Effective IT Use Among Residential Caregivers: The Role of Autonomy, Competence and Relatedness

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Abstract Technological innovation in the healthcare sector is increasing, but integration of information technology (IT) in the care process is difficult. Healthcare workers are important agents in this IT integration. The purpose of this study is to explore factors that feed motivation to use IT. Self-determination theory (SDT) is applied to study how motivational factors impact effective IT use among frontline caregivers in residential care settings. As the team is very important to these caregivers, the team is our unit of analysis. In an embedded single case study design, interviews were conducted with all nine members of a team effectively using IT. All three basic psychological needs from SDT - autonomy, competence and relatedness - were found to have impact on effective IT use, though autonomy was primarily experienced at team level. Conversely, the effective use of an IT collaboration tool influences relatedness.

1   Introduction

In many countries the pressure on the health sector is large and increasing. The COVID-19 pandemic has increased this pressure even further. Effective use of digital resources can provide a solution for the increasing pressure and many digital innovations have been introduced in the care and health sector. To achieve the required impact, however, digital innovations must be adopted and used by healthcare professionals (van Houwelingen et al., 2016; Venkatesh et al., 2003). It is therefore important to understand what motivates healthcare professionals to use IT effectively. As a recent survey of twenty long-term care professionals in the Netherlands shows, "knowledge, motivation, self-image and attitude were at least as important for the adoption of digital tools as purely developing digital skills" (van Mierlo, 2020). Motivation is thus seen as a key concept, which refers to mechanisms that stimulate and direct behaviour (Kleinginna & Kleinginna, 1981). In this study we investigate the relation between motivation and the effective use of IT innovations by caregivers in residential care teams. Residential care constitutes a large proportion of care providers. Of the 1.4 million employees in the Dutch care sector, for example, more than 20% work in nursing and care homes. And this does not include residential care for people with disabilities, mental health issues or youth.

A well-known theory of motivation is the self-determination theory (SDT), which has been extensively empirically tested (Ryan & Deci, 2000). SDT considers the quality of a person's motivation more important than the extent to which someone is motivated. The theory distinguishes various types of motivation and contends that the more autonomous types of motivation are the ones that produce lasting behaviour (Gagné & Deci, 2005). This focus on motivation leading to lasting behaviour, makes SDT suitable for the study of effective IT use by health care providers, in terms of continued use of IT in work processes and the continuous active contribution to innovation.

This study aims to contribute to the growing body of knowledge on motivational aspects of IT use, integrating insights from psychology, as expressed in the self-determination theory (Deci & Ryan, 2000) into the information systems (IS) discipline.

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2   Theoretical Background

As many studies of effective IT use are based on one of the various technology adoption theories, this section starts with a brief discussion of these. When studying motivation in particular the self-determination theory is very relevant, which recognizes the importance of psychological need satisfaction. The section concludes with a brief discussion of what constitutes effective IT use.

2.1   Technology adoption theories

Various technology adoption models have been developed over the years. Well-known examples of models and theories include Theory of Planned Behavior (Ajzen, 1991), Technology Acceptance Model (Davis, 1989; Venkatesh & Davis, 2000), Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), Innovation Diffusion Theory (Rogers, 2003) and Information Systems Continuance Theory (Bhattacherjee, 2001). Many acceptance models consider intention to be an important predictor of usage, with the amount of intention being determined by the degree to which certain antecedents are present. This approach, however, has also been criticized as the evidence for these models is ambiguous (Li, 2010).

2.2   Self-Determination Theory

Self-determination theory (SDT) is developed and refined by Deci and Ryan over the last four decades, and this theory of motivation is based on much empirical research (Deci & Ryan, 2000). In the last decade and a half, SDT has also received attention in research in the IS domain (Lee, Lee & Hwang, 2015; Nguyen & Hess, 2020; Roca & Gagné, 2008; Chiu, 2022). SDT focuses on the quality of motivation and argues that to induce lasting behaviour requires more autonomous types of motivation (Gagné & Deci, 2005).

SDT recognizes three psychological needs, which are innate, universal and essential for growth and (inter)personal functioning (Ryan, 1995), namely autonomy, competence and relatedness. These basic psychological needs energize human behaviour and must be continually fulfilled for a person to function optimally and experience well-being (Deci & Ryan, 2000).

