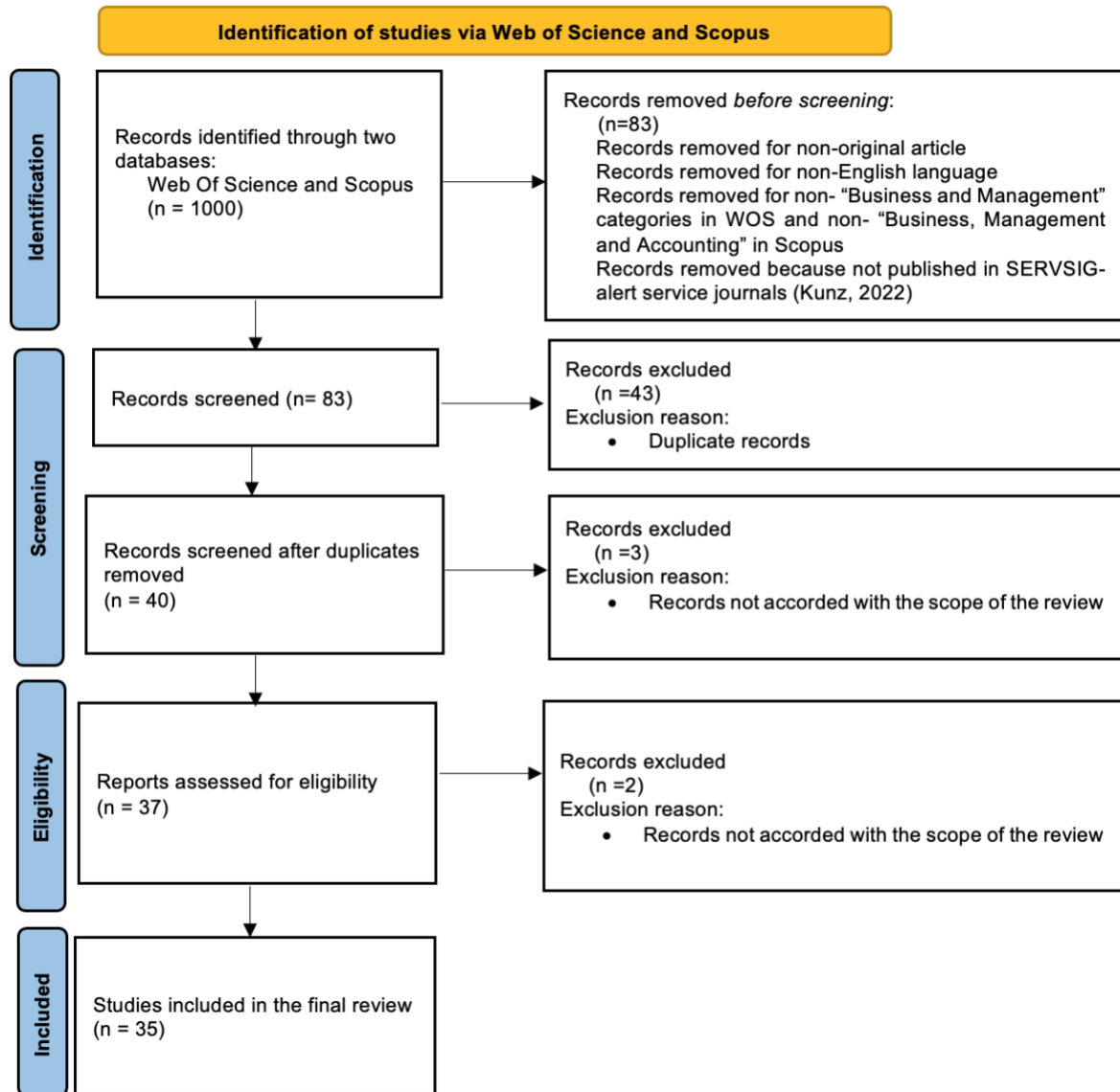
Fig. 14: PRISMA protocol. Source: Author's elaboration

General observations

The field of service robotics has expanded considerably over time across different industries, from retail, to hospitality, and financial services. In their recent literature review, De Keyser and Kunz (2022) assess that one of the dominant industries in which service robots are investigated more is healthcare. Until a few years ago, this sector received less attention than other contexts, but the scenario changed considerably with the COVID-19 pandemic (Berry *et al.*, 2020). For this reason, service robots have been rapidly applied to help stop the transmission of pathogens and viruses (e.g., through logistics, telemedicine, and disinfection) and to support healthcare workers increase efficiency, limit personal contact, and offset the sharp increase in the loss of healthcare services due to the proliferation of contagions. These

sudden changes have led to qualitative and quantitative increases in the vulnerability of human actors (e.g., fear of contamination, social isolation etc). In these situations of loneliness or social distancing, Socially Assistive Robots (SARs) have come into play assuming different appearances, including pets such as dogs and cats. They can communicate and provide companionship. They were originally created specifically to help the elderly and vulnerable people with their daily chores, increasing users' independence while providing mental stimulation and offering them emotional support (Čaić *et al*., 2019).

The COVID-19 pandemic has provided researchers with a context in which the interactions and relationships between human and nonhuman actors have changed significantly, and perhaps to some extent permanently, especially in the context of healthcare. Service robots are so technologically advanced and proactive that they do not require a great deal of human effort; if properly trained, they can also expand access to information, enable the reduction of information asymmetries, and improve the existing relationship between patient and caregiver, resulting in increased well-being for all parties involved (Čaić *et al.*, 2019). In addition, service robots have the ability to flank caregivers and interact with patients while also impacting the emotional-social and cognitive spheres of those involved (Dodds *et al.*, 2022). However, despite prospective assumptions and numerous contributions, research on service robots and healthcare seems to be still in its infancy. In fact, in many articles, healthcare is cited as an example or prospect for future research. Furthermore, most of the published studies that examine service robots in healthcare in-depth are theoretical in nature, where expectations and promises are made explicit (assuming everything a robot is capable of doing). However, the literature review reveals that very few empirical studies have been conducted on the topic (e.g., Čaić *et al.,* 2018) and, as a result, the literature also currently suffers from a dearth of empirical studies.

Robots and the changing into the role of patients and caregivers

The roles of the actors in the healthcare service ecosystems have changed as a result of the advancement of service and social robots. Service robots are an example of the dominant reality of technology adopted by healthcare service providers to achieve well-being outcomes. They are an emerging technology in services per se, particularly in healthcare services (Wirtz *et al.*, 2018; Čaić *et al.,* 2019). On the one hand, the use of artificial intelligence (AI) and related technologies allow healthcare providers to furnish more personalized care and contribute to a shift toward diseases and vulnerability prevention (Bocking *et al.*, 2022). On the other hand, patients can live improved experiences by having a more intuitive and informed understanding

of healthcare services (Hu *et al.,* 2019). These latest technologies can enhance dialogue, provide greater access to information, and reduce information asymmetries, ultimately promoting a more collaborative relationship between healthcare professionals and patients. As a result, this can improve the well-being of both parties (Čaić *et al.*, 2019). Dodds *et al.*, (2022) suggest that AI-based service robots allow collecting healthcare consumer data and recommending the next course of action and automating repetitive processes/tasks or using machine learning technology to make more accurate diagnoses (Bocking *et al.*, 2022).Service robots have the potential to aid caregivers and interact with patients, delivering individualized healthcare and mitigating the risk of human error. Furthermore, they can provide emotional, social, and cognitive resources, which are valuable in promoting better health outcomes for patients (Čaić *et al.*, 2019). A significant number of research studies in this area focus on older patients, who are often considered a vulnerable group (Amine *et al.*, 2021, Belk, 2021). They have the potential to positively impact the elderly care by providing companionship, assistance with daily tasks, and monitoring their health (Odekerken-Schröder *et al.*, 2020).

The comprehensive quarantine measures implemented to stop the spread of COVID-19 have had a long-term impact on healthcare, causing people to experience social isolation and negatively affecting their physical, cognitive, and mental health. Studies suggest that loneliness resulting from damaged social relationships can have adverse effects. Social robots can be utilized to address this issue by monitoring emotional and mental states, providing social interaction, and assisting with daily activities. For instance, they can help promote physical activity among the elderly and encourage play for socially isolated children (Merdin-Uygur and Ozturkcan, 2023). Additionally, AI-powered social and service robots can assist in decision-making by quickly analyzing large amounts of data, integrating internal and external data, spotting patterns, and connecting them to patients' profiles (Wirtz *et al.*, 2021).

However, people may be vulnerable to potential privacy violations, physical harm, and emotional distress caused by the misuse of these robots or the data they collect. Thus, careful consideration of ethical and regulatory frameworks is necessary to ensure the safe and effective use of social robots in elderly care (Belk, 2021).

6. Unanticipated and Unintended Consequences of service and social robots

In the social sciences, the results of a decision that are not as intended are known as unintended consequences. These consequences, as the name implies, do not correspond to the intended outcome of the action and can have both positive and negative effects. This section aims to describe the unexpected consequences, mostly negative, related to service and social robots.

According to Choi *et al.* (2021), these unintended effects of the rapid introduction of service robots have received little research attention. Most of the studies, as highlighted in this chapter, are theoretical in nature and are concerned with enunciating the benefits and promises. The reality, however, is unfortunately different. There are many cases of failure and lots of negative consequences to consider as well. In this regard, the interest of researchers is growing and the presence of special issues related to this topic in high rank journals (i.e., *Journal of Service Theory and Practice JSTP* and *Journal of Business Research JBR)* is an evidence of that.

The unintended consequences of service (and social) robots can involve different aspects such as value co-creation, customers' emotions, customer misbehavior, ethical and privacy issues, among others. Recent studies have shown that people's acceptance of service robots and their understanding of their emotional-social and cognitive complexity can inhibit value co-creation and well-being outcomes (Wirtz *et al.*, 2018; Čaić *et al.*, 2019). The various morphologies of robots play a part as well. In fact, according to Čaić *et al.*, (2021) morphology has a strong impact on humans' interactions with social robots in services. However, the same study shows that regardless of appearance (humanoid social robots, zoomorphic robots, or machine-like robots) the important aspects are the individual differences such as general trust in technologies and affinity for the robot. Emotions and misbehavior are undoubtedly crucial factors to be investigated (Kim *et al.*, 2022). A deeper understanding of the emotional and behavioral consequences of service robots is needed given the increasing adoption of social and service robots in various frontline service contexts, especially when service interactions end up causing anxiety, anger, or frustration in customers and patients (Tsai *et al.*, 2021). People's attitudes, trust, acceptance, and anxiety about robots are influenced by a number of variables. Their opinions may vary, for example, depending on their recent exposure to social robots (e.g., negative past experiences), the intended application domain (e.g., companionship, homecare, or healthcare), and the design of the robot (e.g., humanoid or anthropomorphic).

Finally, although the benefits of using these AI-based technologies for human actors are becoming increasingly clear, recent studies show that digital technologies can be used for unintended purposes and that the use of these technologies in everyday life raises significant ethical concerns (Lobschat *et al.*, 2021). For example, technology can reduce the effectiveness of customer decision making by causing people to adopt the advice of service robots even when those recommendations are inadequate. However, the ethical and privacy issues also apply to the case of social robots as companions. To fully exploit the potential of social robots and human-robot interaction, users' personal data, such as video and audio data for image and word recognition, need to be collected and processed permanently.

7. Future research directions

Service and social robots offer exciting opportunities in a range of service contexts, especially in healthcare ecosystems, in combination with, for example, artificial intelligence, speech recognition, mobile technology, among other technologies (Wirtz *et al.* 2018). There has been accelerated growth in human-robot or rather, human-technology interactions due to the social distancing requirements of the pandemic. Despite the promise and positive, purely conceptual studies published on the topic, such interactions are fraught with challenges and concerns, including ethical considerations (Lima and Belk, 2022). For example, during health care, replacing human health workers (medicians, caregivers, nurses) with robots could be detrimental to the person being cared for, as interaction with a robot may be less emotionally satisfying or trigger adverse reactions that would risk harming the patient's health status. Thus achieving the reverse effect than hoped for. Some of the AI service applications have also led to job losses and privacy violations. These are just a few examples of human-robot service interactions, among several others, that have clear moral, ethical, and well-being implications. In light of the analyses carried out in this chapter, one area of inquiry that has received limited attention has been the "dark" side of service and social robots, considering also the unintended consequences. Therefore, while the increasing penetration and adoption of AI-governed technologies promises great developments and improvements in people's lives, it also raises controversy, ambiguity, and ethical debates in society. Therefore, many challenges remain in the emerging field of research on technologies and their implications on well-being. In particular, the healthcare ecosystem is dense and made up of multiple critical issues. However, future studies may broaden the study contexts to incorporate other highly interpersonal service sectors (e.g., education, legal services) where social robots could be successfully deployed for service delivery. To broaden the comparative picture and draw conclusions for the effective adoption of robots in all service contexts, future study should pay more attention to the understudied domains mentioned above.

