Proceedings of the 6th Annual Architectural Research Symposium in Finland 2014:
Designing and Planning the Built Environment for Human Well-Being

Converting happiness theory into (interior) architectural design missions

Designing for subjective well-being in residential care centers

Ruth Stevens
Hasselt University, Fac. of Architecture and arts, Diepenbeek, Belgium
ruth.stevens@uhasselt.be

Ann Petermans
Hasselt University, Fac. of Architecture and arts, Diepenbeek, Belgium
ann.petermans@uhasselt.be

Jan Vanrie
Hasselt University, Fac. of Architecture and arts, Diepenbeek, Belgium
jan.vanrie@uhasselt.be

Abstract
Subjective well-being (SWB) is an emerging research topic in the field of design sciences, whereby various design researchers focus on the key question *'how to design for SWB'*. Throughout different design disciplines, definitions for SWB are rising and design models and strategies are being developed in an effort to enable designers to increase users' SWB. However, a clear image of how to design an (interior) architectural environment with the purpose of increasing people's level of subjective well-being is still in its infancy. In this paper we formulate spatial design missions for (interior) architects that possibly ignite or increase users' SWB. We start from the general PERMA happiness model of Seligman (2011), modify it to our research needs and illustrate it with material from a design exercise that was carried out by master students in interior architecture in which they had to rethink the communal space system of an existing residential care center. We conclude the paper by formulating seven design missions that, in our viewpoint, allow to augment SWB for elderly persons in residential care environments.

Introduction
In this paper, we will research the link between subjective well-being (SWB) and the built environment specifically applied to elderly people residing in residential care. Public opinion stresses the importance of the built environment and its effect on aging well and the sense of SWB of elderly people. Note that by aging well and the sense of SWB, we do not mean augmenting the health of elderly persons by health supportive design interventions. Our research focuses on the the role of the built environment in terms of how happy people feel in these environments, and the possibility for them to flourish here. Our aim is not to counter strict health-related, mental or physical *ill-being* by specific physical design interventions, e.g. making a living area physically more accessible for an elderly person, admit more daylight (e.g. Morelli and Dilani 2005), but to increase subjective well-being, enhance the possibilities to flourish, using architecture as a tool to achieve that goal. In other words, our approach is not to eliminate problems that threaten one's daily living, but rather to seek opportunities to uplift one's level of SWB and assist people in flourishing. Our scope is based on empowerment of people, not problem solving.

In academic research there are studies that make a link between the built environment and our vision on SWB (e.g. Wahl & Oswald 2010; Wahl et al 2012). Many studies state that SWB can only be accomplished by personal abilities and endeavor in combination with external 'goodness' of surrounding others or parameters, that is, the context (Nussbaum 2001). However, in international research, that 'context a person lives in', is usually defined as the community and its characteristics (e.g. Hooghe and Vanhoutte 2010), or the social structure of the neighborhood one is living in (e.g. Gardner 2011). These types of contexts all refer to the place, the environment a person lives in, in a variety of ways. However they do not often make a link to the actual character, interior of that environment. Nevertheless, the built environment that surrounds us is a factor we are confronted with all the time, and therefore we interact with it, willingly or unwillingly. Regarding our approach to SWB, we feel that the interior perspective of the actual influence of the built environment on one's well-being is still missing.

We believe that the (interior) architecture surrounding us is another important factor of the earlier mentioned 'context'. This idea is shared in academic research (e.g. Knudstrup 2011, Smith, et al 2012) and supported by the philosopher Alain de Botton (2006) who claims that one of the great, but often unmentioned, causes of both happiness and misery is the quality of our built environment, or in other words, the architecture surrounding us. This implies that the architect and the interior architect become actors in our quest of SWB, and that a possible key to obtaining SWB can be found in the *quality* of the interior architectural design and, thus, also in the skills of the (interior) architect. Our research finds itself in this exact spot, and focuses on the link between interior architecture and SWB. We try to contribute to the quality of architectural designs by first researching in what way (interior) architects can approach designing-for-SWB as a specific design challenge.