Satisfaction of basic psychological needs fosters autonomous motivation which in turn has a positive impact on work performance (Baard, Deci & Ryan, 2004; Gagné & Deci, 2005). In SDT (Ryan & Deci, 2000), autonomy is defined as experiencing freedom of choice and feeling free to initiate one's own behaviour (De Charms, 1968). Competence is defined as the feeling of efficacy, the feeling of being able to succeed when interacting with the environment (White, 1959). Finally, relatedness refers to the need to "belong" and being focused on forming and maintaining strong and stable ties with others (Baumeister & Leary, 1995).

Several studies investigate the basic psychological needs in IT use in a work setting. These papers report an influence of all three basic psychological needs (Andersen, 2016; Rezvani et al., 2017; Roca & Gagné, 2008). However, there is not yet a unified picture about which and how basic psychological needs influence (the motivation for) IT use. Conclusions on the extent to which autonomy, competence and relatedness have an influence differ among the studies. Studies are mainly quantitative and focus on the extent to which needs are met. Less is known about how and by whom or what needs are supported when it comes to IT use in the workplace, let alone in the specific work setting of residential care.

2.3   Basic psychological needs in IS research

Several quantitative studies integrate basic psychological needs into the technology acceptance models and theories from IS research mentioned in section 2.1 (Hsu, Tsai, Kuo, Ya-Hui & Lien, 2016; Assadi & Hassanein, 2017; Roca & Gagné 2008; Bhuasiri, Zo, Lee & Ciganek, 2016; Lee et al., 2015; Rezvani, Khosravi & Dong, 2017; Sørebø, Halvari, Gulli & Kristiansen, 2009). However, a difficulty in integrating SDT constructs into existing IS adoption models is that these theories are based on fundamentally different basic principles. SDT is not based on the degree of motivation, as the IS models are, but on the quality of the motivation which is arranged on a continuum from less to more self-determined (Ryan & Connell, 1989), with the more autonomous, self-determined types of motivation being better predictors of optimal functioning (Gagné & Deci, 2005; Ryan, Kuhl & Deci, 1997). Moreover, SDT links motivation directly to behaviour, not to the intention to behave. This difference in fundamental principles is not addressed in these studies.

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2.4   Effective IT use

For an information system to be successful, it must be accepted and used in an organization (Venkatesh, Morris, Davis & Davis, 2003). However, when a caregiver uses more IT, it does not mean that they are providing better care. Therefore, when it comes to IT use, it is important to consider not only the degree of IT use, but also the manner and quality of this use (Sykes & Venkatesh, 2017). The Theory of effective use (Burton-Jones & Grange, 2013) can inform IS research on the quality of IT use. In this theory effective use is defined as "using a system in a way that helps attain the goals for using the system" (Burton-Jones & Grange, 2013, p.633). Goals are attained by performing actions that are afforded by the IT system. The connection between actions and goals can be complex, however, requiring a network of actions with intermediate outcomes (Burton-Jones & Volkoff, 2017; Raymond et al., 2018). According to Burton-Jones & Grange (2013) user activities can be broken down into accessing the system, obtaining faithful information from the system, and acting on this information (Burton-Jones & Grange, 2013). This seems to hold for an organizational context, though in other contexts, such as social media, other types of activities may occur (Eden et al., 2020).

Effective use by the individual does not happen in isolation from the general work context but can be analyzed from the perspective of the goals for which it is used, and can involve multiple actors at multiple levels (Burton-Jones & Grange, 2013; Burton-Jones & Volkoff, 2017). Within residential care organizations, the care team is one of the most important levels from which work is performed (Gosling, Westbrook & Braithwaite, 2003). Residential care is provided by a team of employees who work in a varying shift pattern, to jointly support the assigned client population 24/7. This type of care requires multi-functional employees who collaborate in highly interdependent way with each other. Therefore, for effective use of IT innovations in daily processes, it is important not only to consider the individual in isolation, but to study them in the context of the team.