Chapter 4

Methodology and Research Design

A qualitative approach • Research design • Research context • Data collection • Data analysis • Ethical considerations

Chapter 4
Methodology and research design

This chapter aims to illustrate and discuss the methodological approach chosen to bridge the theoretical insights identified in the previous chapters by reviewing the existing literature on 1) well-being and 2) service and social robots in healthcare service ecosystems.

An action-research approach was adopted to promote an experimental project, in collaboration with Cooperativa Sole, an Italian social enterprise and Vstone, a Japanese company, aimed at implementing and using the HIRO service robot in two nursing homes as research settings located in northern Italy.

1. A qualitative approach

The term qualitative research is often used to refer to an approach to business research in which quantitative data are not collected or generated. However, the distinctiveness of qualitative research lies not only in the absence of numbers. It typically deals with words rather than numbers, but three features stand out: 1) an inductive view of the relationship between theory and research, in which the latter generates the former; 2) an interpretivist epistemological position, which emphasizes understanding the social world through analyzing how that world is interpreted rather than using a natural scientific model as is the case in quantitative research; and 3) an ontological perspective known as constructionist that holds that social properties are the results of interactions between people rather than being phenomena distinct from those who construct them. New insights revealed by qualitative research can inspire the creation of new theoretical frameworks and new research directions. The key to conducting and evaluating qualitative research is emphasizing that it is not a specific type of research but rather that it differs from other types of research in terms of its origin, premises, and methods. Moreover, inductive theorizing based on qualitative data is particularly suitable in new or emerging empirical contexts where existing research is scarce (Bryman and Bell, 2003). However, there are different views on what qualitative research is and how it should be conducted (Bansal and Corley, 2011; Witell *et al.*, 2020). To effectively conduct and assess qualitative research, it is important to emphasize that there is no single type of qualitative study but rather that qualitative studies differ in terms of their underlying premises, methods, and activities. Holmlund, Witell, and Gustafsson (2020) identify five features to do excellent qualitative research in service

studies such as a) relevance, b) rigor, c) integrity, d) narration, and e) impact. The relevance answer to the following question: *"why should we care about the topic and findings of the study?"*. Relevance has to be assessed from the point of the importance of a topic within its field or the contribution it makes to the literature on that field. From a practical and social point of view, such a method of improving qualitative research is developing research topics with professionals as business stakeholders or social stakeholders. As researchers, we have to focus on current and interesting topics, question current assumptions, and produce new relevant insights. These points can contribute to increasing the relevance of the research. The rigor of research refers to how well the researcher conducted the study and how it is credible. Rigor answers the following question: *"how has the researcher made sure the study is solid?"*. In particular, the features of rigor are credibility, quality data, sound data collection, analysis processes, and study coherence. Firstly, it is important to apply theoretical constructs. The researcher has to choose methods and data that match the aim of the paper, theoretical background, and other methods. Quality of data refers to the ability of the researcher to use data capable of providing empirical details and which in turn align with theoretical constructs. Furthermore, to assure the rigor of the research the researchers have to combine methods, use new methods, and ideas from other disciplines. Another method of improving qualitative research is the triangulation of data, finding a balance between systematic and creative analysis. The coherence of the study refers to the clear alignment of the whole manuscript, such as purpose, RQs, theoretical background, methodology, data, results, and implications. Integrity is the third feature that makes a qualitative study stand out. It refers to how the researcher addresses ethical and moral dilemmas and biases in the research. Therefore, a qualitative and quality study means collecting and analyzing data, but most importantly, doing research ethically. In conclusion, the impact of research answers to *"what can we do with the findings?"*. The fourth characteristic identified by the authors is storytelling, that is, the story of the research and the narrative of the results. Finally, the fifth feature of excellence refers to the applicability of a study's findings. In detail, results should be novel and transferable. A researcher has to consider implications not only for academics and professionals but also for other groups of actors such as communities, society, and other stakeholders. Scholars have to develop recommendations for local, national, and international authorities or NGOs and discuss relevance from the perspective of sustainability, responsibility, ethics, and the environment.

Qualitative research is broad and features a variety of techniques (Bryman and Bell, 2003). According to Holmlund *et al.,* (2020) the most popular qualitative research techniques in

service research are interview study, case study, ethnography and there is also a growing strong interest in action research. Interview study is frequently conducted as qualitative research with customers/users/patients using inductive reasoning to construct theories. According to Granot *et al.* (2012), in-depth interviews can provide extensive insights into phenomena of interest and detailed contextual information. One case in point is the study of McColl-Kennedy *et al.*, (2012) that conducted in-depth interviews and focus groups to investigate healthcare customer value co-creation practice styles.

The case study approach is defined as *"a research strategy which focuses on understanding the dynamics present within single settings"* (Eisenhardt, 1989, p. 534). The ability of a case study to delve into a particular unit (e.g., individuals, organizations etc.) to gain a deeper understanding - that would not have been possible through other means - made it a very well-liked and widely used research design in business research (Mele *et al.,* 2022a). Case study refers to a complex and particular case in which the specific phenomenon and its context are intertwined. Yin (2017) assessed that case studies investigate *"a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident"* (Yin, 2017, p. 18). Therefore, this method takes into account the context in which the phenomena are embedded by concentrating on the comprehensive and significant features of real events. Pettigrew (1990, p. 275), argues that *"if the phenomena to be observed are to be contained in a single or relatively small number of cases, then choose cases in which progress is transparently observable"*. Using this single-case study *"allows for the creation of more complicated theories than multiple-case studies, because single-case researchers can tailor their theory exactly to the many details of a particular case"* (Eisenhardt and Graebner, 2007, p. 30). However, according to the authors, including multiple cases also makes possible a robust research strategy with more widely applicable results (Eisenhardt and Graebner, 2007; Yin, 2017). Another qualitative technique is the ethnographic methodology, whose main advantage is closeness to the reality of the topic to be studied (Arnould and Wallendorf, 1994). The increasing role of digitization has resulted in the emergence of digital ethnographies or netnographic research, which have become valuable for theory development (Heinonen and Medberg, 2018). An example is the study of Odekerken-Schröder *et al.*, (2020) that employed the analysis of online visual and textual descriptions of the role of Vector, as a companion robot, during the COVID-19 pandemic. Furthermore, according to Holmlund *et al.*, (2020), another qualitative method that has gained popularity in service studies recently is action research, *"where the actors are also the researchers, continuously reflecting on what has happened and what is in progress"*

(Gummesson and Gronroos, 2012 p. 480). The following section provides a thorough explanation of this novel approach.

1.2 Action research

The social scientist Kurt Lewin (1946) coined the term *"action research"* which involves close collaboration between researchers and practitioners, and helps connect academic research to practice (Lim *et al.,* 2018). This approach combines theory and practice in real business environments (Gummesson, 2000) and action researchers (in this case, the author of this thesis) do more than simply observe to actively contribute to the achievement of organizational objectives. Therefore, they gain a comprehensive understanding of the practice in question by engaging with it in all of its facets in this manner (Coughlan and Coghlan, 2002). According to Elg *et al.*, (2020), action research can be viewed as a successful method for researchers to investigate the transformational nature of service research and to contribute to the growth of both the research community and practice (Gummesson and Gronroos, 2012). Scholars create new knowledge together with practitioners. Therefore, understanding and action are combined (Elg *et al.*, 2020). However, despite its promise of *"creating real change in organizations together with practitioners"* (Lim *et al*., 2018, p. 99), this approach is not very common in service research (Holmlund *et al.*, 2020).

Gummesson (2000) makes a distinction between four types of action research: societal action science (i.e., the traditional type where researchers assist underprivileged groups in solving problems), management action science (i.e., the purpose is to understand in-depth organizations, markets, and customers, to make an operation more efficient), real-time action science (i.e., working in a research project planned for action research), and retrospective action science (i.e., allowing past actions and experiences to be used as data for future scholarly reflection). In their guest commentary, Perry and Gummesson (2004) presented three different types of action research intending to place them within the field of marketing. In detail, they presented: traditional action research, action learning, and interview/case research. The focus of traditional action research is a workgroup within an organization that engages in continuous cycles of planning, acting, observing, and reflecting. Action learning, in contrast, places a strong emphasis on taking action after learning from experience. Case research is an examination of a current, dynamic phenomenon and the expanding corpus of knowledge about it, within the real context of the phenomenon, where distinctions with its context are vague.

To conclude, the methodological strategy employed in this thesis is action research. This approach was chosen because as an action researcher, I was an *"external agent who acts as a*

facilitator of action and reflection within an organization" (Coughlan and Coghlan, 2002, p. 227). Moreover, it allowed me to observe key phenomena, identify issues to be addressed, and formulate an intervention that would experiment with the use of service and social robots to improve human well-being (Reason and Bradbury, 2008). As Perry and Gummesson (2004, pp. 313–14) define action research, it involves:

> *"a group of people who use spiralling cycles of activities that involve planning, acting, observing and reflecting upon what has happened… to try to improve the workgroup process of action; that help to solve complex, practical problems … the action researcher is both an actor and a researcher … a facilitator or an interventionist in a change process."*

Planning, acting, observing, and reflecting are all included in spirals of action-research cycles (Ballantyne, 2004).

In sum, an action research approach involves iterations or cycles of problem identification, action planning, implementation, evaluation, and reflection. Kemmis and McTaggart (1981), described the iteration as cycles of planning, acting and observing, and reflecting (Figure 15). They emphasized the movement towards a change in the situation about which the investigator is reflecting and acting and how one cycle informs its successive cycles.
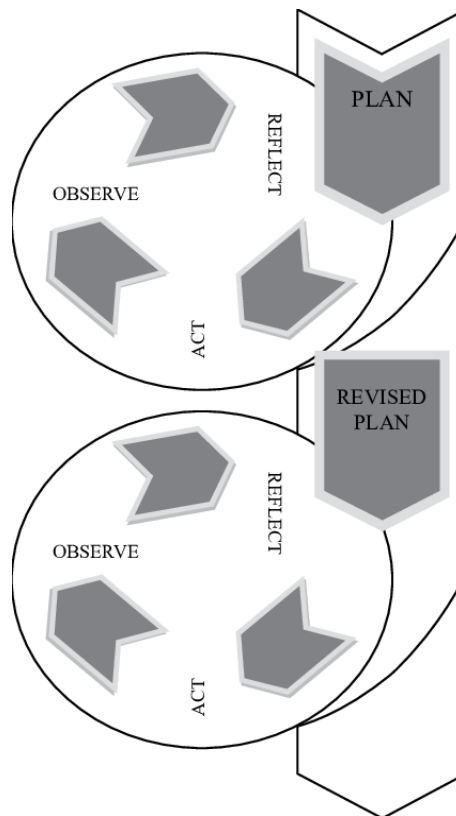
Fig. 15: The action research planner. Source: Kemmis, S., & McTaggart, R. (1981). The action research planner. Geelong, Victoria, Australia: Deakin University.

The four steps that are consistently mentioned in the literature (Kemmis and McTaggart, 1981; Gummesson, 2017) are: 1) develop a plan; 2) act to implement the plan; 3) observe the action and collect data; and 4) reflect on the action and replan. This cycle is deemed to be an appropriate model for this thesis. The formula "plan, act, observe and reflect" can be used to summarize this concept. Grundy and Kemmis (1981, p. 324) argue that this is an important concept by stating that *"Action research is a dynamic process in which these four aspects are to be understood not as static steps, complete in themselves, but rather as moments in the action research spiral."*.

