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Wellness Technology Use in Everyday Life: A Diary Study

TUOMAS KARI, EEVA KETTUNEN, PANU MOILANEN & LAURI FRANK

Abstract Digital wellness technologies and their use have become exceedingly popular. More and more people are using them in their everyday lives. Respectively, the need to understand their users and usage has increased. This study aims to deepen the understanding of how people use and perceive wellness technologies in their everyday lives. Empirically, the study is based on diaries collected from 18 participants over a six-week period, which are analysed using thematic analysis. The results show that the use of wellness technologies can positively influence wellness motivation. Further, they can help people to learn more about their own wellness related behaviour and its effects (learning-effect). Experience of gamification can influence motivation positively. It also seems that some people engage in self-gamification, which is defined in this study as a desire-based action to gamify some recurring activities or bodily functions.

Keywords: • Digital Wellness • Wellness Technology • Sports Technology
• Gamification • Self-gamification • Diary Study • eHealth •

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1 Introduction

During the past years, individuals and healthcare sector have become increasingly interested in measuring and promoting various aspects of wellness and health by using different technological solutions. Although different technological solutions for personal wellness have been around for quite a while, the whole business field of wellness technology is still at a relatively immature stage and rapidly growing (Grand View Research, 2016; Welltodo, 2016). There is a wide variety of products ranging from exercise and wellness applications to activity trackers and versatile sport watches in the market, and completely new solutions are released constantly. Typical to these devices is that they can be used for self-tracking purposes (Kari et al., 2016a). The findings of Miyamoto et al. (2016) suggest that tracking wellness related data alone may result in heightened awareness of daily activity, but it may not be adequate to sustain the use of wellness technologies, which often have low retention rates. Wang et al. (2016) found that a wellness application is more effective the more frequently it is used, and more effective when used over a longer period of time compared to short-term use. Such reports and findings demonstrate the growing need for studying the usage of these technologies.

Regardless of the business field, it is essential to understand as much as possible about the target audience. Studying consumers' motives and habits is important to deepen the understanding about their desires and needs. There exists a wide variety of user characteristics within the wellness technology users, and different target groups have different set of requirements (Warrich, 2016). As wellness technologies are ever more used, there is a growing need to deepen the understanding on their users and thus, it is important to research them to gain new understanding on this matter.

The purpose of this study is to deepen the understanding of how people use and perceive wellness technology in their everyday lives. Besides the many aspects regarding wellness technology use itself, the focus of the study is also on how wellness technology gamification is perceived and whether it motivates people in their wellness related activities. Third point of interest is how people think integrating wellness technologies into their lives is seen by other people, and how these thoughts might influence their wellness technology usage in general. The main research questions studied in this paper are:

- 1) What kinds of feelings do wellness technologies and their use wake among their users?
- 2) How do people experience gamification with wellness technology and how does technology support gamifying?
- 3) How do people perceive other people's views on their wellness technology usage and gamification?

The term wellness technology is used as an overall term for different kinds of technological health, wellness, and sports related solutions that people use in their

everyday lives. Such solutions include e.g. devices, applications, and services. The study follows a qualitative approach and the empirical analysis is based on diaries collected from 18 participants over a six-week period.

The results of this study can help the wellness technology providers in deepening their understanding on wellness technology usage and in providing solutions that are better welcomed by their target audiences. The findings may also assist people working in the healthcare sector in implementing different wellness technologies for health and wellness related purposes.

The paper comprises of six sections: introduction, theoretical background, methodology, results, conclusion, and finally the limitations and future research section.

2 Theoretical Background

2.1 Motivation and Wellness Technology

The actions and behaviours of individuals are influenced by observations on how other people act. According to Bandura's social cognitive theory, observational learning and social experience play an important role in people's personality development and in the development of their self-efficacy (Bandura, 1989). Self-efficacy refers to one's own belief in one's own capability to do a task, which in turn affects their motivation to attempt that task. People with high self-efficacy feel a task more attainable and less difficult and trust their abilities to perform it, whereas people with low self-efficacy might perceive a task as too difficult and may be less motivated to perform it (Bandura, 1998).