3   Research Method

Based on the important role of the team in residential care, we chose the team as unit of analysis. An embedded single case study design was used to investigate the relation between the need for autonomy, competence and relatedness and the

effective use of IT. The research was conducted within one residential care team from a Dutch organization for care of people with intellectual disabilities. This organization implemented Microsoft 365, a digital information and collaboration platform, in the period from late 2018 to early 2019. Since this platform covers a large number of applications and services and as explained above effective use depends on the system and its goals, this study focuses on the effective use of the Teams application, as the core application for team collaboration within this platform.

Within this organization, a team was selected as a case, based on theoretical sampling (Eisenhardt, 1989). For this purpose, a residential care team was sought that was representative of the behaviour under study and thus scored high on effective IT use in the post-implementation phase. To objectively select a team, criteria were defined in a focus group. The focus group was composed of a heterogeneous group of five professionals whose work involves the implementation and/or use of the technological innovation among providers of residential care. Theoretical insights from Theory of effective use were used as input for the focus group meeting (Burton-Jones & Grange, 2013; Burton-Jones & Volkoff, 2017). Six aspects of effective IT use were formulated: active use of Teams, everyone participates, communication by Teams, direct response, collaborating on documents, and perceived own effectiveness. Based on the first three of these criteria a shortlist of effective teams was made, by measuring usage data. The champions of the shortlist teams were briefly interviewed by phone to measure the other three criteria. The team managers of the top two teams were then approached for participation. The number one team manager agreed to participate.

The selected team consisted of nine employees. Their work experience in healthcare was gained within the team. Two-thirds of the team members had worked on this team for six or more years. Two team members were very open to new IT and were intrinsically motivated to see what can be done with it. A number of members experienced new technology more as a necessity, which cannot be avoided at work, although they also saw its usefulness.

Each of the nine employees of the selected team participated in a semi-structured individual interview. These interviews took place via online video meetings during the period from March to April 2021. Depth was obtained by asking open-ended

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questions, following the interviewee verbally with their own wording in order to enrich the answers without leading in a direction (DiCocco-Bloom & Creabree, 2006), and by asking follow-up questions. The questions pointed in a general direction to motivations, underlying needs, and antecedents. Examples are: "What caused you to start using this IT? ", "Who or what was needed to do this?", "Who or what supports you in this activity?", "What is holding you back?". Follow-through questioning, respect and attention was used to facilitate interviewees in formulating (previously perhaps unconscious) motivations. In addition, a number of set questions were asked about demographic characteristics such as gender, age, and work experience.

Interviews were transcribed according to the verbatim principle. The analysis phase of the study was conducted according to the thematic analysis method of Braun & Clarke (2006). An initial inductive round of coding was conducted, using the in vivo coding method (Miles, Huberman & Saldaña, 2020). The codes from this first round were next categorized into themes of stimulating and hindering factors. In a third round a deductive approach was used, in which the three concepts of autonomy, competence and relatedness served as analytical dimensions.

4   Interview analysis and interpretation

Associations to each of the three basic psychological needs were found in all interviews. The following sections discuss how the three basic psychological needs come into play in participants' use of IT.

4.1   Competence

From the interviews it appeared that competence in an application such as Teams is not limited to competence in system access and system functionalities but is also required when dealing with and acting on content. Difficulties were experienced in absorbing and retrieving all information. Sometimes messages were missed. As reasons participants mentioned the amount of information (#2, #6, #8), one's own attention span (#1), system deficiencies (#9) or unknown (#1). When information in Teams is the basis for acting (correctly), missing that information impedes the ability to succeed in tasks, which leads to a feeling of frustration. This is not just about the individuals need for competence; in team tasks, missing information by an

individual affects the success of the entire team: "I just notice that I sometimes miss entire messages, strangely enough. And I'm not the only one, I recently learned… A pretty important one, of things that had to be arranged… if in this manner you miss things and miss a deadline because of that, then that's pretty annoying, either for yourself, or for your colleagues." (#1).

When the own competence appeared to be inadequate, help was freely sought from immediate colleagues: "We work in a team where that is fairly easy, you know. So, then you ask… then they watch what you do, ah, you have to do that so and so. They are also quite practical in all those things." (#5). Taking time to increase one's own competence is indicated as a stimulating factor by the vast majority of participants. However, when it comes to increasing skills, time is expressed in diminutive terms: "a small lesson" (#1), "little piece of explanation" (#1), "small, brief training" (#3), "just an hour or two" (#5), "this particular point … go over it with each other for a moment" (#7). Asking for help outside the direct circle of colleagues or one's own network does not happen often. It takes longer in the perception of some and external help from a helpdesk is not available in the evenings.

