



Autonomy in Residential Care: Using TEAMWORK and the Deep Dive to Facilitate Interdisciplinary Collaboration

Yixuan Zhang^{1,2(✉)}, Rachel Pozzar², Xing Zhou³, Miso Kim⁴,
Paul W. Fombelle⁵, and Valeria A. Ramdin²

¹ College of Computer and Information Science, Northeastern University,
Boston, USA

zhang.yixua@husky.neu.edu

² Bouvé College of Health Sciences, Northeastern University, Boston, USA
pozzar.r@husky.neu.edu,

{v.ramdin, r.ramdin}@northeastern.edu

³ Beijing Technology and Business University, Beijing, China
zhoux@th.btbu.edu.cn

⁴ College of Arts, Media and Design, Northeastern University, Boston, USA
m.kim@northeastern.edu

⁵ D'Amore-McKim College of Business, Northeastern University, Boston, USA
p.fombelle@northeastern.edu

Abstract. Residential care communities provide services that allow individuals with chronic health conditions to live independently, yet the transition from the home environment to a residential care community may be associated with loss of autonomy. Services that aim to promote autonomy in the residential care setting have the potential to improve quality of life, yet the needs of individuals with chronic health conditions are complex and best understood from an interdisciplinary perspective. Although interdisciplinary research has been increasingly applied in design practice and academia, it is associated with unique challenges such as divergent terminology, differing theoretical frameworks, and varying criteria to evaluate success across disciplines. In this paper, we describe strategies to draw knowledge from a variety of disciplines, using our team's efforts to frame the problem of autonomy among individuals with chronic health conditions who live in residential care settings as a case study.

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Keywords: Personal autonomy · Assisted living facilities
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1 Introduction

In the United States, there is a growing proportion of older adults living with one or more chronic health conditions [1]. Individuals with a chronic health condition may require assistance managing their condition in the home environment and may experience functional limitations requiring assistance with activities of daily living [2]. Residential care communities such as assisted living facilities provide services that

allow individuals with care needs to continue to live independently, yet the transition from the home environment to a residential care community may be associated with loss of autonomy [3].

Given that reduced autonomy among older adults is associated with negative health outcomes and decreased quality of life [4], services designed to promote independent living among individuals with a chronic health condition ought to incorporate features to preserve and promote consumer autonomy. The optimal design of complex personal health services such as these demands collaboration between multiple disciplines, including service design, personal health informatics, and the health sciences. Stickdorn and Schneider described “service design thinking” as a mode of interdisciplinary thinking that integrates the perspectives of different disciplines [5]. However, interdisciplinary research collaboration presents unique challenges, including divergent terminology, theoretical frameworks, and methods of inquiry [6].

Choi and Pak described eight strategies to enhance interdisciplinary collaboration, represented by the acronym TEAMWORK, which stands for team, enthusiasm, accessibility, motivation, workplace, objectives, role, and kinship [7]. In addition, Witteman and Stahl [8] advocated the use of a five-step ‘deep dive’ [9] to enhance interdisciplinary collaboration. The deep dive entails (1) conduct of secondary research to identify gaps in current knowledge and understand the scope of the problem; (2) conduct of primary research to observe current practices and ascertain users’ perspectives; (3) visualization of proposed designs; (4) development and testing of prototypes; and (5) implementation of the newly designed service [8].

Despite the existence of frameworks meant to facilitate interdisciplinary collaboration [7], reports describing interdisciplinary research collaborations are limited [10]. Thus, in this paper, we describe the strategies proposed by Choi and Pak [7] and Witteman and Stahl [8] as they relate to our experiences assembling and working as an interdisciplinary team.

2 Strategies to Facilitate Interdisciplinary Research: A Case Study

The purpose of our research project was to generate a conceptual model of autonomy in the residential care setting that would inform the development of a service prototype dedicated to promoting autonomy among elders living in residential care facilities. In the following section, we relate our experiences assembling a team of researchers from the fields of service design, nursing, marketing, and computer science in the context of the TEAMWORK framework proposed by Choi and Pak [7]. In the subsequent section, we describe the strategies we employed to integrate knowledge from the design, human factors, and nursing literature to identify and frame the problem of autonomy among individuals with chronic illness who reside in a residential care facility.