According to Ryan and Deci (2000), motivation can be divided into intrinsic and extrinsic motivation. Intrinsically motivated people perform activities such as exercising just because of the pleasure of doing it, whereas more extrinsically motivated people do the activity because they see it as a tool of gaining something else they are interested in, such as competition prizes from a race or acceptance from their peers. A person who does not have any motivation to perform a task is considered amotivated.

There has been a substantial interest in the role of wellness technology to motivate people to be more physically active or to adhere to physical activity guidelines (see e.g. Marcus, Ciccolo & Sciamanna, 2008). In this kind of research, wellness technology is assessed especially from the points of view of various models of behavioural change – especially the transtheoretical model by Prochaska and DiClemente (2015) – or motivational psychology. Results concerning the role of wellness technology are somewhat contradictory. According to a systematic review by Sjögren et al. (2013), one cannot be certain that technology contributes to adherence in intervention studies, but the role of technology should be researched further. However, if technology-based interventions (including exergaming) are used in rehabilitation, wellness technology seems to increase the physical activity of intervention participants (Rintala et al., 2016). This is interesting,

as this research finding suggests that the main motivation for the increase has to be based on personal and intrinsic motivation and it can be strengthened with technology.

The reasons why different kinds of wellness technologies are acquired seem to vary. Previous research has shown that the usage intentions of different solutions can be driven by both utilitarian or hedonic perceptions (e.g. Kari & Makkonen, 2014; Makkonen et al., 2012a; Makkonen et al., 2012b).

2.2 Gamification and Exercise Motivation

Gamification refers to the use of game elements in non-game contexts (Deterding et al., 2011). The common purpose of gamification is to motivate users to behave in desired ways by making the user experience more playful and enjoyable (Deterding et al., 2013). Implementing gamification has become very popular in various different contexts (Hamari, Koivisto & Sarsa, 2014b). As the utilization of gamification has grown, it has become a subject of growing interest in academic research as well (cf., Hamari, Koivisto & Pakkanen, 2014a; Hamari et al., 2014b).

Kari et al. (2016b) proposed recently that a division should be made between the process of gamification and the experience of gamification. Kari et al. (2016b, p. 400) define the process of gamification as “using a set of activities with the aim to implement game elements to non-game context” and the experience of gamification as “a use experience in non-game context that the user perceives as gameful”. Commonly, the process of gamification aims to create an experience of gamification for the user. Yet, the experience of gamification can also arise from non-gamified features (Kari et al., 2016b). In this study, the focus regarding gamification is especially on the experience of gamification.

Gamification can be an efficient approach to influence user behaviour and use of an application (Law, Kasirun & Gan, 2011). It can also have a positive impact on motivation in general, but differences occur between different solutions, elements, and also between individuals (e.g. Fitz-Walter, Tjondronegoro & Wyeth, 2012; Gawley et al., 2016; Hamari et al., 2014b; Kari et al., 2016b). In the context of wellness technology, these individual differences can be traced to such personal characteristics as attitudes towards sports technology, exercise habits, and competitiveness. Different people also experience gamification in different ways (Kari et al., 2016b). Overall, the experience of gamification can influence a user’s exercise motivation positively (Kari et al., 2016b). A recent study shows that the relevance of gamification in wellness domain will continue increasing (Kari et al., 2016c)

3 Methodology

This study followed a qualitative approach. It can be defined as a diary study based on phenomenographic approach. Phenomenography is a research method originally developed by Ference Marton (1981) in Sweden. As the name suggests,

phenomenography is linked to phenomenological philosophy, in which the attention is directed to the world as humans experience it. Hence, the research object here is the human experience on the use of wellness technology in everyday life. Phenomenography is especially popular research method in educational sciences, but lately it has been adapted to information systems (IS) research as well (see e.g. Kaapu & Tiainen 2012). Phenomenography was well suited to the research setting, since phenomenography brings out the essential in users' view and can reveal the variation in it.

Phenomenographic studies are usually based on textual data, e.g. transcribed interviews, essays, or diaries. In the research setting of this study, user diaries were selected as data collection methods. Diary study was selected as the method because its ability to provide more authentic information on human-technology relationships and technology use in situ (e.g. experiences and feelings), as the so-called presentation effects (i.e., participants may act differently due to the presence of a researcher) are diminished (Carter & Mankoff, 2005).