Here, we concentrate our research on elderly people residing in a residential care center (RCC). They are an interesting target group in this respect, because they spend most of their time within the same environment, which implies that the architecture surrounding them is an extremely important factor in their daily living. Also, residential care environments are interesting cases concerning SWB of users, since they are usually not co-designed by the users themselves, but resulted from a collaboration of other stakeholders and the spatial designer. Therefore, RCCs can be interpreted as manifestations of how the different stakeholders, such as owners, managers and staff members, understand housing with care for the elderly and built what is best for the residents in their opinion (e.g. Popham & Orrell 2012). The users themselves, however, were usually not involved in the design process. Looking at the different complaints of residents that were registered via the *woonzorglijn* (a complaints desk that registers complaints regarding RCCs; Woonzorglijn 2011), we can see that many of the complaints can be brought back to (interior) architectural design decisions, and can therefore be avoided when including residents in this design process. Consequently, it appears that the present reality of RCCs is not at a satisfactory level and the physical environment does not meet the residents' well-being needs (e.g. Hujala 2013). A final aspect that contributes to our choice for residential care environments is that due to the ongoing trend of the greying society (FGOV Statistics Belgium 2012), the housing of elderly persons in residential care facilities is a high-priority but rather problematic sector (in Belgium). We refer to the shortages in vacancies, the negative stigma in public discourse, and foremost the upcoming tensions we expect: future generations of elderly persons transferring to a residential care facility will likely have a different, more elaborate set of expectations, wishes and demands as they are used to a more prosperous life, with free time and extra money to spend on hobbies and vacation, and tend to both have and voice strong opinions on these issues. These are all thoughts that need to be taken into account by designers when conceptualizing residential care centers for the future.

Our goal is to be able to design environments for people in order for them to flourish. More than 50 years ago, Frances M. Carp (1966) already stated that physical and social conditions increase residents' satisfaction with living arrangements. Today, we also look at the emotional and intangible impact of

the built environment. Unfortunately, there are no readily available guidelines for designers to solve this current SWB quest and obtain a positive, strengthening interrelation between a person and the built environment. With this paper we want to contribute to SWB-research in the field of (interior) architecture and define in what proactive way (interior) architecture can stimulate SWB, specifically applied to elderly persons in residential care.
Note that we do not aim to deliver a single, "optimal" spatial design, since well-being cannot be 'produced' or 'manufactured' (Hujala 2013) and interior architecture will always remain a creative business. We believe it is more useful to think in terms of spatial SWB-concepts that we can hand to designers in the form of design missions. It is important that a designer can creatively implement these missions to eventually increase or stimulate well-being, since designing is intrinsically a creative process and the resulting spatial environments should not become fixed, 'one and the same' solutions. A designer's interpretation is part of the creative process of designing. Therefore "design work" in the field of SWB will eventually lead to a mix of designed objects, scenarios of usage, etcetera. Together, these realizations might be more effective in supporting the possibility of wellbeing (Miller and Kälviäinen 2006). In this respect, Klaus Krippendorf (2006 p. xv) says: "Design has to shift gear from shaping the appearance of mechanical products [....] to conceptualizing artefacts, material or social, that have a chance of meaning something to their users, that aid larger communities, and that support a society that is in the process of reconstructing itself."

In the next sections of this paper we will at first explain the contribution of the built environment to SWB. Subsequently we will explain our research strategy and the methodology and eventually work towards spatial missions for SWB. We will conclude with a discussion and further research possibilities.

The contribution of the built environment to SWB: a spatial perspective

"Place" is a concept consisting of social, cultural, historic, political, economic and many other features that make up the meaningful context of human life. It is increasingly recognized as an important element in research, education and built practice relating to life of elderly people (Hujala 2013). Research in elderly care is starting to acknowledge the importance of physical place (the architectural space; e.g. Rioux 2005) and begins to emphasize that the physical environment is also a determinant of SWB. In the last decade, person-environment interaction has become a popular research topic in international research in architecture; Wahl et al (2012) for instance researched the physical context and the social context of ageing, and Rioux (2005) emphasized that more studies need to be performed on combinations of people/space/activity to increase elderly persons' well-being. According to Rissanen et al (2010) many studies give insight in the complexity of the relations between persons and their space. However, an integrative model is still missing.