There appeared to be one task for which no team member had a good understanding of how the application works. For this task, the team-wide sense of competence was clearly low. The need for outside instruction on this point is mentioned by the majority of participants. So even in a team selected for a high degree of effectiveness in use compared to other teams within the same organization, there are still opportunities for growth.

The basic psychological need of competence is nourished from one's own knowledge, skills and experience, a high degree of ease of use of the system and readily available peer support. Competence, the feeling of being able to succeed, could be nurtured even more by external training on a select number of functionalities. Making time for this is seen as an important factor. Within the case study, all individual team members experienced a sense of competence for daily task performance. Microsoft Teams as an IT innovation has become part of the daily routine. The application is perceived as easy to use.

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4.2   Autonomy

The reason for the team to start using Teams was an obligation from the organization. Initially, little individual freedom of choice was experienced. The subsequent use of online meetings was also prompted by an external actor: the lockdown declared by the Dutch government to reduce COVID-19 infections meant that meetings with the team were no longer possible without the use of online meeting tools. The response was characterized by the acceptance of the situation and acceptance of what is coming to the team, both in individual and team attitudes: "If this is asked of me and someone or [the organization] wants me to do it, yes, then go let's do that." (#2); "I think we're pretty docile in what's being offered and we don't hold on to the old, but go with it, do what is offered." (#8). However, an obligation from the organization is "no guarantee of success", explained one of the participants, "something intrinsic will have to happen" (#7). An important element here was the (quick) recognition of usefulness, which was experienced by the whole team in efficiency increase through fast, transparent communication and clear and findable information: "Back then it was kind of a must. And now it's like, yeah, it might be quite useful." (#4); "See, I will. But you have to see the benefits quickly." (#8).

Some participants described the choice to use Teams or certain functionalities as a joint decision in a team meeting (#4, #6). Freedom of choice was experienced by members in the way Teams can be used and configured by the team. Participants experienced the possibility of improvements in various ways. While some had a more internal locus of control and were seeking for more effective use in increasing their own skills, others put their hopes in improvements in the system.

The basic psychological need for autonomy is fed by the decision-making space that the team experienced in how to use it. Within the existing room for maneuver, decisions are made collectively and there is a sense of freedom of choice at the individual and team level. By starting to use the system, usefulness was quickly experienced, which contributed to the perception of wanting to use the tool oneself. Little autonomy was experienced in the implementation phase. However, the obligatory nature of the start does not seem to frustrate the need for autonomy, but is met with an attitude of acceptance. The obligation from outside was followed by a movement from within the team itself.

4.3   Relatedness

By communicating via Teams, team members became aware of what was going on
at the site and among colleagues, asked each other for an opinion or help and
received response. This provided a sense of connection with each other: "I call it
connection. Yes, you want to feel connected,… you know what is going on. And
with each other. And it's also, yeah, just a piece of, yeah how do you say, social
control with each other. Also towards your colleagues, is someone okay, or are things
not going good with someone. Yes, sometimes I don't work with a certain colleague
for two weeks, then it's very nice that you can see oh, what has she been working on
and that kind of thing." (#3). Conversely, relatedness was frustrated when
communication is missed and team collaboration is less optimal as a result.

The need for relatedness when using IT is fueled by mutual support, which is a
matter of course. Team members help each other "with all the love" (#3), "of
course" (#5) you ask each other for help, "it's just a safe team to do that" (#8).
Qualities and skills of others were noticed and used.

When the participants looked back at the start of the innovation, the feeling was that
it was done together, in connection with each other. A few participants also
mentioned a motive to go along with the group: "When this is offered to the team
and you start working with it, yes, you just go along with it."(#2); "You are not the
only one to say: I will be the only one to work with this while the others do not, or
the other way around." (#4). The driving force behind this experiment was one team
member, who had already been assigned to handle IT issues within the team. With
a team of nine, the presence of one such person appears to be sufficient, provided
this person can get others on board. The initiator of the experiment outlined a
number of conditions that were important to bring the team to use IT, such as
marking and creating a safe practice environment and coaching.