The voluntary participants for this study were recruited from a list of participants from an earlier study. They had expressed to be available to participate in research related to sports and wellness technology. The goal was to get 15 to 20 participants for the study. To recruit the participants, during late 2015, invitation e-mail to participate in the study was sent out to 50 potential participants, out of which 35 replied. Out of those 35 who replied, 22 signed up for the study. No restrictions were placed regarding the participants (e.g. their demographics, physical activity level, wellness technology usage, gamification activities), as the goal was to reach varying kinds of participants. However, all the participants were from Finland. The participants were asked to keep a diary of their wellness related technology usage and perceptions for six weeks. They were also asked to provide basic demographic information on a separate sheet. All the participants received an information letter, in which the central terms – wellness technology and gamification – were explained. The participants were also given instructions regarding keeping the diary. They were especially asked to focus on three different aspects in their diaries and write down opinions, thoughts, feelings, experiences, and perceived effects regarding: 1) Wellness technologies and their use, 2) wellness technology and gamification (e.g. using wellness technologies with gamified features, gamifying different health behaviours, experience of gamification), and 3) perceptions on other people's views on one's own wellness technology use and gamification. They could choose how to keep the diary themselves. All the participants wrote it electronically.

The participants were not given any strict time limits regarding when the six-week period should take place. The return dates of the diaries ranged from December 2015 to February 2016. After the six-week period, the diaries were returned electronically to one of the authors. Out of the 22 participants, four dropped out during the study. As a result, diaries were received from 18 participants. This can be considered to be an adequate amount for this qualitative study.

To analyse the data, thematic analysis was used. This analysis method is often used especially when researching matters of common everyday life, since it provides practical answers to the research problems (Eskola & Suoranta, 2014). It is also the most widely used analysis method of qualitative research (Guest, MacQueen & Namey, 2012) and enables organizing and describing the data with rich detail (Braun & Clarke, 2006). The actual data analysis was guided by Braun and Clarke (2006). Following their suggestion, the guidelines were adjusted to fit the research subject and the data. Thematic analysis was used to identify, analyse, and report patterns within the collected data. The analysis started with familiarizing oneself with the data and marking all the interesting features of it. The data was then divided into three different themes for each individual. The themes were as follow: 1) wellness technology use and perceptions in everyday life, 2) wellness technology and the experience of gamification, and 3) perceptions on other people's views regarding one's own wellness technology usage and gamification. After this, all three themes were separately studied by examining all the participants' answers under that particular theme and searching for similarities and differences. These were then reviewed in relation to the data. The analysis also aimed at interpreting specific aspects and exceptions of the investigated matter. Finally, the report was produced. As Braun and Clarke (2006) propose, the analysis process was a recursive and non-linear, as it moved back and forth between the different phases of analysis.

4 Results

In total, the study had 18 participants. Four of the participants were male and 12 were female. The age of the participants ranged from 18 to 70 and the average age was 39.6 years. More detailed description of the sample can be found from the appendix.

4.1 Wellness Technology Use

The wellness technologies used by the participants varied from activity trackers and heart rate monitors to smart scales and step counters as well as different mobile applications related to wellness and physical activity. Few also reported the usage of exergames – digital games requiring aerobic physical effort from the player (Kari & Makkonen, 2014) – or other gamified applications. The most common reason for acquiring a device or an application was to get more accurate data on personal exercising or health; data that is not only based on own feelings. GPS features were also considered as important by many participants. Most participants liked how they were able to get varying and interesting data with the help of wellness technology. Many were using the technology to control their exertion level during physical activity either by checking that they were not training with too high intensity or that they were training with intensity high enough.

Wellness technologies were also considered to have motivational elements, since they provided a reliable tool for setting goals. Most of the participants reported that wellness technologies had positively affected their motivation by enabling them to see and compare their own exercise data. Seeing longer-term improvement regarding exercise

and health typically added their motivation. For some of the participants, using a wellness technology device in their training made them train harder or longer. For example, being able to follow data while exercising could increase motivation to do more through running longer, lifting more weights, or training with higher intensity. “In indoor cycling, I speed up if my heart rate is too low, and while running it is motivating to see how far I have gone”.

Some participants reported they were intrinsically motivated to exercise and for some of them using wellness technology did not bring any extra motivation. Some participants reported wellness technology being able to increase their motivation during their more active exercise periods. However, when they feel less physically active, using wellness technology and seeing your own data could actually decrease exercise motivation. Respectively, some reported that when things are going well, the information from the technology makes one happy, but when things are going badly, the information from the technology can be annoying.