2.1 TEAMWORK: Assembling a Team

Team. The first strategy of the TEAMWORK framework [7] is to select one or more team leaders with enough familiarity with the involved disciplines to recognize the expertise required by the team. Team leaders need to have the interpersonal and communication skills necessary to share their vision for the project, recruit team members, and facilitate collaboration. The team members themselves need to be mature and flexible, and they must agree that the research question under study is best examined from the perspective of multiple disciplines.

Our project was first envisioned by an assistant professor in our university's College of Arts, Media, and Design (MK). Recognizing the ways in which the project would benefit from an interdisciplinary perspective, this individual first met with the Dean of the School of Nursing and a tenured professor in the School of Business, each of whom agreed to advise the team throughout the duration of the project. In collaboration with these advisors, the assistant professor recruited team members from relevant disciplines who expressed interest in the project and possessed the expertise necessary to make a unique contribution to the team. First, the assistant professor from the College of Arts, Media, and Design formed a partnership with an assistant professor from the School of Nursing as a co-principal investigator, thus establishing an interdisciplinary leadership team. The leadership team then recruited an interdisciplinary team of students that includes one PhD candidate from the School of Nursing; one PhD student from a joint program of the College of Computer and Information Science and the Bouvé College of Health Sciences; one visiting scholar who is a Ph.D. candidate from the school of Design at Tongji University in China; and one senior undergraduate Experience Design student from the College of Arts, Media and Design. Each of the involved disciplines contributes a unique perspective to the understanding of autonomy among elders living with a chronic illness; the team is attuned not only to the health issues that may affect the autonomy of elders, but also to the environmental and systemic factors that affect autonomy and may comprise suitable targets for intervention.

Enthusiasm. Following the recruitment and selection of team members, the next step within the TEAMWORK framework is to foster in team members a personal commitment to the project. In particular, Choi and Pak [7] observed that personal commitment is enhanced when the research topic under study is of interest to the team members and when the success of the project can assist team members in meeting their career goals. Our interdisciplinary team is comprised primarily of early career investigators for whom participation in this project represents an opportunity to benefit from the guidance of senior faculty while also gaining research experience. In addition, the topic under study is relevant to each team member's individual research interests. Autonomy is a phenomenon of interest to designers, nurses, and marketing professionals alike, each of whom aim to meet the needs of individuals. Moreover, disciplinary subspecialties such as transformative service design and well-being marketing specifically seek to promote the well-being of consumers [11, 12].

Despite our enthusiasm about addressing an issue that impacts quality of life and developing an intervention to serve others, we encountered one of the barriers to enthusiasm described by Choi and Pak [7]. Specifically, guidelines for multiple

authorship vary across disciplines. In nursing and the health sciences, the first author of a manuscript or presentation is understood to be the individual who made the most significant contribution to a scholarly work, while the last author is increasingly regarded as the “senior” author who oversaw the project being reported. In other disciplines, such as design and marketing, authors are simply listed in descending order of contribution. Similarly, differences in tenure decisions exist across disciplines. In nursing and the health sciences, publication in a reputable journal is valued more highly than presentation at a conference, yet the opposite is true in design and computer science. These differences posed a challenge to our team as we sought to produce scholarly works that would most effectively disseminate our research findings while also assisting our team members to meet their career objectives.

Accessibility. The third strategy of the TEAMWORK framework is to ensure accessibility of the team members. Choi and Pak [7] described the importance of working together in either a physical or virtual setting, using the Internet and e-mail as a supporting platform when necessary. This strategy was essential to ensuring regular communication among our team. Departmental meetings, disciplinary conferences, and teaching responsibilities often made it difficult for team members to connect in person. We overcame this barrier by scheduling a weekly team meeting and using online platforms such as Skype and Google Hangouts to connect with team members who could not be physically present. We also sought to enhance accessibility by using shared language and avoiding disciplinary-specific jargon to the extent possible. Reading relevant journal articles from disciplines outside of our own improved our understanding of one another’s specific disciplinary perspective, research methods, and terminology.