2. Research design

In the social sciences, the *"research onion"* (Saunders *et al.*, 2016) for business studies, is frequently used to build the theoretical framework for research. The principles of this model provide a strong framework for the development of a coherent and consistent research design. Scholars defined research onion as *"a model of designing research methodology"*. Indeed, it is a tool that aids in the step-by-step development of the research design and organization of

the research (Saunders *et al.*, 2016). Fig. 16 presents the research design of this thesis adapted from the research onion of Saunders *et al.*, (2016).
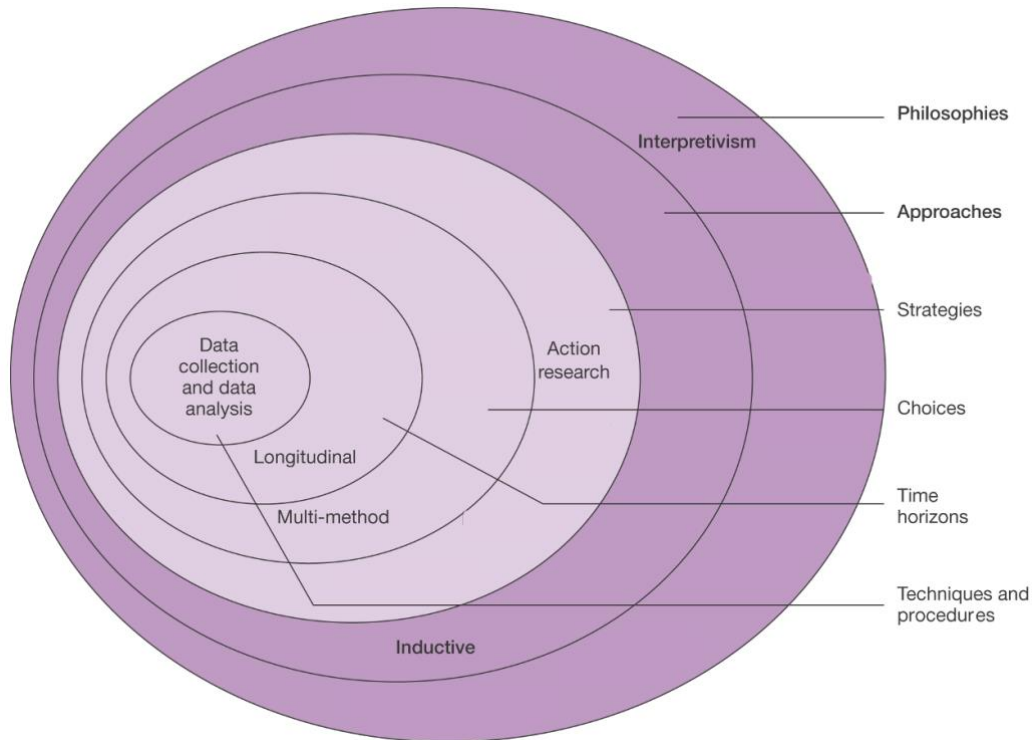
Fig. 16: The research onion applied to this study. Source: Author's elaboration on "The research onion", Saunders et al., (2016).

The philosophy of this thesis is interpretivism. With interpretive philosophy, the researchers play an active role in the study, as it is crucial to draw a holistic view of the participants and their actions, thoughts and meanings. The interpretivism approach is based on subjectivist ontological presumptions that since discourse constitutes entities, only social constructions like consciousness or language can be used to search for existing or socially constructed reality (Meyer, 2008). As a result, this philosophy holds that knowledge and facts are relative and subjective, and reality is socially constructed and constantly changing. The approach is inductive reasoning, i.e., a way of theory building with specific observation on the basis of which a general rule is formulated (Arthur, 1994). The methodological choice is qualitative multi-method, as a combination of qualitative methods (e.g., semi-structured interviews and observations). This choice was reached because using different qualitative methods while maintaining a common epistemological perspective can improve the caliber of the research (Silverman, 2020). For instance, this study combines interviews with audio-or video-recorded

observations. The research strategy is action research, as described above. Finally, the time horizon is longitudinal, since the research project lasted from October 2021 to February 2023.

The Hiro project

In detail, this thesis is the result of a research project that began in October 2021 and was born out of the collaboration between a) Cooperativa Sole, a social enterprise that implements innovative care services and new housing models for well-being and longevity, b) Vstone Co. ltd. technology provider, producers and developers of Hiro robot, which will be presented later, and c) the research group I am part of at the University of Naples Federico II, whose scientific directors are Prof. Cristina Mele and Prof. Tiziana Russo Spena. This is in line with Elg et al. (2020), according to which the special characteristics of the action-research process, such as flexible interactions and a wide range of data collection methods, require a highly qualified research team. The aim of the project is to foster the well-being of vulnerable patients and, to some extent, also of the community of vulnerable people through the implementation of Hiro, as a social robot, in daily healthcare activities. The project aims to encourage the use of robotic solutions in nursing homes, as evidenced by previous studies (e.g., Khaksar *et al.*, 2016; Čaić *et al.*, 2019; Kipnis *et al.*, 2022), to improve caregiver-patient interactions and increase the well-being of actors involved in the healthcare services ecosystem. It also sets the challenging goal of integrating traditional pharmacological care for vulnerable patients with a new type of non-pharmacological therapy using a robot.

The research project adopted an action-research approach. As a researcher, I observed key phenomena, identified issues to be addressed and formulated an intervention, and most importantly, experimented with the practitioners on the use of service robots to promote well-being. As Gummesson (2007) stated, I was thus an actor, researcher, facilitator, and interventionist. The methodological approach was purely qualitative, and the main techniques were participant observation, a technique used to study social interaction in which the researcher immerses himself and learns using the resources of dialogue and participation, informal interviews on site and semi-structured interviews both on-site and online with caregivers. The research project initially included only one research setting, namely Felice Pullè nursing home. However, at the end of the first pilot that lasted from April to October 2022, it was decided to launch another pilot, namely Residenze del Sole nursing home, which started in December 2022. The same research process and research protocol was followed for both pilots.

The project started with the first pilot (Felice Pullè) in October 2021 and followed the 4 steps of the *plan, act, observe and reflect* formula (Perry and Zuber-Skerritt, 1991, Gummesson, 2007). The first stage (planning) involved the research project design and pre-implementation analysis, i.e., in-depth study and analysis of the robot and context. To this end, No. 2 meetings were first organized between the research team and VStone, the technology provider, to understand the characteristics of the technological solution. Next, No. 10 meetings were held between the research team and the nursing home managers and caregivers to better understand the activities and feasibility of the nursing homes and the characteristics of the patients. This phase involved the construction of a precise research protocol, shared and agreed upon between researchers and practitioners, the choice of the experimental setting, and the criteria for inclusion and exclusion of patients (i.e., study participants), as detailed below in Section 3.

The second stage (acting) covers the implementation of Hiro and the testing phase. Specifically, the research team met with caregivers, both through remote and in-person meetings, to organize the testing and trial initiation activities. In detail, the testing phase required that all patients selected in the study received and accepted the robot in 3 administrations on 3 different days. Therefore, patients (previously selected through joint work and based on the inclusion criteria in Table 1) would have to pass the testing phase by accepting the robot 3 times at 3 different times to be included in the study.

11 patients (out of 16 who met the inclusion requirements) passed the testing phase in pilot 1.

10 patients (out of 10 who met the inclusion requirements) passed the testing phase in pilot 2.

Stage 3 (observe) was the execution and monitoring phase, which involved administering the Hiro robot to patients. In essence, this phase takes us to the heart of the project, moving from initial planning (plan stage) to execution. In this phase, data were collected from multiple sources, such as semi-structured interviews, observations, personal diary, visual and audio material, such as videos and pictures. Stage 4 (reflection) is about evaluation, data analysis and re-evaluation of the plan. The phase 4 of the first pilot was the basis for beginning the research project in the second pilot (Residenze del Sole). Figure 17 summarizes the phases. The research contexts, inclusion and exclusion criteria of the patients involved in the study, their characteristics, and data collection and subsequent analysis are described in detail in the following paragraphs.

PLANNING

- Planning action (i.e., designing the research project)

Actors involved:
- Research team "Federico II"
- Vstone company, technology provider
- Cooperativa Sole team
- Nursing homes professionals and caregivers

evaluating implementing revisiting

identifying informing organizing

REFLECTING

- Priority setting

Actors involved:
- Research team "Federico II"
- Cooperativa Sole team
- Nursing homes professionals and caregivers

ACTING

- Pilot (nursing homes) testing
- Implementing Hiro robot

Actors involved:
- Research team "Federico II";
- Nursing homes caregivers

analyzing reporting sharing

trialling collecting questioning

OBSERVING

- Data collection (participant observations, interviews)
- Data analysis (thematic analysis, narrative analysis).

Actors involved:
- Research team "Federico II", nursing homes psychologists and caregivers

Fig. 17: The action research cycle applied to the research project. Source: Author's elaboration.

3. Research context

As above, the exploratory and qualitative study was conducted in collaboration with an Italian social company, Cooperativa Sole, a growing reality in the field of assistance, leveraging a business model based on the combination of human resources and technologies.

The research project was conducted in two different contexts. The first pilot is Felice Pullè, a daily care center for the elderly settled in Riccione (Emilia Romagna region) from April to October 2022. The second pilot is Residenze del Sole, a nursing home settled in Cinisello Balsamo, Milan (Lombardy region) from December 2022 to February 2023. In addition, it is crucial to mention that although the two contexts are two different research pilots, the same research protocol was followed for both, which included the same criteria and methodologies. The two nursing homes are described in-depth below.

Nursing Home #1: Felice Pullè

The first research context is Felice Pullè, a nursing home, and daycare center for the elderly. It is articulated in a nucleus of 20 places and included in the network of territorial services and

interventions in the city of Riccione (Emilia Romagna region, Italy). Caregivers provide lots of services, i.e., primary care, personalized support for all daily activities, and nursing care with medication administration. Considerable emphasis is also placed on recreational, occupational, and socio-cultural activities.

This research context was chosen, moreover, with the approval of the manager of the Riccione Municipality. Once the research site was agreed upon, some preliminary inspections and interviews were carried out with Felice Pullè manager to carry out a proper analysis of the context.

Nursing home #2: Residenze Del Sole

The second research context is Residenze del Sole, a nursing home aimed at providing care and functional recovery services to vulnerable and non-self-sufficient people. All care activities revolve around the following objectives: the centrality of the elderly person, quality of life, health promotion, and the importance of the patient's social role. In this perspective, they ensure qualified healthcare services, ongoing staff education aimed at the re-evaluation of their motivation and skills, and the highest standard of quality of life and well-being for their guests (patients). In sum, Residenze del Sole provides high-quality healthcare services to people who are residents of the Lombardy Region and have the same vulnerabilities: limitations of physical, mental, and/or social autonomy for which it is difficult to provide appropriate assistance at home. The activities are distinguished by qualified healthcare services and a high standard of humanity, which is essential to ensure the health and dignity of the person.

Patients selection criteria

To assess which patients were suitable for the study, in both cases preliminary interviews were conducted with nursing home managers, caregivers and psychologists. The precise criteria for inclusion and exclusion are shown in table 1. In this stage (plan stage), the psychologists (No. 2) analyzed the patients' medical records and conducted interviews and tests (NPI for

behavioral disorders[1] and QUALID for quality of life[2]) to assess their level of vulnerability (e.g., diseases, sensory deficits etc.) and the possibility of inclusion in the study.

Patients with the following vulnerabilities were included: moderate to severe dementia, behavioral disorders in dementia Behavioral, Psychological Symptoms in Dementia (BPSD), Alzheimer's syndrome, and forms of cognitive impairment. In contrast, patients with sensory disabilities (e.g., hearing or visually impaired), patients with traumatic family injuries or conditions, and severely ill patients whose presence of acute clinical conditions might have interfered with study participation were excluded from the study (Table 12).

Inclusion criteria	Exclusion criteria
● Moderate-severe dementia (Mini-Mental State Examination - MMSE <18 ● Behavioral Disorders in Dementia - Behavioral and Psychological Symptoms in Dementia (BPSD)	● Sensory deficits (vision and/or hearing); ● Presence of traumatic events related family and parental life; ● Presence of clinical conditions acute conditions that may interfere with participation in the study.

Table 12: Inclusion and exclusion criteria of patients

All family members of patients eligible for the project were informed in detail. Those who consented to participate in the trial signed informed consent to the processing of sensitive data and audio-visual materials. Withdrawal at a later date by patients' families was allowed without any consequences.

A total of 21 patients (11 Felice Pullè and 10 Residenze del Sole) were selected. Tables 13 and 14 show the characteristics (gender, age, vulnerability, family background) of the people involved in the two research pilots.

# Patient	Sex	Age	Vulnerabilities	Family background

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[1] The UCLA Neuropsychiatric Inventory (NPI) is a widely used assessment tool that measures the frequency and severity of behavioral and psychological symptoms in individuals with dementia and other neurocognitive disorders (Rogers and Kasper, 1990, University of California, Los Angeles). The NPI is a structured interview that can be completed by a caregiver or other informant who is familiar with the patient's behavior. It consists of a series of questions about 12 behavioral domains (e.g., agitation, depression, hallucinations, etc.) and includes both positive (e.g., euphoria) and negative symptoms (e.g., apathy).

[2] The Quality of Life in Late-Stage Dementia (QUALID) scale is a tool that measures the quality of life of individuals with late-stage dementia. The QUALID scale consists of 14 items that assess different aspects of quality of life, such as physical well-being, emotional well-being, and the presence of positive and negative symptoms. Each item is rated on a 5-point Likert scale, with higher scores indicating a better quality of life. The total score ranges from 0 to 56, with higher scores indicating a better quality of life.