For some participants, wellness technology also had some educational effects such as learning more about training intensity, calorie consumption, and heart rate levels, and being able to better compare objective data to subjective feelings. This kind of learning-effect could also lead to discontinuance in using the technology, as it was felt that the technology could not provide any new or interesting information.

Some participants raised the question about the reliability of wellness technology. They highlighted the fact that their devices sometimes do not work properly. Participants found this annoying since they would rather focus on their own performance during the exercise than thinking whether their device works at that moment. Some participants also emphasised that people should not always blindly trust the information received from wellness technology since the information is never completely individualised for them. Some participants were also reluctant to value wellness technology data and its accuracy over their own feelings. Some were commenting that “Why can exercise be considered hard only then if the result is proven by a sport watch?”.

The most common negative remark about wellness technology was related to technical problems that occur during exercise. For some, this might even bring the feeling that the exercise has gone to waste; “If the heart rate monitoring stops working during exercise, I want to throw the device into a rubbish bin”. Another case when technology might bring negative feelings is when people forget to take it along to their exercises or when some wellness application does not work on a specific device. Some participants considered sport watches to be so big in size that they did not want to use them during any other time than while exercising, which limited their usefulness in tracking other everyday wellness related activities such as sleep or general activity.

While some participants felt it was “easy” to wear wellness technology devices, others felt wearing them was uncomfortable and sometimes even pointless, for example, when

their training focus was on strength training instead of aerobic training. In other words, the willingness to use technology was also partly associated with the conducted activity or sport. Few participants reported that keeping a log of their own exercises was hard work with or without the help of wellness technology. Some also emphasised the fact that some wellness technology devices and applications are too difficult to use. For one participant, tracking exercises created too much stress about exercising and therefore woke the need to stop using all devices.

Several participants associated wellness or sports technology use with hard and intensive training with set goals. They did not consider themselves as athletes and therefore did not see why they would need to use or how they would benefit from using wellness technologies. Some of them were afraid that adding new technologies to their exercise routines would take some of the fun away by making it more goal oriented and strict, subsequently decreasing the intrinsic motivation to be physically active.

The study also included four participants from the “young elderly” age group, i.e., 60–75 years of age (Carlsson & Carlsson, 2016). Studying the young elderly age group is deemed important, as they are a growing and a very large group of individuals with a rising need for different digital wellness solutions (Carlsson & Carlsson, 2016). Bearing in mind that the study only had four participants from this category, the data supports this notion by Carlsson and Carlsson (2016), as all the young elderly participants were using some sort of technology to support personal wellness. However, among the young elderly, the polarisation was quite apparent. At its simplest, the technology used by two participants was restricted to just a blood pressure meter or an electronic scale, whereas the other two were using sports computers with their various features and electronic training diaries. Interestingly, only one saw age as any kind of limitation regarding the use of these technologies.

4.2 Wellness Technology and the Experience of Gamification

Almost all participants who were using wellness technology reported they were comparing (a form of gamification) their own previous health and exercise related results to their current ones to keep track of their development and fitness level. This data was often received from a sport or wellness technology device. Some participants reported they compared their old and new data also to see how their technique had developed. This kind of comparison also seemed to wake experience of gamification. However, when it comes to sharing data in social media or comparing own data with other people’s data, the situation was different. Most participants felt their exercise data is personal. Few participants compared any of their data with family members’ data or to other people’s data that can be seen, for example, in some web service. Only those participants who did some level of competitive sports, more constantly compared their results or data with their training partners. Considering this, it seemed that the experience of gamification rather comes from comparing own data with own data than comparing own data with data from others. An exception to this seems to be different voluntary physical activity

challenges that people can participate. Comparing own activity level to that of others within these voluntary challenges was seen as gameful and motivating by those taking part.