The need for relatedness was satisfied by nearby peer support in daily task
performance and the mutual sharing of user experiences. The fact that the team
members experience the team as a safe, trusted environment was helpful here. The
need to belong to the team encouraged participation in the joint use of Teams. The
start was experienced as a joint effort, spurred on by one individual, supported by
the collective.

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Effective use of a collaboration application like Teams itself, also contributes to the satisfaction of the need of relatedness. Through effective communication and collaboration via Teams, ties with teammates were maintained and strengthened.

5 Discussion and Conclusion

The results show that not only the individual needs are important. In team tasks, need satisfaction of other team members also has a relationship with one's own effective IT use as well as with performance at the team level. Basic psychological needs are mainly satisfied by direct colleagues. Satisfaction of competence and solidarity with one's own team members seem to go hand in hand. When it comes to satisfying the need for autonomy, it is mainly aspects at the team level that are considered important. The need for a collective decision space and the value attached to initiatives from within the team itself point to the collective rather than the individual. Satisfaction of individual need for autonomy seems to play a lesser role. Also, remarkably little is said about the manager. Within the investigated case there does not seem to be a significant role for the direct manager when it comes to effective IT use.

The relationship between basic psychological needs and effective IT use is not a one-way street. In the case of relatedness, this becomes clear from the data. Perhaps this reciprocity in relationship is also present with autonomy and competence. The interviews focused on what is needed for effective use, however, and what results from that use was not explicitly explored.

Based on the results, the following preliminary conclusions can be drawn:

- Autonomy is experienced at the team level and is satisfied by having decision space within the team and facilitating a movement from within the team.
- Competence is satisfied by investing time in increasing one's own knowledge, skills and experience, by having a system with a high degree of ease of use and by having direct support from others.
- Relatedness is satisfied by a perceived shared commitment, mutual discussion of user experience, a safe team climate and close peer support.

- Effective IT use itself contributes to the satisfaction of basic psychological needs. Effective use of a communication and collaboration application feeds relatedness.

This empirical study aimed to contribute to the growing body of knowledge on motivational aspects of IT use, integrating insights from psychology into the IS research domain. The perspective of self-determination theory shows to be useful for clarifying the prerequisites for continued effective IT use. This qualitative case study indicates that among Dutch residential caregivers, the satisfaction of all three basic psychological needs is involved in effective IT use.

Whereas in earlier quantitative technology acceptance studies competence, relatedness and autonomy are used as antecedents of concepts, such as effort expectancy and perceived usefulness, feeding in turn intention, we found that, the other way round, ease of use feeds competence. It may be worthwhile to consider reversing the relationship in technology acceptance studies, positioning the abovementioned concepts as antecedents to competence, relatedness and autonomy, feeding in turn IT use.

As with any study, there are limitations. First, the method used, a single case study, has drawbacks. Caution should be exercised in generalizing; a generalization to the population cannot be made. The case was purposively selected for representativeness in terms of effective IT use and does not reflect the population. This limits the study to analytical generalization (Yin, 2018). Moreover, results may be related to idiosyncrasies that occur only in this team. As a result, analytical conclusions are not as strong as they would be in a multiple case study.

Second, although the interviewer attempted to create a safe setting and approach participants openly and empathically, there may be an effect of conscious or unconscious social desirability in the response, which is inherent in personal interaction. Social desirability bias and the fact that the case represents most effective IT use, may have resulted in negative aspects such as frustration being less apparent than in reality.

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There are some avenues for further research. The results attest to a team in which needs are met primarily within the team. Willingness to help and team safety are high, and intensive communication takes place. Because of the data collection method of individual interviews and thematic analysis based on a theory from psychology, little attention has been paid to the role of sociological aspects, such as group dynamics and team functioning. Sociological theories could inform further research into factors at the team level of residential care. Gosling, Westbrook & Braithwaite (2003) already showed that better team collaboration results in more effective use of IT. Also results from the current study point towards a possible influence of team level factors on effective IT use.

Also, the reciprocity of the relationship between basic psychological needs and effective IT use could be tested.

A final suggestion for follow-up research is to build theory around the integration of SDT concepts and existing technology acceptance models, addressing differences in fundamental principles. This would benefit further research into the qualitative aspects of motivation to use IT.

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