Patient 1	F	82	Moderate-severe dementia Behavioral disorders: busyness and depression Progressive polystructural dementia Anxiety-depressive syndrome	Widow 3 children (2 daughters 1 son)
Patient 2	F	69	Alzheimer's disease in rapid cognitive deterioration Psychological and behavioral disorders	Widow 2 daughters
Patient 3	F	77	Alzheimer's disease Medium-grade cognitive decline of possible degenerative genesis	Widow 2 children (1 daughter 1 son)
Patient 4	F	94	Severe cognitive decline of a vascular nature Apathy	Widow 1 son and 2 non-biological
Patient 5	F	64	Anxiety and depression Alzheimer's disease in severe and rapid cognitive deterioration	Married 4 children (2 sons and 2 daughters)
Patient 6	M	93	Psychological and behavioral disorders: Psychomotor agitation Alzheimer's disease in rapid cognitive deterioration	Married 2 daughters
Patient 7	F	76	Alzheimer's disease in rapid cognitive deterioration and severe behavioral disorders Psychomotor agitation	Widow 2 children (1 son and 1 daughter)
Patient 8	F	85	Moderate-severe dementia Psychological alterations: busyness, euphoria	Divorced 1 daughter
Patient .9	F	87	Moderate-severe dementia Behavioral disorders: apathy	Widow
Patient 10	M	84	Alzheimer's disease in rapid cognitive deterioration and severe behavioral disorders Deep depression	Married 2 children (1 son and 1 daughter)
Patient 11	M	82	Anxious depressive syndrome Psychological and behavioral disorders	Married 2 children (1 son and 1 daughter)

Table 13: An overview of Felice Pullè patients, their vulnerabilities and family background. Source: Authors'elaboration

# Patient	Sex	Age	Vulnerabilities	Family background
Patient 1	F	70	Alzheimer's disease Medium-grade cognitive decline of possible degenerative genesis	Married 2 daughters
Patient 2	F	67	Alzheimer's disease in rapid cognitive deterioration	Married 2 sons

Patient 3	F	71	Moderate-severe dementia Anxiety-depressive syndrome	Widow 1 daughter
Patient 4	F	83	Severe cognitive decline of a vascular nature Apathy	Married
Patient 5	F	68	Alzheimer's disease in rapid cognitive deterioration Psychological alterations: busyness, euphoria	Married 3 children (2 sons and 1 daughter)
Patient 6	M	82	Alzheimer's disease in rapid cognitive deterioration	Widow 2 daughters
Patient 7	F	83	Alzheimer's disease Psychological and behavioral disorders: Psychomotor agitation, euphoria	Widow 2 children (1 son and 1 daughter)
Patient 8	F	75	Alzheimer's disease in rapid cognitive deterioration and severe behavioral disorders	Widow 1 daughter
Patient 9	F	79	Severe dementia Behavioral disorders: apathy Deep depression	Married
Patient 10	M	65	Moderate-severe dementia Anxiety-depressive syndrome	Married 2 daughters

Table 14: An overview of Residenza del Sole patients, their vulnerabilities and family background. Source: Author's elaboration

4. Data Collection

Data were collected through participant observation and personal diary, in-depth interviews with caregivers, and collection of audio-visual data. In order to triangulate the data, it is necessary to gather various types of evidence and pay close attention to the context in which all aspects of the study were placed (Creswell and Poth, 2018). Figure 18 summarizes the data collection process.
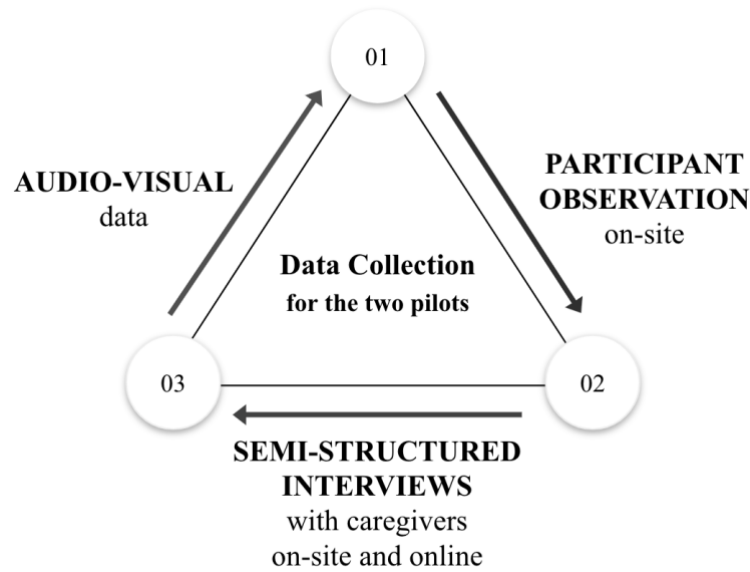
Fig. 18: Data collection. Source: Author's elaboration.

Participant observation on-site

The observations included pre, during and post administration of Hiro to patients. In detail, 1) how the patient appears before the interaction with the robot (e.g., agitated, calm, sad, apathetic, euphoric, etc.); 2) caregivers-Hiro-patients and Hiro-patients interaction; 3) how the patient appears after the interaction with the robot.

The observations were made in situations where they did not interfere with caregivers' work activities. Informal interviews during the observation were conducted concerning the events. Informal interviews, typically used in qualitative research methods such as action research, involve conducting unstructured or semi-structured interviews with individuals or groups that are being observed as part of the research process (Craig, 2009). These interviews are typically conducted in a casual and conversational manner. The purpose was to gather in-depth information and insights about the caregivers' perspectives, experiences, and behaviors. Each observation and informal interview were recorded with start and end times and who said what. On average, the observations lasted from 10 to 50 minutes. In addition, environmental factors, nonverbal events, other caregivers' reactions, the number of patients, and reflections were noted. Handwritten field notes taken during the observations were transcribed into online Word files after each session. Participant observation ended when information power was achieved and saturation met the purpose of the study (Patton, 1999). In total, I spent 10 days between the two nursing homes collecting systematically observational data (Table 1) focusing on the

daily interactions that took place between caregivers and patients. The extended time for data collection enabled observation of things that otherwise would have gone undetected; the time spent on-site also encouraged the informants' confidence in me. Such trust was also found in the meetings (interviews) that took place later online. According to Leino *et al.*, (2020) vulnerability experiences are difficult to study explicitly and unambiguously, but it is possible to interpret them inductively during interviews and observations (Baker *et al.*, 2005). Participant observation allowed me to capture the emotional state of patients and caregivers, thus going beyond what they later revealed in interviews.

Semi-structured interviews on-site and online

During the months of the research project, there were several meetings with nursing home managers and formal caregivers, in which the changes and outcomes of adopting the service robot were discussed. Subsequently, as suggested by Giorgi and Giorgi (2003), in-depth phenomenological face-to-face and online interviews were carried out. Face-to-face interviews were often conducted during their working hours. This resulted in significant variation in interview duration. In detail, 60 unique interviews were conducted, with an average time of 31 minutes, lengths ranging between 32 minutes and 1 hour, to allow caregivers to tell their stories. The online interviews, held on google meet, were audio recorded and transcribed. I agree with Dodds and Hess (2021) because online interviews were comfortable, non-intrusive, and easier to handle in terms of work dynamics and social anxiety. All interviews began with general questions such as: "Did you work today (or yesterday), how was your day?" A semi-structured questionnaire encouraged informants to provide insights into the implementation of Hiro. Subsequently, caregivers were invited to discuss their emotions, perceptions, and motivations and were asked to comment on and narrate any issues they felt were significant. In doing so, I follow the suggestion of Dodd and Hess (2021), I set myself up as an "interviewer and scribe", using the comment function to add without interrupting the flow and keeping friendly but to the point. Furthermore, to supplement the observations and informal interviews during participant observation some of the individual face-to-face interviews were held immediately after the observation period in a separate location away from the patients (Table 15). These insights were supplemented with data from secondary sources, such as videos, medical reports, and psychologists' reports (Lincoln and Guba, 1985).

Nursing Home	Informants	No. Interviews (both semi-structured and	Participant observations (in days)

		informal)	
Felice Pullè (Riccione)	1 Nursing home managers	5	17 (by three researchers)
	1 Psychologist	14	
	5 Caregivers	10	
Residenze del Sole (Cinisello Balsamo, Milan)	1 Nursing home managers	3	5 (by two researchers)
	1 Psychologist	6	
	11 Caregivers	22	
		Tot: 60 interviews (average time 31 minutes)	**Tot:** 22 days

Table 15: Data collection

Audio-Visual data

Visual data collection can be used to document physical settings, artifacts, and nonverbal behavior. Both audio and visual data can be used to triangulate other forms of data, such as observation, fieldnotes, and written documents. During the observations I recorded videos through my smartphone and took pictures. This collection of data enabled the iterative process of data collection. In this perspective, data is used to inform subsequent rounds of data collection and this process is repeated until additional data collection is not likely to yield new insights (Srivastava and Hopwood, 2009). Infact, the videos - which were also analyzed months later - firstly, made possible to capture further evidence of what was found during the observations and the interviews with the caregivers and secondly, inform subsequent rounds of data collection following participant observation.

5. Data Analysis

As extensively addressed throughout this chapter, action research is embedded in organizational and social contexts (Coghlan and Brydon-Miller, 2014). Therefore, the nature of action research has different effects on data analysis. First of all, it is difficult to separate data collection from data analysis. Data analysis is, in a sense, an integral and continuous part of the action research process due to the cyclical nature of action research and the inclusion of reflection as a crucial phase of the action research cycle (Zuber-Skerrit and Fletcher, 2007). Second, researchers often focus their data analysis on the development of action plans and

interventions, paying little attention to approaches to data analysis that lead to theory creation (Coghlan and Brydon-Miller, 2014). According to Elg *et al.*, (2020) data analysis should begin as soon as the research is conducted. In doing so, researchers engage fully in their fieldwork (whether it is an interview, participant observation, or published text) and then read and reread the data to interpret them. At this stage, researchers seek to understand the research findings by immersing themselves in the data. Thematic, narrative, and discourse analysis are just a few of the qualitative data analysis methodologies that action researchers have conducted and modified. Similarly, Grounded theory analysis has a long history of being used to add formality and rigor (Strauss and Corbin, 1990) such as collaborative and participatory data analysis that is also becoming more popular as a component of participatory action-research projects.

In this thesis, the techniques employed for both research pilots are thematic and participatory data analysis, which are described below.

5.1 Thematic Analysis

Thematic analysis is a method used to identify recurring themes in commonly collected data. Despite being used in various disciplines for many years, it is becoming increasingly popular in management and business studies. The goal of this approach is clear, but the process for extracting themes has not been well-defined, leaving room for researchers to find the best approach. Scholars suggest that understanding the meaning of "theme" is crucial for identifying them, as they are considered to be the underlying reasons behind the analyzed text. According to Bryman, (2016 p. 264) *"a theme is more likely to be identified the more times the phenomenon it denotes occurs in the course of coding"*. Coding data involves identifying and labeling meaningful passages, words, or phrases in the data. It is a way to organize and categorize the data, making it easier to identify patterns and themes. In other words, a theme is a broad idea (or concept) that emerges from the data and is used to organize and make sense of the information (Boyatzis, 1998). Themes can include patterns, categories, or generalizations that capture the essence of what the participants are saying.

5.2 Participatory analysis

Participatory data analysis refers to a process in which individuals or groups actively engage in the analysis and interpretation of data, as opposed to having data analyzed and interpreted solely by experts or analysts (Reason and Bradbury, 2008). According to Clarke *et al.*, (2018) the participatory data analysis is appropriate when research involves people with dementia.

This approach emphasizes collaboration and the sharing of knowledge and expertise, and can be used in a variety of settings, including research, policy-making, and community-based projects. The goal of participatory data analysis is to ensure that data is analyzed and used in a way that is meaningful and relevant to the individuals or groups who are participating in the process. In a collaborative and participatory data analysis setting, coding can be done with the active participation of multiple individuals or groups, such as researchers, practitioners, and community members.

5.3 Data Analysis in two pilots

In a research study with two research pilots, the data collected from each pilot can be analyzed separately and compared to see if there are any differences or similarities between the results. This can help to validate the findings and increase the robustness of the research result (Coughlan and Coghlan, 2002).

Pilot #1: Felice Pullè nursing home

Therefore, in the first pilot project, a data coding process was adopted using thematic analysis, which, rather than taking a mechanistic approach of data reduction, means "taking the raw data and bringing it [to] a conceptual level" (Gummesson, 2017, p. 205). The coding technique was open coding, which involves reading the data and identifying concepts, ideas, or phrases relevant to the goals of the study (Holton, 2007). The key to analyzing Hiro's patient-caregiver interactions comes from the literature review, which is the multidimensional model of well-being namely: psychological, physical, and social well-being of patients with dementia, as described in Chapter 2. Involving multiple stakeholders, in this case caregivers, in the coding process allowed for a more inclusive and transparent analysis of the data. Finally, it allowed for the consideration of different perspectives and thus a more comprehensive understanding of the data. In essence, the interpretation of the data was aided and abetted by the caregivers, which allowed me to improve the quality of the results and not the data.