When participants explicitly reported about the type of gamifying they do, they also most often referred to comparing their own results with their own exercise history and data with the help of some technology. Some participants set a goal to reach enough daily activity, to walk or run the same route with a faster pace than before, or to be able to maintain a lower heart rate than in previous runs. Strength training was also reported to be something where the gamified aim is to reach the “next level”. More competitive exercisers reported gamifying by comparing their own training and race results to previous ones or trying to improve their own scores in competitions or lap times during training. Some participants reported to challenge themselves by tracking their weight on a regular basis. One participant reported using a gamified application to drink enough water. Overall, different technologies were regularly mentioned to support these gamified activities. Considering the motivational effect, many participants reported that this kind of gamifying brought extra motivation. One participant described that the activity tracker reminds a Tamagotchi (a digital pet that was hugely popular in the 1990’s) with the need to “feed it and keep eye on it on a regular basis”.

Few participants were also using gamified applications or doing geocaching, which as an activity is all about integrating technology into exercise by adding extra gamified elements into regular hiking, walking, or running session. For these participants, having the gamification element made them venture further and visit different places. Exergaming was also mentioned as a one form of exercise.

Among the young elderly, the participants’ reports were similar. Most commonly, the experience of gamification came from comparing own current data with own previous data – often with the help of some technology. This was also considered motivating and an enjoyable means to support reaching personal goals. One also mentioned occasionally playing exergames.

It seemed that some people also engage in a sort of self-gamification, which can be defined as a desire-based action to gamify some recurring activities or bodily functions. Pursuing the experience of gamification by self-gamification could begin as non-technical, but later on, some technology was implemented to support the gamifying.

4.3 Perceptions on Other People’s Views of Wellness Technology Use

Most of the participants neither shared their wellness related data with other people nor felt the need to tell anybody that they were tracking their wellness. Some felt exercising was their own personal thing and no one else’s business, and some were reluctant to show their results to anybody because they felt other people exercise more and have better results. Some believed that no one would be interested in whether or not they track their wellness or exercise, because it is considered so normal these days. Some had the

perception that many others usually view tracking as too difficult or time consuming and therefore not worth doing. Some reported that other people had asked them about their use of the device they were wearing.

Some participants were even a little bit ashamed of their exercising and results. One participant was worried to be seen as too old-fashioned if anybody knew about the habit of doing exercise with an exercise video. Another participant reported to be sure other people would consider geocaching to be a too childish hobby. Some applications also seem to have a negative image, and people were not eager to admit they were using such application. One such example was a calorie-tracking application, which was associated as a tool for overweight people.

One participant felt embarrassed to wear a sport watch due to feeling concerned to be seen as an athlete by others, even though being just a regular exerciser; “In badminton it can be embarrassing to wear a sport watch since my opponent is better than I am. It makes me feel I take this too seriously. I try to start my watch in a way that is as unnoticeable as possible”.

The perceptions were similar among the young elderly. If anything, they seemed to feel even more strongly about not wanting to share their own personal data with other people. They also believed that their friends would not be interested in their own data. Respectively, they reported to be very uninterested in the data of their friends.

Even though there were more negative perceptions regarding other people’s views on personal wellness technology use, a few participants reported they felt proud and got extra motivation when other people saw them doing something different and positive such as running or using a wellness technology.

5 Conclusion

The purpose of this study was to deepen the understanding of how people use and perceive wellness technologies in their everyday lives. The focus was also on related gamification and perceptions regarding other people’s views. A qualitative diary study based on phenomenographic approach was conducted. The study included diaries from 18 participants who kept diaries for six weeks regarding their wellness technology usage and related issues.

The most common reason for acquiring a wellness technology was to get more accurate and objective data. Motivational effect was also an important factor behind acquiring one. Based on the data, it seems that the use of wellness technologies can positively influence wellness motivation. For some, a mere buying of a device brings additional motivation, but for the majority, being able to follow personal progress by receiving objective data and that way comparing own results to previous results is the key motivational factor. This implies that it would be worthy for the designers and the parties aiming to increase

people's wellness to provide technologies with features that enable following one's own progress in desired areas of wellness.

In general, wellness technologies can help people to learn more about the level of physical activity and training effects. Regarding the finding that a learning-effect could lead to discontinuance in using the technology, it demonstrates that even if the user would stop using the technology, it does not necessarily mean that the technology or its use would have been a failure, but instead a success in a way of being able to teach the user the things he or she wanted to know. This was an interesting new finding and something to consider, for example, when investigating the retention or use continuance with these technologies and also IS in general.