Motivation. The next strategy outlined in the TEAMWORK framework is to ensure team members stay motivated to participate in the project. Choi and Pak [7] observed that for some team members, the potential for the project to answer a challenging research question may serve as its own motivation, but that additional incentives may be necessary. Insufficient time and insufficient funding may serve as further barriers to motivation.

Our project received financial support in the form of a 15-month grant, which allowed the team leaders to provide financial support to student team members, fund data collection, and purchase the proper software to analyze the data. However, we recognized at the outset that insufficient time was likely to impede our progress. To address this barrier, we devised a plan to account for team members’ evolving responsibilities and schedules. At the beginning of the project, team members were asked to estimate the number of hours per week they would be able to commit to the project over its 15-month duration. This permitted faculty to account for teaching responsibilities and student team members to account for coursework and dissertation-related deadlines. Labor-intensive project phases were scheduled for when team members were most likely to be available. For example, we engaged in secondary research during the summer, when most team members had fewer responsibilities within their respective schools and colleges. Primary data collection took place primarily over the winter break, when team members were available to interview and observe participants.

Workplace. Choi and Pak [7] emphasized the importance of institutional support for interdisciplinary collaboration. Our team benefitted from being affiliated with a university that values interdisciplinary collaboration, offering numerous interdisciplinary majors and minors, and providing space for interdisciplinary team meetings at its interdisciplinary science and engineering complex. The support of tenured faculty from several disciplines facilitated recruitment of a diverse team and provided student and faculty team members with the opportunity to collaborate outside their respective schools and colleges.

Objectives. Development of a common goal and shared vision is the sixth strategy outlined in the TEAMWORK framework. Choi and Pak [7] cautioned that discipline conflicts may arise when team members have conflicting ideas about the concepts that form the basis for their analysis. Within several months of assembling our team, we engaged in a brainstorming exercise to identify concepts relevant to elder autonomy from the perspective of each of our disciplines. This exercise allowed us to identify common areas of concern as well as areas in which the perspectives of another discipline could improve understanding of the problem under study.

Role. The TEAMWORK framework advocates negotiating clear roles and rotating responsibilities among team members to reduce role overload. Our approach involved identifying three key phases of our project: (1) secondary research; (2) primary research; and (3) service design. All team members engaged in secondary research, which allowed each team member to gain an understanding of elder autonomy from a variety of perspectives. Team members from the School of Nursing and College of Health Sciences who were familiar with qualitative research methods and the issues facing elders living with a chronic illness devised the plan for the primary research phase, while team members from the School of Business and the College of Arts, Media, and Design were primarily responsible for the service design phase.

Kinship. The final strategy of the TEAMWORK framework is to facilitate open communication between team members and to provide constructive feedback on team members' performance. Lack of communication may hinder the working relationship; similarly, unequal power between disciplines may result in group rivalry. We engaged in weekly team meetings in which team members discussed and provided feedback on both the research strategy and written products of research such as abstracts and manuscripts. Given that our leadership team itself was interdisciplinary, power between disciplines was perceived as equal. In addition, our division of the workload according to each team member's area of expertise ensured each team member was recognized for his or her strengths.

2.2 Framing the Problem: Conducting a Deep Dive

The Deep-Dive technique [9] was originally developed by the IDEO, a leading industrial design company, and has been widely applied in interdisciplinary research to enhance collaboration and participation. The deep dive entails (1) conducting secondary research to identify gaps in current knowledge and understand the scope of the problem; (2) visualizing theory-based conceptual models; (3) conducting user research

to observe current practices and ascertain users' perspectives; (4) prototyping, designing, developing, and user testing; and (5) implementation of the newly designed service [8]. We adapted the 'deep dive' technique [8] in this work to improve the performance of our interdisciplinary team across the fields. Since this project is in progress, we will not describe the last two phases, which are prototyping design, implementation, and evaluation in this paper.