The data collected and interpreted from the first pilot research were used to inform the decision-making process and guide future actions. In detail, the data were first analyzed through a qualitative thematic analysis. Next, themes were identified to help make sense of the information collected. The next stage was reflection and dialogue with stakeholders (caregivers, psychologist, nursing home director, and research team) to understand the findings more deeply and share perspectives and experiences. Reflection and dialogue enabled

conclusions to be drawn and decisions to be planned and made to guide future actions in the second pilot. Data interpretation was a collaborative process involving multiple perspectives and experiences (Coghlan, 2011).

Pilot #2: Residenze del Sole nursing home

The results of the first pilot research were the starting point for the second one. I built on the analysis conducted in pilot 1 to improve subsequent observations. I used the knowledge gained in the first pilot to improve the quality of the study in this second one. This knowledge was new to me in two respects: a) new because it was less directly related to my research area-although it was a service area-and b) new in that it emerged from empirical evidence.

In particular, also in this case data collected were first analyzed through thematic analysis. The results of the observations and caregivers' interviews were classified and coded according to the multidimensional model of well-being (psychological, physical and social). The interpretation of the results of the data analysis and the conclusions drawn on the research question were then analyzed together with the caregivers, who shared and reflected on their personal perspectives on the results and shared their thoughts. In this way, participatory action research allows the caregivers' collective knowledge and experiences to inform the interpretation of the results, making them more relevant and meaningful.

6. Ethical Considerations

The project was approved by the Department of Economics, Management, Institutions of the University of Naples "Federico II", the City of Riccione in the case of the Felice Pullè nursing home, and the managers of the private nursing home Residenze del Sole. No patient was involved in this study without obtaining informed consent from family members. In fact, they could decide to leave the study without giving any reason and at any time. This never happened. Those in charge of the Riccione Municipality and the residence located in Cinisello Balsamo, as well as all caregivers (registered nurses, physicians, and care assistants) received written and verbal information about the study. Caregivers directly involved in the trial also gave written informed consent. All data were processed and stored ensuring confidentiality. In this thesis, participants do not have fictitious names but are simply referred to as "*caregiver No. 1*", "*patient No. 1*", "*psychologist No.1*" etc.

7. Relevance, rigor, integrity, narration and impact of this study

The latter section enunciates the five criteria by Holmuld *et al.*, (2020) - mentioned above in paragraph 1 - as applied to this thesis (Table 16). The authors have identified five characteristics that excellent qualitative service research must adhere to, especially when researchers investigate in critical service settings or conduct research with vulnerable actors. And that is why I decided to use the research of Holmluld *et al.*, (2020) to justify my methodological choices, as well as the description of the results, which will be presented in the next chapter.

The five features of excellent qualitative research Holmuld et al., (2020)	The five features applied to this thesis
Relevance i.e., *(i.e., why should we care about the topic and findings of the study?)*	**Theoretical meaningfulness of the topic** • Investigating human well-being and emerging technologies are service research priorities (Donthu et al., 2021; Ostrom et al., 2021); • The society's growing interest and investment in implementing robots in the healthcare ecosystem has attracted recent attention (Na et al., 2023); • Infusion from psychology, sociology and medical science. **Business significance of the topic** • Practitioners were involved in all phases of the project, from the first stage (planning) of the project. **Social value of the topic** • Cross-fertilization of the research (i.e., the research project was developed with a social enterprise and at a later stage two nursing homes).
Rigor *(i.e., how has the researcher made sure the study is solid?)*	**Credibility** • Theoretical constructs were applied to three dimension of well-being; • The action research (methodological strategy) fit with the study's purpose; • The time frame of the research covers more than 1 year. **Quality data** • Alignment of theoretical constructs to their illustrations (e.g., multidimensional well-being. See chapter 2); • This study employed action research little used in service research studies (Elg et al., 2020) and borrowed well-being theories from psychology, sociology and medical science (i.e. Kitwood, 1997 and Keyes and Waterman, 2003). **Sound data collection and data analysis processes** • I developed familiarity with the two contexts due to participant observations; • Triangulation of data through participant observations, semi-structured interviews with caregivers, visual and audio data.

	Study coherence • Alignment between the thesis's RQs, theoretical background, methodology, results, and implications.
Integrity *(i.e., how has the researcher handled ethical issues and preconceptions in the study?)*	**Ethical values** • The research project was approved by different institutions: a) University of Naples "Federico II", b) Cooperativa Sole and c) two nursing homes. The patients' family members, caregivers and managers of the two facilities signed an informed consent. See paragraph 6. Chapter 4 on Ethical Considerations.
Narration *(i.e., how is the story of the study and its findings told?)*	**Effective visuals** • Original illustrations (author's own elaboration) have been used to explain the overall presentation of the thesis (chapter 1), methodology (chapter 4), results and discussion (chapter 5) to ensure better understanding for the readers. **Compelling method elucidation** • Chapter 4 systematically describes the entire research process. A paragraph on ethical considerations has also been added.
Impact *(i.e., what can we do with the findings?)*	In this study, vulnerable patients affected by dementia, cognitive impairment, and behavioral disorders were selected and examined. Thus, an unusual context in service research has been selected (Holmuld et al., 2020). No study in service research has ever addressed multidimensional well-being of dementia patients interacting with a social robot. This thesis has a threefold contribution: theoretical, methodological and practical. See chapter 6.

Table 16: Relevance, rigor, integrity, narration and impact of this study. Source: Author's elaboration

Chapter 5

Social Robots to foster vulnerable actors' well-being

Presentation of results • Adopting service and social robots in healthcare service ecosystems • Fostering multidimensional well-being • Discussion • Modeling and assessing well-being • Implications • Further research

Chapter 5
Social Robots to foster vulnerable actors' well-being

1. Presentation of results

This first part of this chapter shows the main findings deriving from action-based studies. Section 2. "*Adopting social robots to foster vulnerable actors' well-being*" presents the results of two research pilots. Section 2.1 presents an overview of Hiro, a minimal design robot, designed and developed by the Japanese company VStone. The following (2.2 and 2.3) present the results of the observations at the two nursing homes. Excerpts from the caregivers' interviews are also reported. Three key moments are illustrated: a) the moment before interacting with the robot, i.e., how patients present themselves at different times of the day, the caregivers' load, and the general climate within the nursing homes; b) Interacting with Hiro, i.e., when patients - and even caregivers - interact with the robot. It is always the caregiver who initiates the interaction and introduces Hiro to the patient; c) Post interacting with Hiro, which is the moment after the interaction with the robot.

The objective of the comprehensive observations, conducted on three separate occasions, was to assess the overall impact of Hiro on patients, including determining whether a healing and positive effect takes place, and if so, whether it persists.

2. Adopting social robots to foster vulnerable actors' well-being

At first in the Felice Pullè, and then replicated for the Residenze Del Sole nursing home, the Hiro robot was implemented to foster vulnerable patients' well-being. In the following paragraph (2.1) Hiro-chan and its features are presented. Then, the results of the action studies related to the two pilots are shown (sections 2.2 and 2.3).

2.1 The Hiro robot

The first stage (planning) of this action-based study concerned the investigation of the robot. Hiro is a social robot and it is mainly intended for the elderly for its therapeutic effects. Hiro differs from the well-known humanoid robots and pet robots. It is a *"minimal design robot"* because it has an abstract representation of the body (Figure 19). It resembles a human child, with a distinguishable head, torso, and limbs, but no face. Due to cognitive and social-emotional decline, mental illness, and other factors, older people have difficulty integrating

information from various modalities. Therefore, presenting information in fewer modalities is probably more effective in making its meaning clear to older audiences. A less fragile and more affordable robot could also be built thanks to the *"minimal design"* method. As the developers of the technology explain:

"Although the limbs could have been removed, they were retained so that older adults could more intuitively understand the orientation and interaction position of the robot."

(Technology Provider No. 1)

To promote positive interactions, the robot's facial features were excluded, as the elderly tend to imagine the robot's expressions through communication. Hiro does not assume verbal communication and, therefore, even dementia patients who have difficulty speaking can continue to interact with it.

In sum, Hiro has no facial and emotional expressions or detailed body parts, but expresses emotions only through sounds, as follows:

"Since Hiro is designed for older people, instead of visual information, we enhanced human-likeness in the auditory information." (Technology provider No. 2)

"We improved human likeness in auditory information rather than visual information. We extracted 91 vocal patterns from a one-year-voice old's recording"

(Technology provider No. 1)

Hiro has been embedded with different types of babbling sounds (e.g., "ma ma ma" that convey slightly positive emotion and different patterns of laughter and crying. The goal is to create a positive emotional atmosphere to encourage better interaction between the robot and dementia patients. According to the technology providers, the minimal design was chosen because it is thought to stimulate patients' imaginations and encourage emotional interaction, as demonstrated in previous studies of Telenoid, another robot produced by Vstone (Sumioka et al., 2014). In other words, the robot vocalizes according to its emotional states, which respond to the elderly's actions, for instance it cries when left alone, calms down when cuddled, and laughs when picked up. In addition to the therapeutic effects common to nonpharmacological interventions such as multisensory therapy, HIRO also represents a low-cost solution that can be easily implemented within the two selected research settings. In fact, it costs only 50 euros, unlike other expensive robots on the market.

Fig. 19: Hiro-chan characteristics. Source: Vstone.com

2.2 Nursing Home #1: Felice Pullè

The observations covered three distinct and key moments, such as (1) pre (i.e., how the patient appears before the interaction with the robot), (2) during (i.e, caregivers-Hiro-patients and Hiro-patients interaction) and (3) post (i.e., how the patient appears after the interaction with the robot).

2.2.1 Pre-interacting with Hiro

The patients were arranged in a large room, and half of them were agitated and sad. The other half was calm and apathetic.

Some at times seemed overwhelmed, lost, and emotionally fragile. They all frequently experienced feelings of psychological disturbance, alternating between moments of agitation, euphoria, and sadness. The state of agitation was expressed through uncontrolled movements and emotions (for example, patients walked aimlessly in the ward, crying and moaning continuously). In many cases, patients appeared withdrawn, isolated and looked out of the windows. This was the case with patient No. 3, who often appeared aloof and isolated. She appeared fearful and afraid to perform any simple gesture, such as standing up or speaking, so she constantly sought consent from caregivers and others. Some patients with certified depression refused to participate in common activities such as interacting with others (social rejection) and showed frequent mood changes. Sadness, irritability, anger, or apathy occurred with some frequency. The observed feelings - before interaction with Hiro - varied from agitation, apathy, euphoria and ultimately even tranquility (Figure 20). In fact, sad and apathetic patients often showed calmness as well, the caregivers explained:

"There are times of the day when patients are partially calm, usually after breakfast and after lunch. However, at other times the situation degenerates. Sadness becomes anxiety and agitation. Anger becomes euphoria. The anger and nervousness of only one in 10 patients, unfortunately, affects and influences the mood of others." (Caregiver No. 2)

However, with the first appearance of Hiro, a complete novelty in their monotonous days, the situation changed considerably. As the caregivers report:

"Every day we experience complex situations. Some patients typically show a state of sadness, passivity and absence of emotion and joy. Others are euphoric and sometimes aggressive. However, when they saw Hiro for the first time they were all intrigued. Surely Hiro's presentation led to a decrease in their agitation and nervousness and aroused their enthusiasm and curiosity" (Caregiver No. 1).

Fig.20: Patients before interaction with Hiro. Source: pictures taken by the author

2.2.2 Interacting with Hiro

The caregivers, approaching the individual patient, asked, as follows:

"Can you take care of it?" "Can you hold it for a while? I'll be right back"

"They need me, would you mind taking care of him? (Caregivers 1-5)

Not all patients immediately took Hiro in their arms; some asked caregivers who Hiro was, and others, somewhat cognitively higher, asked if the robot was a baby doll. Some patients observed the robot in detail in the first few minutes. They looked at the onesie, the buttons, and touched the head. Other patients, however, talking to the caregivers, asked if it was possible to hold it or play with it on the table.

In general, all patients who interacted with Hiro for at least 5 minutes showed a **positive attitude.** Patients treated the robot as if it were a real baby, even though it had no facial

expression, by **stroking, singing, lifting, kissing, cuddling and cradling it**. On average, the interaction lasted from 5 to 50 minutes.

Patients who could communicate often talked to the robot, regardless of its condition, saying for example:

"It's so cute but it's very small." (Patient No. 9)

Patient No. 4, usually agitated and brusque with other patients, wondered what Hiro's name was and then remembered and talked about things related to herself and her life. Similarly, patient 7 began to tell about vacations spent at the beach with her two children and grandchildren. The caregivers were then asked if what they observed corresponded to reality, that is, if indeed the patient had two children. The answer was yes, but the patient's children are now 41 and 43 years old. Hiro reminded the patients of their past, **eliciting memories** of youth when their children or themselves were still young. On these occasions, the intervention of the caregivers was crucial. They knew the patients' history and could then intervene by asking personal questions, stimulating interaction and discussion. For example:

"What's your name? [..] Your name is Roby, like my daughter." (Patient No. 4) [..]