The biggest concerns the users seem to have are related to the situations where the device stops working during an exercise or for some reason does not record the entire exercise session properly. For some, this may even be a reason to stop exercising. Therefore, to achieve longer-term motivation, for some people it would be better to use devices and applications they are already familiar with. Both users and those promoting wellness should acknowledge this. Another concern was related to wearing a wellness device, such as a sport watch. Whereas some described wearing one to be perfectly "easy" and normal, some reported not feeling comfortable wearing one outside exercising or sometimes not even when exercising. This obviously limits their usefulness in tracking other daily wellness related activities. Thus, these devices should be designed as ubiquitous and as easy-to-wear as possible, also acknowledging the look of the device and the different user groups.

Regarding gamification, the most common type of gamifying seems to be comparing personal results or data with previous personal data – usually with the help of some technology. This kind of comparison also seemed to wake experience of gamification, which, in turn, was reported to influence motivation positively. It also seems that some people engage in self-gamification, which we define as a desire-based action to gamify some recurring activities or bodily functions. Interestingly, pursuing the experience of gamification by self-gamification can begin as non-technical, but later on, be supported by the use of some technologies. In general, including a gamification element to wellness related activities seems to bring extra challenge, motivation, or even make the activity as more enjoyable. Thus, people struggling with their wellness motivation could try self-gamification or some gamified technological wellness solutions. The designers should undertake the process of gamification, for example, implement their devices and application with gamified features. The societal parties working with wellness promotion might be able to increase the effectiveness of their interventions with gamification.

With the exception of more competitive individuals, most participants did not feel the need to share their training data with other people since the information was generally considered personal. Some were also concerned how other people view their wellness technology use. This implies that the marketers of these solutions could benefit from

making it seem that the use of these devices is common and socially acceptable among their target audiences.

Regarding the young elderly, experiences of gamification were similar with people of other ages. Compared to others, they felt more strongly about the personality of their own data and felt it to be uninteresting to others. Regarding the usage in general, there seemed to exist polarisation among the participants. These findings support the call made by Carlsson and Carlsson (2016) about the need and importance of studying the habits and experiences that the young elderly have with digital wellness solutions.

This study provides interesting insights into people's everyday use of wellness technologies. The results assist the scholars and wellness technology providers in deepening their understanding on wellness technology usage. The developers can utilize the findings in providing and marketing solutions that are better welcomed by their target audiences. The findings may also assist people working in the healthcare sector in implementing different wellness technologies for health and wellness related purposes.

6 Limitations and Future Research

There are few limitations to the study that should be noted. First, studies concerning wellness and exercise behaviour at some level have been known to include the challenge that research subjects may intentionally report their behaviours as more positively than in reality, thus biasing the responses. However, the participants of this study were emphasized that the wellness and exercise behaviour itself are not relevant regarding the study but rather the experiences and perceptions regarding wellness technologies and their use. The intention of this was to minimize the possibility that participating in the study would lead the participants to intentionally change their behaviour. Second, the study was based on the diaries from 18 participants. Although providing a great amount of information, the amount of data should be considered when assessing the results of the study. Especially so in regards with the young elderly, as there were only four of them. One should also consider the female-dominance in the sample. Third, the level of detail in reporting in the diaries varied between the participants. Despite these limitations, this study provides some highly valuable new insights into the subject.

Future research could collect diary data from a longer time period and focus on possible behaviour changes regarding wellness behaviour and the usage of wellness technologies. Future research could also repeat similar research with particular focus on some specific user group, for example, the young elderly or athletes. Overall, the whole area of wellness technology usage continues to be an important topic of research.

Appendix A. Description of the Sample

Participant	Gender	Age	Employment status	Household type
1	Female	28	Employee	One family without kids
2	Female	31	Employee	One family without kids
3	Female	22	Student	One family without kids
4	Female	25	Student	One family without kids
5	Female	31	N/A	One family with kids
6	Female	33	Employee	One person
7	Female	57	Employee	One family without kids
8	Female	28	Unemployed	One family with kids
9	Female	55	Employee	Single parent
10	Female	63	Unemployed	One person
11	Female	66	Pensioner	One person
12	Female	30	Home parent	One family with kids
13	Male	18	Student	N/A
14	Male	33	Employee	One family without kids
15	Male	34	Employee	One family without kids
16	Male	66	Pensioner	One family without kids
17	Female	70	Pensioner	One family without kids
18	Female	22	Student	Single person

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