2.2.1 Identify Research Problems

We conducted secondary research from the design, nursing, and human-computer interaction literature to identify and frame the problem of autonomy among older adults with chronic illness who live in residential care facilities. From a nursing perspective, determinants of autonomy in this population include the degree to which individuals retain control over their decisions [13], have privacy in residential care [14], and are able to maintain existing relationships with their friends, families, and neighbors [15]. From a design perspective, prior research has explored how design can influence an individual's autonomy. Friedman's work [16] discussed how hardware design can either hinder or improve a person's technology control. In the field of human-computer interaction, researchers have proposed four spheres of autonomy in technology design [17]. These four spheres include designing autonomy in technology design, designing assistive technologies to support and improve autonomy in daily activities, addressing individual needs through personalized design, and design technologies to enhance autonomy through psychological development.

Researchers have explored and discussed autonomy, how design can influence autonomy, and how to improve autonomy using technology in their own fields. However, there have been few investigations into how to enhance autonomy among elders living with a chronic health condition through design. Therefore, our interdisciplinary research team aimed to identify this gap and understand the scope of the problem.

2.2.2 Visualize Theory-Based Conceptual Models

Our interdisciplinary team conducted a series of brainstorming workshops to generate conceptual models to guide the user research phase. First, each team member extracted key terms from the literature independently and wrote down the terms on sticky notes (Fig. 1). The use of sticky notes can assist a team to converge on common ideas and concepts and move thoughts around. Next, we used the affinity diagram [18] process to identify themes by grouping common notes. Themes that emerged after the affinity process included quality of life, communication, social identity, transition, care experience, emotional autonomy, and drivers of autonomy.

In the field of nursing and health sciences, to develop and implement an effective product, a theory-based approach is necessary since it guides program development and provides a foundation for the evaluation of impact [4]. Built upon public health and behavioral science, ecological models focus on the nature of people's transactions with their physical and sociocultural environments [5]. Ecological models provide a framework to create a more comprehensive method to design and develop studies by integrating multilevel influences including intrapersonal, interpersonal, and community level theories.

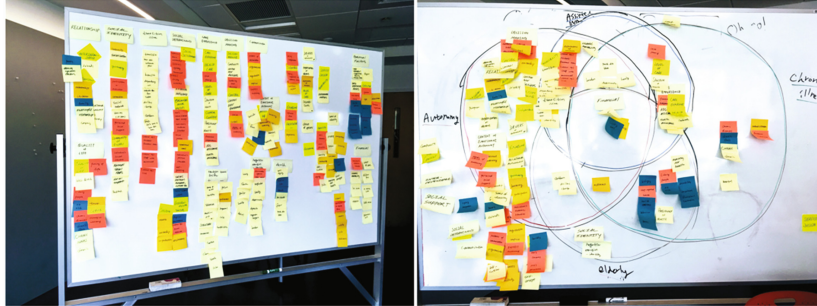


Fig. 1. Create conceptual models using sticky notes and white board for ideation and brainstorming.

Transformative Service Research (TSR) is a relatively new research area that focuses on services and well-being. TSR is defined as ‘the integration of consumer and service research that centers on creating uplifting changes and improvements in the well-being of consumer entities: individuals (consumers and employees), communities and the ecosystem’ [19]. In the context of the residential care setting, there are mainly two groups of people interact in the delivery of health care services: consumers (e.g., the elderly and/or their families) and nursing home service providers (e.g., licensed professionals and support staff). Therefore, we take both parties into consideration when designing the conceptual model described below.