Looking in detail at the scope of SWB studies regarding person-environment interaction, the subject is mostly the level of the neighborhood (by which we mean infrastructure, services closeby, etcetera.), the physical situation of the private house versus institutionalized elderly care, or the level of homelikeness in residential facilities (e.g. Davis et al 2012, Iwarsson and Isacsson 1997, Fay and Owen 2012). Studies specifically dedicated to SWB in the spatial setting of RCCs, usually deal with interior architectural elements on micro level that generate a more pleasurable experience, for example the lighting fixtures, the arrangement of the furniture, material choices, etcetera. (e.g. Weenig & Staats 2010, Stevens et al 2013). Also spatial interventions that fight ill-being of RCC-residents are discussed, for example wheelchair accesibility, userfriendly bathroom furniture; however these interventions contribute to the objective well-being (OWB) of residents, and are therefore more closely linked to Universal Design approach than to the SWB approach. We take a different approach, and try to find out what an interior architectural space should allow, generate for its users, instead of how it should be equipped and decorated (Stevens et al 2014). We do not aim to provide concrete instructions on 'how to…', because in that case the creativity of designer would be overlooked, resulting in a

standardized environment for the heterogeneous target group of elderly persons. We believe designers can contribute to SWB of residents if they are able to use their spatial creativity and broaden their scope to design spaces for activities or functions (Stevens et al 2014) that support users in one way or another. Popham and Orrell (2012) have evidenced that for institutionalized elderly with dementia disorder, not the layout of the facility was the most important factor, but the ability to make choices and engage in activities. This supports our point-of-view. Topo and Kotilainen (2009) also stated that living environments at their best provide opportunities for action and self-expression of residents. At their worst, they limit, stop actions and provide little opportunities. Therefore, a space must carry enabling qualities and 'afford' people to be able to do things. In other words, a building needs to be generous towards its target audience by acting on human abilities in a supporting way (Stevens et al 2014).

Research strategy and methodology

As spatial experts, we aim to look for missions to design environments that support people in the process of flourishing. This is a first test in trying to develop spatial missions in designing for SWB for the target group of elderly people is the spatial setting of RCCs. Figure 1 is the schematic overview of this particular research and the methodology that was followed for the different steps.

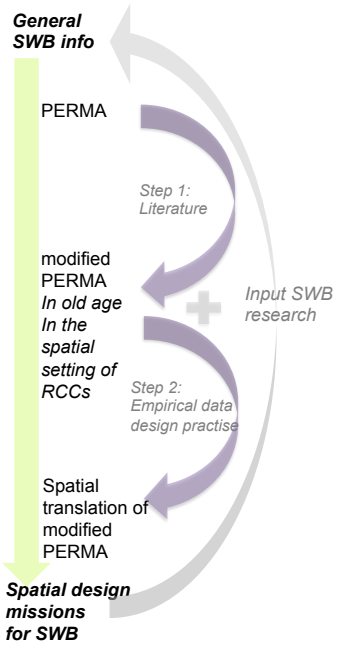

Figure 1. Schematic overview of research methodology

At this moment, there is no specific SWB model available that is applied to the target group of elderly people in the spatial setting of residential care. Therefore, we need to start from general SWB or happiness models. (Note that in academic literature the terms 'happiness' and 'SWB' are often used interchangeably, and in this paper we adopt these terms when speaking of models that have a long-term influence on our feeling of subjective well-being.) Because human flourishing, which means being at your best, and feeling positive, meaningful and virtuous at the same time (Desmet & Pohlmeyer 2013), is our endgoal, we built our research on the base of an existing and acknowledged happiness model that is developed to assist people in their quest for flourishing. As figure 1 illustrates, we chose the PERMA-model, in short a general happiness model built up from five SWB parameters developed by Seligman (2011). The generality of this model was a key factor in our choice, since it summarizes and contains SWB-information on an abstract level, which implies that there is room to specify and 'upload' it. In this paper, we adopt a deductive research approach. In the following chapter of the paper, we will explain the PERMA model in detail and what it is developed for.