"Is she an only child?" (Caregiver No. 1)

"No, I also have a boy. After school, in the summer, we go to the beach, specifically to bathhouse 33, with my nephews and brothers. My sister, however, does not come, because she lives in Bolzano and cannot come the whole summer." (Patient No. 4)

In the case of patients who tended to be calmer and gentler, the interaction with Hiro lasted even longer than 45 minutes. For example, patients would walk around cuddling Hiro, put him to bed and mimic the act of putting him to sleep. In many cases, the interaction would be purposely interrupted by caregivers because it was time for a meal or personal hygiene.

"In many cases, they start by simply stroking, then they may sing a lullaby and put Hiro to bed. In this case the patients move from one place to another in the ward, often to the quietest part. Hiro helps us a lot in this regard, often under the guise of putting him to sleep we get the patients up and let them walk around a bit." (Caregiver No. 4)

"In addition, Hiro indirectly affects the health status of patients because, due to its healing effect, patients feel better, are less agitated and wander less between wards, which is a great achievement for all of us as wandering is extremely dangerous." (Caregiver No. 5)

The use of Hiro produced positive effects on interactions between patients and caregivers, as well as among the patients themselves. The robot's presence aroused the interest of other patients, who approached spontaneously, intrigued. With the help of the caregivers, the patients overcame their initial shyness and began to interact, telling imaginary stories and pretending to play with the two robots. In particular, patients No. 4 and patient No. 6 enjoyed telling stories about washing and dressing Hiro.

*"We often further encourage conversation between patients, facilitating the sharing of common memories and emotions. We believe it is possible to develop a **closer relationship** and reduce their loneliness." (Caregiver No. 2)*

On many occasions, the caregiver used the robot as a pretext for patients to interact on their own, while on others, group interaction occurred spontaneously, with one patient getting up and going to play with other curious patients (Figure 21).

Fig.21: Caregivers and patients. Source: pictures taken by the author

2.2.3 Post interacting with Hiro

Interactions with Hiro led to a change in the patients' emotional state from one of agitation and passivity to one of activity and calm. The activation also affected people who usually showed passive and apathetic behavior. The patients involved in the study thus showed an improvement in mood and calmness. After interaction with Hiro, the patients were calmer and more relaxed, as reflected in interviews with caregivers:

"Patient 6 is a patient with a challenging temperament and considerable dementia. Sometimes he gets agitated even with us operators. We did not expect him to be emotional during the interaction and to maintain a calm state even after the interaction." (Caregiver No. 1)

Furthermore, in the following days some patients asked the caregivers where Hiro was and when it would return. They remembered and asked for Hiro. Thus, it aroused positive emotions, and in addition, the time with which patients interacted with Hiro increased more and more over time, until it reached 50 minutes. Therefore, Hiro's beneficial effect is not a one-time one but is long-lasting. Patients with such vulnerabilities, unfortunately, tend to forget, so every day is a new day to interact and get excited with the robot. Post-interaction results vary from patient to patient and are likely to be influenced by multiple factors, including, for example, the level of cognitive impairment and individual character proclivities of the patients. It was observed that in cases of patients who tended to be calmer, the state of calmness continued (Figure 22). Some patients would request Hiro after administration and others would not leave it unless they were voluntarily withdrawn by the caregivers.

Fig.22: Patients post interaction with Hiro. Source: pictures taken by the author

2.2.4 Caregivers'point of view

The implementation of Hiro has also proven to be advantageous for caregivers. Its presence has been seen to improve the mood of patients, resulting in them becoming more relaxed and calm, in contrast to their previous state of anxiety and restlessness. This makes Hiro a valuable tool for caretakers to handle stressful situations and to soothe patients during high-stress moments. As one caregiver noted:

"With Hiro, patients tend to calm down almost immediately because they are so impressed with his appearance. Hiro resembles a child, and his vocalizations calm the patient. For example, patient No. 3, who is always complaining, often even crying and emitting painful vocalizations, calms down and falls silent while cuddling Hiro. This is obviously a benefit to us, because we don't have to waste time to get her to stop crying." (Caregiver No. 1)

The robot introduction helps also to establish a connection and a sense of familiarity between the actors involved, which is especially important for patients with cognitive impairments who may struggle to establish and maintain interpersonal relationships.

"Patient No. 5 is always silent. Hiro, on the other hand, awakened old memories for her, which she told Patient No. 2 with great surprise. The two patients are very similar character-wise; in fact, when we see them lonely and sad, we have them interact with the robot. We use Hiro as a person-centered intervention, based on analyzing the needs of the individual patient. Each administration for this gives value and uniqueness to each person with dementia." (Caregiver No. 2)

2.3 Nursing home #2: Residenze del Sole

As in the first pilot, the observations covered three distinct and key moments, such as (1) pre (2) during and (3) post. The level of cognitive impairment of patients in pilot project 2 is higher than that of patients in pilot project 1, some have motor difficulties, and 6 out of 11 are in wheelchairs.

2.3.1 Pre-interacting with Hiro

In this nursing home, patients are arranged in a large room and appear particularly apathetic. They alternate between quiet moments and times of agitation and nervousness. Some patients would get up and wander aimlessly around the wards. Patients with moderate-severe dementia often cry and complain. For example, patient No. 4 shakes and takes off her shoes once a day. She cries and moans continuously, emitting only whimpers and unintelligible noises. Her agitated state often unnerves the other inpatients as well. In sum, the situation is almost similar to that in Felice Pullè nursing home, as the caregiver explains:

"Some patients are very depressed, it's as if they are totally absent, so they show 'quiet'. Others are always very agitated, crying and complaining all the time. The problem arises when the nervousness of one also affects the others and it becomes difficult for us to manage them." (Caregiver No. 7)

Many patients often suffer from anxiety and loneliness, resulting in social isolation and difficulty communicating and interacting with others. Therefore, compared with the first

experience, the introduction of Hiro was proposed as a form of complementary therapy to help improve their well-being and also facilitate the work of caregivers.

2.3.2 Interacting with Hiro

One of the early benefits of interaction with Hiro was a **reduction in anxiety states**. In most administrations, patients had **attitudes of gentleness and affection**, and there were also positive repercussions on behavioral disorders related to depression. In the second pilot experiment, Hiro's administration always took place according to predetermined criteria, time and manners. Each caregiver was responsible for at least one patient. This helped to reduce anxiety states, as the patient not only focused attention on the robot, demonstrating attitudes of gentleness and affection, but this also had a positive effect on trust toward the caregiver, **limiting angry outbursts.**

"Patient No. 1 has an anxiety disorder, crying and complaining almost all day long. Especially in the afternoon when it's time to sleep. With Hiro, it is as if the patient concentrates on her breathing and enjoys the feeling of calm she feels. When she interacts with the robot, she stops shaking and doesn't complain anymore." (Caregiver No. 1).

Another positive aspect, accentuated in this second research context, is related to the **awakening of pleasant memories**. It was observed that patients, who were parents or had cared for a child in the past, immediately and repeatedly imitated the simple act of cradling and cuddling Hiro, often singing him a lullaby as explained by the caregiver:

"We believe Hiro brings back emotions and feelings related to a happy time in his life because patient No. 5 always tells about the time he used to pick up his son from school in Naples. He had never talked about this story before." (Caregiver No. 6)

A strength of Hiro compared with doll therapy, which had already been pioneered by the Residenze del Sole nursing home, was the **interaction facilitated by Hiro's vocalizations.** Hiro emits positive vocalizations that **calm the patient and relieve symptoms of agitation,** encouraging to not leave the robot and to continue playing. Patients often repeat Hiro's vocalizations and laugh as caregivers explain:

"We are surprised by the reaction of some patients who have refused doll therapy in the past. Hiro talks and thus positively stimulates patients, captures attention, and invites them to

smile, talk and sing. Seeing a patient go from a state of total apathy to smiling is a great achievement for us." (Caregiver No. 1)

In addition, Hiro became a diversion to **foster relationships** with other patients or caregivers, also reducing apathy and **stimulating involvement in social activities, reducing loneliness** and depressive states. As stated by caregivers:

"Patient 5 played a lot with patient 4. They shared some challenging character traits but did not always get along. We administered it at the same time while they were quite nervous. They calmed down and their mood improved as well." (Caregiver No. 7)

"I encouraged patients 3 and 5 to interact with their Hiros. They both started chatting, sharing their names, personalities and interests. They also told episodes about their children. It's impressive because this has never happened" (Caregiver No. 1)

Caregivers also administered Hiro to groups of multiple patients (e.g., No. 3 patients sitting at the same table). Hiro multiple administrations averaged 30 minutes. The patients continued to play and cuddle Hiro, **telling stories and interacting with each other** (Figure 23). Caregivers also stepped in to stimulate discussion and offer new insights, such as "*Is Hiro okay?*". In sum, Hiro can become a kind of "intermediary" in relationships with other patients or caregivers, stimulating the person to participate in social activities (e.g., snacking at the table with other people, coloring drawings) by reducing episodes of anxiety or stress. However, according to the operators:

"It is necessary to create a break, or an interruption, because the stimulus can turn from pleasant to anxiogenic or even symbiotic." (Caregiver No. 2)

This was the case for patient 4 with severe dementia, who cried when Hiro was taken away from her. The interruption consisted of removing Hiro from the patient's sight, always in a kind and sincere way. For example, the caregiver would say, "*Hiro needs to sleep*" or "*I need to change its clothes.*"

In general, it was observed that interaction with Hiro resulted in reduced agitation and **improved temperament** and, in some cases, even **reduced wandering**. Handling Hiro and caring for him reduced some behavioral disorders such as so-called **wandering**. By holding Hiro in their arms, caregivers can capture the attention of wandering patients, first of all by accompanying them from one room to another without particular agitation and, most

importantly, by making them safe from falls and unforeseen events. From a physical point of view, for those patients for whom it is possible - many are in wheelchairs - Hiro provides an excuse to **make small daily movements.**

"I believe that Hiro can have positive effects on physical activity in the elderly, but in an indirect way. For example, if patients suffering from depression or anxiety start to feel better emotionally, they are likely to have more energy and motivation to participate in daily activities, including motor activities. This is critical to prevent complications such as loss of mobility and frailty." (Caregiver No. 9)

"Before, it was difficult to make an elderly patient walk, but with Hiro this happens naturally. Hiro stimulates patients. The patient gets pleasure from it and is motivated to do it." [...] Of course the robot is not a one-size-fits-all solution for mobility or physical problems, but it is a valuable tool to entice small - but large - daily movements" (Caregiver No. 1)

For wheelchair patients, but not limited to, Hiro also improved the sleep-wake phase. In fact, under the guise of putting Hiro to sleep, caregivers invite patients to go to rest.

"It's hard to look after a child, I'll take care of it while you relax. I'll give it back to you as soon as you've rested." (Caregiver No.1)

Fig.23: Hiro and patients. Source: pictures taken by the author

2.3.3 Post interacting with Hiro

The effectiveness of interaction with Hiro for dementia patients varies depending on many factors, such as the severity of the disease, the patient's personality, and the caregiver's individual approach. However, in general, it has been observed that after the interaction, patients are calmer and sometimes respond to caregiver requests (e.g., going to bed, having a snack, getting up for hygiene) with less effort.

"At first, the patients seemed quite calm to us after interaction with Hiro. Instead, as the days passed, we noticed that the robot has a healing effect in terms of generalized anxiety

episodes. When patients are calm, we caregivers can perform tasks more quickly, even if only

for a few but precious minutes." (Caregiver No.5)

2.3.4 Caregivers' point of view

As happened in Felice Pullè nursing home, the introduction of Hiro can also be beneficial for caregivers. It caused a change in the patients' mood (Figure 24). Most of them, as a result of Hiro, have become calmer and more relaxed compared to their previous state of anxiety and agitation. Thus, Hiro helps caregivers handle nervous situations and can be used to calm patients in times of high stress.

"Patients often get up and wander around on their own, which is very dangerous because

they may fall and hurt themselves. They are fragile subjects and the risk is high. Hiro helps

us keep them busy, and keeping them busy, seeing them busy cuddling Hiro is a good thing

for both of us." (Caregiver No.4)

Hiro can also help establish a **sense of connection and familiarity** between patient and caregiver, which is particularly important for patients with dementia or other cognitive disorders who may have difficulty establishing and maintaining interpersonal relationships.

"It has helped us create a bond with the patients. In addition, the relationship has improved

since we use Hiro as the patients' daily task. Patients have the task of cuddling and caring for

Hiro. In this way, patients feel better because it is as if they have the role of caring for Hiro.

*In short, **they are occupied, busy doing something**. We benefit because the patient is calmer*

and therefore easier to manage." (Caregiver No.2)

Fig.24: Hiro and patients. Source: pictures taken by the author

3. Discussion

This research considers how the introduction of social robots could improve the well-being of patients with vulnerability (i.e., dementia patients) in healthcare service ecosystems.