Our visualization led to the development of a conceptual model that was based upon existing social-ecological models, design theories, and transformative service design. The model is presented as follows (Fig. 2):

2.2.3 Conduct User Research

We next conducted qualitative user research to understand the determinants of autonomy among elders living with a chronic health condition in the residential care setting. The human-centered research method included semi-structured interviews, field observations at participants’ homes, and journal entries completed by participants that documented their daily routines. Quantitative assessments included the Rapid Estimate of Health Literacy in Medicine – Short Form [20] and the Allen Cognitive Level Screen (ACLS) [21]. The ACLS is used in nursing research and clinical practice to assess functional cognition, which is defined as an individual’s capacity to accomplish everyday activities in community living environments [22]. Ethical approval was granted by the Institutional Review Board (IRB) at our university. All participants had signed consent forms prior to data collection. Eligible participants were (a) aged 65 years and older; (b) living with at least one chronic health condition; (c) residents of a residential care community; and (d) able to communicate in verbal and written English.

In the next phase of our study, we will analyze qualitative data through directed content analysis and will summarize quantitative data through descriptive statistics. The results of these analyses will guide the prototype design phase of our study, while user testing and evaluation are left for future work.

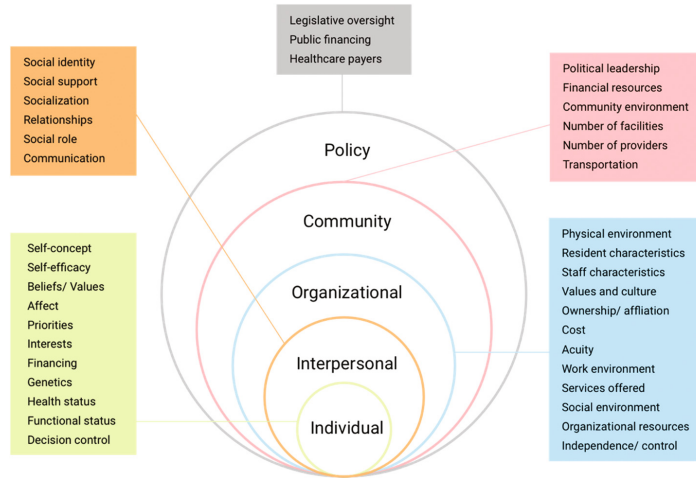


Fig. 2. The conceptual model contains five levels: individual, interpersonal, organizational, community, and policy level.

2.3 Interdisciplinary Research Evaluation

In the fields of nursing and the health sciences, effectiveness is an essential outcome measure of intervention research [23]. Following feasibility and acceptability testing, one of our goals will be to determine the extent to which the service prototype increases autonomy among elders living with a chronic health condition in the residential care setting.

In contrast, designers tend to not heavily rely on a pre-set framework to evaluate the success of design research. Instead, they explore design problem by thinking as making and research through design as they interact with users, and often conduct another set of user test at the end of design phase for validation and refinement. The final deliverable often comes with products. However, finding a research problem using a framework and suggesting useful and usable solutions is not sufficient in design field. The goal is to generate even better and desirable solutions.

3 Discussion

Our experience assembling an interdisciplinary research team illustrates the utility of the TEAMWORK framework [7] for anticipating and overcoming several barriers to interdisciplinary collaboration. In particular, our experience illustrates the importance of early discussions about authorship conventions and team members' goals for producing scholarly works. Frequent communication via weekly meetings, whether in person or online, improved team members' accessibility and maintained their motivation. Institutional support facilitated the recruitment of team members and provided an environment conducive to collaboration.

The five-step “deep dive” [9] serves as a suitable guide for integrating knowledge from several disciplines. Our team began by conducting secondary research, a procedure that not only allowed us to identify gaps in knowledge, but also to gain an improved understanding of the ways in which elder autonomy is conceptualized across disciplines. Secondary research, brainstorming, and visualization allowed us to generate a conceptual model that guided primary data collection and analysis. In the next phase of our study, we will apply our research findings to the development and testing of a service prototype.

4 Conclusion

In this paper, we described the challenges and benefits of interdisciplinary research and identified strategies to promote interdisciplinary teamwork. The included case study described the early phases of a project that is dedicated to promoting the autonomy of elders living with a chronic health condition in the residential care setting. In closing, we hope this description of our experiences can empower researchers to engage in their own interdisciplinary collaborations.

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