Next, we need to specify PERMA to our target group in their specific spatial setting, which means rewriting and filling in the existing universal PERMA parameters to fulfil the well-being of the specific target group of elderly persons in the spatial setting of residential care centers. Therefore, we research academic literature concerning SWB in old age (step 1 in figure 1). This will lead to a modified PERMA model in old age in the spatial setting of RCCs.

In the following step (step 2 in figure 1), we try to convert the modified PERMA-model applied to old age in the spatial setting of RCCs into spatial design missions by looking at design practice. In this paper, we use empirical data which we retrieved from a design for SWB exercise executed by master students in interior architecture, in which they had to rethink the communal space system in an existing RCC with the goal of augmenting the SWB of the residents. In order to do this, students had to immerse themselves in the RCC, and collect ethnographic research data by questioning visitors, staff and residents, and accompanying staff throughout a workday. These data, together with a SWB focus point that was given to them, helped students in defining a SWB-threat, and eventually designing an intervention that had the potential of augmenting the experience of SWB of residents. The design data from the exercise were analyzed and we looked for spatial "translations" of the modified PERMA parameters throughout the design results. In practical terms, students were questioned to explain their design objectives and the final design results

were put to meeting with the residents of the RCC the exercise was held in. In that way, we got a clear perspective on what kind of SWB increasing experiences students had intended to create for the residents, and how these experiences were perceived by the residents judging by the design presentations.

Eventually, seven spatial SWB design missions were retrieved. This list is the result of a spatial convertion of the modified PERMA, and are characteristics a SWB designed environment could strive to meet for the target group of elderly people in the spatial setting of RCCs.

Towards spatial missions for SWB

A positive interaction between the environment and our personal self, is important in all ages, but the late phase of human life span seems highly sensitive to this character of person-environment interaction (Wahl and Oswald, 2010). In order to ignite SWB, the relationship between a person and his or her environment should be at its best. We have earlier defined that an environment should be generous towards its users, hence we need to design spaces that allow activities to happen and actions to take place in that assist people is becoming the best person they can be. In what follows, we elaborate on the issue how we believe that the existing happiness model of Seligman (2011) can be translated into design information that can assist (interior) architects in the design processes.

PERMA model of Seligman

The PERMA-model of Seligman (2011) is a model rooted in positive psychology that contains the 'building blocks of human well-being', and therefore an interesting starting point in our research. Seligman drew upon five elements, that are basic human motivations each playing a significant role in our experience of well-being. Together, these elements form a foundation for a flourishing life (Seligman 2011). The aim to support people to flourish is shared by Seligman and ourself, however we have a more detailed scope regarding the target group in a specific spatial setting. Therefore we aim to apply the model and modify to stand at the service of (interior) architecture, in that way (interior) architects can assist people in their flourishing process.

A positive interaction between the environment and our personal self, is important in all ages, but the late phase of human life span seems highly sensitive to this character of person-environment interaction.

The five PERMA parameters are Positive emotion, Engagement, Relationships, Meaning and Accomplishment, which together form the acronym PERMA. In what follows, we shortly elaborate about each of these elements:

-Positive emotions is pleasure and enjoyment, fight negative bias, create upward spirals.

-Engagement: becoming absorved in an activity, achieving the state of being in the flow, a state of total engagement, losing sense of time (Csikszentmihalyi 1990).

-Relationships: having and maintaining a close and authentic connection to others, supporting a social network.

-Meaning: having a purposeful existence, attaching oneself to something larger than life, spirituality, charity.

-Accomplishment: gaining a feeling of success, having goals in life and commit to them which hopefully leads to achievement. This helps to build self-esteem.