Vulnerability is a common and anticipated occurrence in healthcare ecosystems due to the convergence of persistent illnesses, treatments with enduring impacts, or inherent limitations (Mele *et al.*, 2022a). Patients suffering from vulnerability cannot always act alone, and other actors (i.e., formal and informal caregivers) must serve them to enhance their well-being (Virleè *et al.*, 2020).

Specifically, individuals with dementia are heterogeneous, with a broad spectrum of clinical profiles, requirements, skills, and impairments. Nevertheless, the observations and interviews carried out yielded valuable insights into person-centered care approaches, posing significant questions for future research and practice.

In this thesis, well-being is viewed as a construct composed of multiple dimensions that are related to the mental and physical health of the individual and the interactions between the individual and the social environment (Kitwood, 1997). The results suggest that the introduction of Hiro affects patients' well-being at three levels: (psychological, physical and social), thus adhering to the definition of multidimensional well-being (Keyes and Waterman, 2003; Kelley-Gillespie, 2009). The three levels are not mutually exclusive, but rather interconnected (Figure 25).
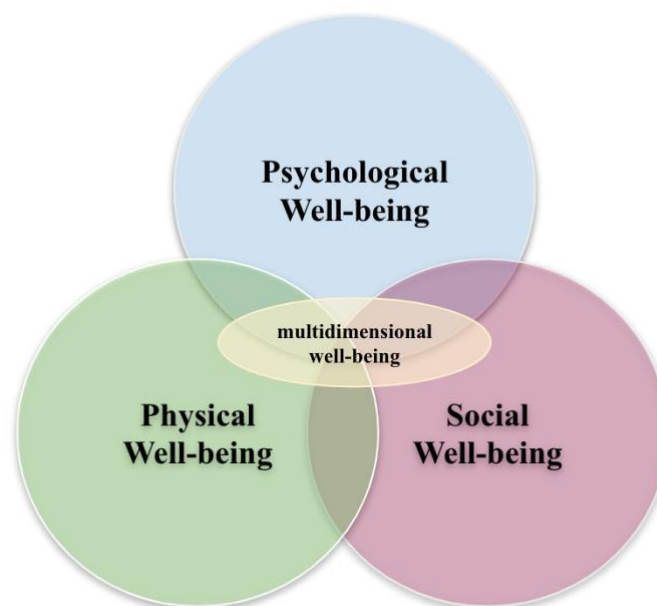

Fig. 25: Multidimensional well-being. Source: Author's elaboration

3.1 Fostering a multidimensional well-being

All patients involved in the two research contexts reacted positively to Hiro's administration mainly by talking and smiling. All participants had at least 3 more than positive outcome administrations in which they mainly demonstrated attitudes of attachment, caregiving and beneficial interaction with caregivers and other patients. The observations and the interviews showed that patients, before interacting with Hiro, presented as passive actors lacking any emotion. Interacting with Hiro, patients became active participants, laughing and getting excited resulting in a **reduction of state of apathy, agitation and nervousness** and acting **attachment behaviors**. Patients demonstrated these behaviors in several ways, including physical contact, e.g., they held the robot in their arms most of the time, stroking its head or cuddling it. They treated Hiro as if it was a real baby, rocking it, asking if it was hungry and singing to it. Many patients, on the other hand, enacted protective behaviors, such as covering the robot with a blanket or making sure it was safe. Furthermore, **Hiro triggered memories and positive thoughts**. Patients talked about memories related to their children or other loved ones and **recalled past experiences** while interacting with the caregiver and Hiro. The observed behaviors provided insight into the **positive emotional state** of the patients and **built a relationship between the patients and the caregivers.** Ultimately, Hiro fosters **patients' psychological and emotional well-being** and helps them feel more comfortable. In fact, the main and most common reaction in both contexts was to reduce stress and anxiety.

Observations and interviews with caregivers revealed that interaction with Hiro also affects **physical well-being**. On the one hand, interaction with Hiro affects the patient's health status because it nudges patients to engage in daily exercise activities, contributing, albeit minimally, to the **maintenance of their health status**. Indeed, although the robot has a minimal design and does not directly induce exercise through vocalizations, it has been noted that caring for the robot prompts the patient to make small movements, stand up, and **stimulate the use of senses** (e.g., vocalizations stimulate the patient by capturing his attention). Through small daily movements, Hiro enables them to protect, prevent, and even **promote better health.** On the other hand, as anticipated above, interaction with Hiro has a soothing effect on the patient, thus indirectly impacting the entire health status. During the participant observation, one thing that astonished the researchers was the continuous wandering of the patients in the first research setting.

Observations and interviews showed that the introduction of Hiro enabled joint interaction among patients, creating positive and supportive social networks in terms of improving the quality and quantity of relationships. This finding was confirmed by the video and images analyzed later. Hiro brought together people who were unlikely to socialize. Patients, by sharing the excitement and joy of playing with the robot, also **improved interpersonal relationships.** Hiro's presence served as a starting point for conversation and interaction among the patients, also encouraging the **sharing of common emotions and memories,** especially during leisure activities. In this way, the robot was a factor of curiosity and subsequent aggregation. Patients, intrigued, approached other patients, took their seats and often started conversations on their own, also without the intervention of caregivers. Therefore, the robot impacted on patients'**social well-being**, by helping to create a **sense of community** and **reduce loneliness and isolation.**

3.2 Assessing multidimensional well-being

In this study, well-being is considered as a construct composed of multiple dimensions that are related to the psycho-physical health of the individual and to the interactions between the individual and the social environment (Kitwood, 1997; Keyes and Waterman, 2003). As discussed in Chapter 2, the well-being of vulnerable actors can be evaluated using various techniques such as clinical assessments, questionnaires, observation, and caregivers feedback. This study utilized observation and caregivers feedback to assess patients' well-being concerning their interaction with Hiro. Observation involves observing the patient's behavior and interaction with their environment and others, while caregivers feedback involves information on the patient's health status, social relationships and mood (anxiety, stress, wandering etc). It is important to note that well-being is a dynamic measure and should be tailored to each individual patient's needs and circumstances. Table 17 presents the indicators as assessable measures of patients' well-being obtained during and after interaction with the robot. All indicators are the result of the joint action and analysis of researchers and healthcare providers. Indicators of well-being in this context include different aspects e.g., reduction in anxiety and depression, improvement in interpersonal relationships, improvement in daily motor activities, and reduction in problem behaviors. Evaluation of these indicators was important to identify any changes or improvements in the quality of life of the patients.

Well-being dimensions	Indicators/ Feelings associated to

Psychological well-being	• positive affect (e.g. pleasure, enjoyment, contentment) • activation of memories and positive thoughts • reduction of state of apathy • reduction of agitation • reduction of nervousness • reduction of anxiety • reduction of depressive states • reduction of angry outbursts
Physical well-being	• realization of daily motor activities • reduction of wandering • stimulation of senses • reduction of anxiety and stress which influence the sleep-wake quality
Social well-being	• positive interaction with others • socialization, psychosocial support, emotional support/reassurance for and from others • development of a sense of connection and community • opportunity for fun, enjoyment, and creativity into daily activities/leisure • enhancement in relationships with caregivers • enhancement of social confidence • reduction of loneliness

Table 17: Indicators of well-being. Source: Author's elaboration

3.3 Integrative framework

Based on these findings, this study delineates an integrative framework (Figure 26) incorporating multiple theories to formulate a comprehensive and coherent understanding of the phenomenon. The goal is to provide an overview that takes into account the different perspectives and integrates their strengths to get a more complete and comprehensive picture of how social robots can foster vulnerable actors' well-being.
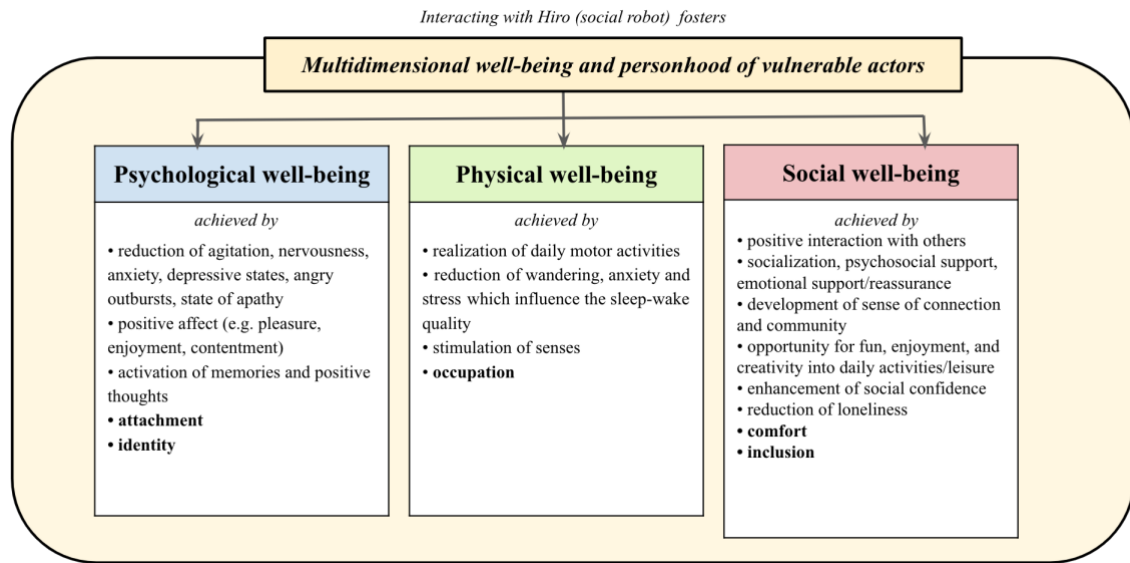
Multidimensional well-being and personhood of vulnerable actors

Psychological well-being	**Physical well-being**	**Social well-being**
achieved by • reduction of agitation, nervousness, anxiety, depressive states, angry outbursts, state of apathy • positive affect (e.g. pleasure, enjoyment, contentment) • activation of memories and positive thoughts • **attachment** • **identity**	*achieved by* • realization of daily motor activities • reduction of wandering, anxiety and stress which influence the sleep-wake quality • stimulation of senses • **occupation**	*achieved by* • positive interaction with others • socialization, psychosocial support, emotional support/reassurance • development of sense of connection and community • opportunity for fun, enjoyment, and creativity into daily activities/leisure • enhancement of social confidence • reduction of loneliness • **comfort** • **inclusion**

Fig. 26: How interacting with Hiro fosters well-being. Source: Author's elaboration.

In detail, action studies in two research pilots show that the introduction of Hiro, as a social robot, promotes patients' multidimensional well-being (Keyes and Waterman, 2003) by reducing their vulnerabilities. This approach has synergies with Kitwood's (1997) fundamental conceptualization of well-being and personhood in dementia (Clarke *et al.*, 2020). In this regard, on the one hand, interaction with Hiro promotes the patient's multidimensional well-being (Keyes and Waterman, 2003). On the other hand, it also satisfies the five needs of *comfort, identity, inclusion, attachment, and occupation,* which enable **personhood** and ***well-being*** to be achieved. In other words, when met, Kitwood's (1997) five basic psychosocial needs contribute to the overall well-being of the vulnerable individuals examined, both psychologically (emotionally), physically, and socially, with the main aim of reducing vulnerabilities. Therefore, they are identified as indicators of well-being (Fig. 12). In addition, each component contributes to promoting multiple dimensions. For example, *inclusion* contributes to both psychological and social well-being, because on the one hand, it is about creating meaningful relationships, and on the other hand it is about providing positive feelings, comfort, and safety to the patient.