To take action, and try to integrate the PERMA in one's life with the purpose of augmenting the experience of well-being, possible actions can be assigned to each of the five elements. Therefore, in order to try to formulate spatial missions for elderly people residing in residential care while basing ourselves on PERMA, an intermediate step is necessary, namely specifying the PERMA parameters to this specific target group.

PERMA modified for elderly people in residential care: step 1

We have made the remark that PERMA is a general theoretical happiness model, not specifically applied to a particular target group. In our research, we focus on the group of elderly persons who reside in the spatial atmosphere of residential care. Since the personal and spatial dynamics in this context are quite specific (Wahl and Oswald 2010, Wahl et al 2012), there is a need to

”translate” the PERMA parameters into more concrete terms related to the target group and the spatial situation. As visualized in figure 1, we looked for an appropriate interpretation and specification of the PERMA parameters for the target group, while researching academic literature concerning SWB in old age. An visual overview of this step can be found in table 1, below.

In environmental gerontology, Lawton and Nahemow (1973) stated that aging well involves a dynamic person-environment interchange. According to Miller and Kälviäinen (2006, and Hujali 2013), positive psychology can be an aid to define SWB of elderly persons in RCCs. In their research, they made a link with the built environment, and state that designers should aim to enhance well-being in three general ways, generated from their own research and expertise: (i) enabling effective and involving action with an awareness of control, (ii) encouraging satisfying social interaction, and (iii) promoting mindfulness, physical involvement and enjoyment. In the authors' viewpoint, all three topics from Miller & Kälviäinen (2006) are specifications of parameters in the PERMA model. Enabling effective and involving action is a very closely linked to 'Engagement', being part of something and participating. The concept of 'flow', introduced by Csikszentmihalyi (1990) connects the visions of Miller and Kälviäinen and Seligman in this respect. Awareness of control is a form of 'Meaning' for residents in residential care, since control-issues come up when having to move from the private residence into a residential care setting. In the current RCCs, residents have to waive the privilige of filling in their own life, and thereby usually feel deprived of the sense of control in favor of strict time schedules and workplans of the RCC. Being able to take control over daily routines and activities can therefore be sensed as meaningful and contribute to a purposeful existence for residents. Satisfying social interactions corresponds to the parameter 'Relationships' from PERMA. Promoting mindfulness, physical envolvement and enjoyment are logical specifications for 'Engagement' (physical activity) and 'Positive emotion' (mindfulness and enjoyment).

Building forth from the theory of Miller and Kälviäinen (2006), we further explored environmental gerontology literature that addresses SWB in old age. Combining insights is necessary to draw conclusions on how architecture can influence well-being for elderly persons in their built environment, and eventually translate this information for designers. Our search mainly indicated variations on the same topics that Miller and Kälviäinen talked about; for instance Wahl and Oswald (2010) have built an overarching person-environment conceptual framework in which they state that housing related control beliefs and proactivity are important aspects in the behaviour of elderly persons towards their home environment. Again, 'control' (control beliefs) is shown to be an important aspect in the SWB of elderly persons, which endorses its status as a specification of 'Meaning' from PERMA. Also, 'activity or involving action' is a recurrent item, and is a form of 'Engagement' (PERMA) as we have sais before. This is agreed by Stephen Katz (2000), who claims that 'activating' elderly persons in RCCs is a typical Occidental concept in ageing well. Trying to push residents to keep fulfilling small tasks themselves eventhough they might need assistance, keeps them from letting themselves go completely. That could slow down declination and both physical and mental decay. Therefore, encouraging elderly persons to train their skills, and challenge them into trying new things, can help them to age well, and contribute to their well-being.