Specifically, *comfort* refers to the provision of closeness and relief; it promotes safety and reduces anxiety (Kitwood, 1997). Thus, it is not only the absence of pain or physical problems but also includes emotional support and the expression of positive feelings. Thus, comfort is a combination of psychological, social, and, to some extent, physical factors that affect well-being. Hiro contributes to comfort because it is presented as a simple, lightweight robot that is easy to interact with. Because of its healing effects, it is a reassuring robot that has helped

reduce episodes of anxiety, agitation, and stress. In this way, Hiro has contributed to the psychological and emotional well-being of vulnerable patients. *Identity* is a sense of continuity between the person one has been in the past and the person over time. According to Kitwood (1997), identity is seen as an evolving creation, shaped by significant life interactions and events. Social robots can therefore play a role in connecting people with their past memories, and fostering positive relationships with caregivers and other patients. By stimulating memory, senses, and emotional thinking, social robots can help bring back important memories and relationships, helping to bring a sense of coherence and stability to a person's sense of self. *Inclusion* is about recognizing that the person is part of the group and is welcomed into the community despite vulnerabilities. Data from interviews with caregivers indicate that Hiro helped build relationships among patients and strengthen their relationships with caregivers, nurses, psychologists, and physicians. The audio and video data also revealed more peaceful interaction among patients. Indeed, at least one caregiver was always involved in the interactions and conversations, so the introduction of technology largely promoted social interactions, involving not only the patient-patient but also the entire caregivers' network. Therefore, inclusion and identity are both indicators of psychological and social well-being. *Occupation* refers to the activities, tasks, and roles that make up a person's daily life and how they give meaning and purpose to their experiences. In the care of people with dementia, occupation is considered a fundamental aspect of a patient's well-being and includes both structured activities (e.g., recreational activities) and unstructured activities (e.g., daily tasks and routines) and provides vulnerable patients with a means of maintaining the identity and connecting with others (Kitwood, 1997). Allowing emotional expression and facilitating social connection helps support the need for occupation (Belanche *et al.*, 2020). In line with studies on social robotics (e.g., Rasouli *et al*., 2022), Hiro has served as a means to facilitate social exchanges and keep patients occupied, fostering both physical and social well-being. For example, taking care of Hiro involved small but significant daily movements that helped maintain the patients' physical health as well as patients also avoided wandering between wards and appeared more relaxed. As a result, also a significant reduction in psychological stress was observed. The robot was a useful tool for caregivers to create socially supportive relationships. Participating patients were not passive recipients of the robotic therapy, but active agents who used their feelings and senses to create a positive social experience. For many patients involved in the two pilot projects, actions such as cuddling, cradling and playing *(attachment)* with Hiro represented a task, an activity, or a daily routine. In sum, according to the caregivers, the

patients benefited greatly, both **physically, socially, and psychologically**, from interacting with the robot.

In summary, introducing a minimally designed social robot into such contexts can function as a therapeutic interaction that can help reduce many negative episodes such as anxiety, agitation, stress, and wandering. The social robot thus provides an opportunity to manage negative emotions and foster positive ones. Hiro also encourages interaction with others, whether patients or caregivers, reducing patients' loneliness and isolation and increasing social interaction and a sense of belonging. The benefits found in patients also trickle down to caregivers. When patients, even the most difficult ones, are engaged with the robot, caregivers are more likely to work calmly and focus on other tasks. In addition, the atmosphere in nursing homes can often be overwhelming due to managing patients' vulnerabilities, but Hiro's presence helps to create a calmer, more relaxed environment. This results in caregivers being less stressed and interacting more easily with patients, reducing the likelihood of anger, euphoria, and nervousness. In conclusion, the integration of social robots into such healthcare environments has been shown to have a significant impact on the well-being of vulnerable patients, providing them with comfort, companionship, and stimulation of senses, while reducing feelings of loneliness and anxiety. Additionally, social robots can also benefit caregivers by reducing their workload and improving their interactions with patients, leading to a more positive work environment. As such, social robots represent a promising innovation for enhancing the overall quality of life for both patients and caregivers in healthcare settings.

4. Implications

4.1 Implications for scholars

This thesis advances understanding of the role of social robots in promoting the well-being of vulnerable actors in healthcare, both in the context of service research in general and specifically in the field of Transformative Service Research (TSR). It expands upon previous work on social robotics and well-being (Henkel *et al.,* 2020), and vulnerable populations (Blocker and Barrios, 2005; Sharma *et al.*, 2017; Mele *et al.*, 2022a). The study also seeks to serve vulnerable actors in service research, according to Rosenbaum *et al.* (2017). Additionally, it provides a multidimensional view of well-being by drawing heavily from studies in psychology, sociology and medical science (Keyes and Waterman, 2003; Kitwood, 1997).

Rosenbaum and Russell-Bennet (2021) recently encouraged scholars to study the impact of service technologies and human well-being. This action study indicates that social robots can foster vulnerable actors' psychological (emotional), physical and social well-being. In detail, this thesis offers three main contributions on extant literature.

First, this thesis contributes to the emerging literature on service technologies and human well-being in service research (Rosenbaum and Russell-Bennet, 2021; Anderson and Xue, 2022; Mele *et al*., 2022a). The study proposes that the integration of social robots presents a unique chance to enhance the quality of life for vulnerable patients (Blaurock et al., 2022), while also alleviating the negative effects of "*ill-being"* on caregivers. This, in turn, has the potential to lead to improved service provision by caregivers (McColl Kennedy *et al*., 2020).

Through this research, a contribution was made to the literature on vulnerable people and the role services play to ensure their participation, inclusion, and well-being (Finsterwalder et al., 2021). In line with Kabadayi *et al.*, (2020) this research suggests that well-being assists in bettering people's lives in terms of individuals (e.g. patients, caregivers), service organizations (e.g., nursing homes), and industries (e.g. healthcare sector).

Third, the present study sheds light on a comprehensive set of indicators for well-being that are associated with interaction with social robots. Despite the importance of well-being assessments in the realm of service studies, a scarcity of research in this field remains a concern (Mele *et al.,* 2022a). Hence, it becomes imperative for service research to actively pursue ways to augment well-being through effective utilization, assessment, and modeling of available data. The incorporation of specific measures for well-being in assessments can be of immense help for caregivers in charting progress towards healthcare and well-being goals, as well as in planning and evaluation. Additionally, it is worth noting that the concept of well-being is much more nuanced and complex than current literature suggests, with a complex interplay between well-being and vulnerability. Thus, it may be necessary to define novel technology-driven indicators for well-being to gain a more accurate understanding of psychological (emotional), physical, and social well-being, and to achieve more precise measurements. Moreover, this perspective could also inform the development of new indicators and metrics to measure well-being in the context of transformative robotic services (Anderson and Xue, 2022). These findings have the potential to guide future research and provide valuable insights for scholars interested in exploring the impact of social robots on the well-being of vulnerable actors.

4.2 Implications for practitioners

Social robots represent the new frontier of service and assistive technologies and are capable of addressing challenges affecting the well-being of vulnerable actors.

Firstly, this study helps service and social robotics researchers, nursing home managers, and caregivers improve the patients' well-being through an understanding of the role social robots play in healthcare services. In sum, this research promotes efforts to improve and increase well-being by reducing vulnerabilities through interaction with a social robot. To achieve this goal, according to Mele *et al.*, (2022a) caregivers must combine high-tech and high-touch elements in service provision, incorporating cutting-edge technology as a valuable tool in their daily activities. Secondly, to ensure the effective and efficient use of technology, practitioners should have a comprehensive understanding of the context, capabilities, and limitations of the technology itself. This can be achieved through clear and collaborative communication that helps dispel potential biases that may result from resistance to change in professional practices. It is critical to promote awareness among practitioners to overcome these obstacles. Social robots can increase the efficiency, accuracy, and safety of healthcare and caregiving activities as well as improve the patient experience and overall well-being. To meet these expectations, it is recommended that managers gradually recreate daily social activities in nursing homes, using social robots to mitigate stressful episodes, reduce workload (e.g., by keeping patients occupied), and thus improve care capacity. However, transitioning to the use of robots requires a significant investment in awareness, communication, time, and, in most cases, money and may require reorganization of staff and training in the use of new technologies. The success of this study hinged on collaborating closely with the caregivers to guarantee the safety of patients, ensure they had the right conditions to participate in the study, and make the entire experience positive, with a focus on the patient's well-being.

5. Limitations and Further Research

While the research project makes a valuable contribution to research dialogues on how social robots impact the multidimensional well-being of vulnerable actors, the study also suffers from several limitations. The narrow scope of the research, which involved only two nursing homes, limits its generalizability and requires expansion of the framework (i.e., social robots to foster multidimensional well-being) to other settings. With a sample size of only 21 patients, I suggest future researchers increase the unit of analysis. Using action research as the chosen methodology provides a unique perspective but may limit the depth of information obtained. Indeed, action research was conducted in a specific context (i.e., the nursing homes) and with a specific group of participants (i.e., vulnerable actors and their caregivers), which may limit

the ability to generalize the findings to other contexts or actors. To address these limitations, a more longitudinal design could be implemented to better understand the effects of social robot adoption beyond the promising initial results. Alternatively, a comparative approach could be used to examine cases where well-being outcomes are different (e.g., other dimensions) or less positive. Therefore, I encourage scholars to provide further empirical evidence with different methodologies (both qualitative and qualitative) and interdisciplinary approaches. Each discipline has a unique perspective. Therefore, interdisciplinarity allows scholars to combine different techniques and perspectives to gain a more complete and in-depth understanding of the problems they are addressing.

Furthermore, this study concentrated on evaluating the effect of a minimal design robot (Hiro), which lacked facial features but had vocalizations similar to a baby. Future research could examine the impact of social robots on human well-being by exploring different morphologies of robots. This could include studying physical dimensions, colors, and the shapes of body parts, to understand the effect they have on human perception and comfort. The effectiveness of communication and the ability of robots to establish positive relationships with users could also be investigated. In addition, the effect of morphology on risk perception and safety is an important area of study. Finally, the research could explore how to design the morphology of social robots to support vulnerable people, such as vulnerable patients or the elderly, to ensure an optimal and safe experience.

Future research could be conducted to evaluate the effectiveness of social robots in interacting with vulnerable actors, especially concerning issues such as quality of care, patient satisfaction, and reduction in caregiver burden. Research could also be conducted to identify possible barriers to the adoption of social robots in healthcare service ecosystems and to develop solutions that could overcome these barriers. In addition, it would be important to explore how social robots can be integrated within the context of the healthcare service ecosystem to provide more comprehensive and coordinated support to both vulnerable patients and formal and informal caregivers (e.g., families). An interesting and promising area of research concerns the use of social robots for home care and the effects they could have not only on patients but on the entire care community. Finally, it would be useful to examine the long-term impact of social robots on the overall health status and well-being of vulnerable patients. A burgeoning area that future research could focus on is the ethical, legal, and social implications of the use of social robots in health care, including privacy and security issues and the impact on healthcare providers and patients. The potential for social robots to improve the well-being and healthcare service ecosystem is vast, and future research could play a crucial role in realizing this

potential. By exploring the impact of social robots on patients and caregivers and the ethical, legal, and social implications of their use, researchers can help shape the future of healthcare and improve the well-being of vulnerable actors. Other research opportunities might pursue further explorations of well-being indicators to further refine and validate them in different contexts. Research should seek to understand the relationship between different indicators and how they interact to influence overall well-being outcomes. In particular, there is a need for research to examine the effectiveness of using social robots as a tool to support well-being, especially in vulnerable populations. This may involve exploring the impact of social robots on various aspects of well-being, for example, emotional regulation, anxiety reduction, and social connections.

Scholars would conduct a similar study with a focus on caregivers, in terms of reducing the psychological, emotional, and financial burden a person may experience when caring for a vulnerable person. In other words, investigate how social robots reduce the so-called *caregivers burden*, which can involve a number of stressors, such as physical fatigue, emotional stress, financial concerns, and impact on work and private life. These stressors can have a negative impact on caregiver well-being and can also affect the patient's quality of life.

In sum, the impact of social robots as a service technology on human well-being is a topic that has yet to be extensively explored in the field of service research and beyond. The efficiency of their implementation and the long-term effects on the well-being, and psychological (emotional), physical, and social health of vulnerable actors remain unexplored. This presents a substantial opportunity for scholars, researchers, and managers to address these issues.

Table 18 provides several suggested research questions.

Topics	Future research questions
Social robots and well-being for vulnerable actors	• What are the possible social and cultural implications of widespread use of social robot technologies for well-being? • How can social robots integrate with other forms of therapy or treatment for vulnerable actors? • Is there a standard methodology for using social robots with vulnerable actors, especially older people with dementia? • What are the ethical implications of using social robots for individual well-being? • What are the consequences of caregivers from the perspective of healthcare service provision?

	• What are the well-being outcomes of informal caregivers (i.e., family members)? • What are the bright and dark sides of adopting social robots in nursing homes? • What are the unintended consequences of social robots in reducing vulnerabilities?
Indicators of well-being	• What are the cultural factors that influence psychological, physical, and social well-being and how can they be taken into account in assessment? • How is well-being assessed in vulnerable individuals and what are the challenges associated? • What are the differences in well-being indicators between men and women and how can these differences be explained? • What are the indicators of well-being for caregivers following the introduction of social robots into daily (work) activities?
Social robots morphology and vulnerable actors	• How does the physical design of social robots affect their perceived acceptability among vulnerable actors? • What are the relationships between the dimensions and shapes of social robots and the emotional responses of vulnerable actors? • What is the impact of the color, shape, and texture of social robots on the human perception of ill-being reduction? • Can the morphology of social robots be designed to establish positive relationships with vulnerable actors? • How can the morphology of social robots be optimized to meet the needs of specific vulnerable populations in healthcare service ecosystems?
Social robots and caregivers	• How do social robots in nursing homes help caregivers manage relationships with patients? • Where should healthcare organizations use robots to replace or collaborate with caregivers?

Table 18: Future research questions. Source: Author's elaboration

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