Hyde, Wiggins, Higgs & Blane (2003) state that next to control, also autonomy, self-actualization and pleasure are important conditions to obtain SWB and measure quality of life of elderly persons. We have already labeled 'control' as an interpretation of PERMA's 'Meaning'. In the setting of elderly persons in RCCs, this PERMA parameter also refers to 'autonomy'-issues, since being able to take control over daily actions, provides residents with a sense of freedom and therefore autonomy. Hyde et al's parameter of self-actualization can in our viewpoint be understood as en example of PERMA's 'Accomplishment', since maintaining a sense of self-esteem and self-determination while being in a situation that forces one to receive intensive help from others is something residents can strive for and experience as an

achievement. Hyde et al's parameter of pleasure is an element that is a clear synonym for 'Positive emotion' of the PERMA-model.
Kane, Bershadsky, Kane, Giles, Degenholz, Liu and Cutler (2003) focussed on SWB and quality of life in care homes by measuring the following parameters: autonomy, dignity, privacy, meaningful activity, enjoyment, relationships, comfort, security, functional competence for being independent, sense of being valued and spiritual wellbeing. Matching the parameters articulated by Hyde et al. (2003) and Kane et al. (2003) with the three topics of Miller & Kälviäinen (2006) shows that all elements are specifications of one of in some cases more than one PERMA parameter (see Table 1).

Combining the insights from gerontological SWB theories, learns us that PERMA can be translated and specified into five items that specifically adress SWB in old age in the spatial environment of residential care, see table 1 below.

PERMA	*Step 1: Literature*		**Modified PERMA** ***in old age in the spatial setting of RCCs***
positive emotion			**mindfulness & enjoyment**
	mindfulness & enjoyment	*Miller & Kälviäinen*	
	pleasure	*Hyde et al*	
	enjoyment	*Kane et al*	
	comfort	*Kane et al*	
	spiritual well-being	*Kane et al*	
engagement			**involving action**
	physical involvement	*Miller & Kälviäinen*	
	proactivity	*Oswald & Wahl*	
	meaningful activity	*Kane et al*	
relationships			**satisfying social needs**
	privacy	*Kane et al*	
	relationships	*Kane et al*	
meaning			**control belief**
	awareness of control	*Miller & Kälviäinen*	
	control belief	*Oswald & Wahl*	
	control	*Hyde et al*	
	autonomy	*Hyde et al*	
	autonomy	*Kane et al*	
	dignity	*Kane et al*	
	security	*Kane et al*	
	being independant	*Kane et al*	
	meaningful activity	*Kane et al*	
	functional competence	*Kane et al*	
accomplishment			**self-actualization**
	self-actualization	*Miller & Kälviäinen*	
	self-actualization	*Hyde et al*	
	being valued	*Kane et al*	

Table 1. PERMA translated into modified PERMA in old age in the spatial setting of RCCs

Human-related terms must be converted into space-related derivatives, or affordances of space that an architectural designer can work with. This way, architecture can become of great value in assisting people in their flourishing process.

The specified version of PERMA applied to elderly persons in the spatial setting of residential care, can be interpreted as a list of human motivations, or in other words, abilities or positive characteristics one should strive for or possess in order to augment the feeling of well-being. As spatial experts, we believe the interior environment can act as an important SWB-catalyst by supporting or even provoking these characteristics through the way the space is built up (Stevens et al 2014). Consequently, from the viewpoint of designers, the specified PERMA list should be looked at in a different light. In order to be able to create environments that trigger the kind of human 'abilities' that are listed up in the specified PERMA (i.e., table 1), designers could strive to interpreted and read it as a list of characteristics of the built environment in order to be able to nurture and support those human characteristics. To facilitate this, we need to convert the human-related terms in the specified PERMA into space-related derivatives, by which we mean affordances of space that an architectural designer can work with in order for (interior) architecture to be of great value in the realization of SWB-environments and to assist people in their flourishing-proces. This convertion process is what we call formulating spatial design missions.

Spatial translations of modified PERMA: step 2

In order to try to built up spatial missions out of the modified PERMA parameters, we need to pore upon actual architectural practice.

In this research, we chose to use empirical data, the analyzed results of a design for SWB exercise which 40 master students in interior architecture executed in February 2014. In this exercise, ten groups of each four students had to rethink the communal space system of an existing RCC with the goal of augmenting SWB of residents and add potential value to the entire neighborhood. In order to do this, students had to first immerse themselves in the RCC, and collect ethnographic research data by questioning visitors, staff and residents, and accompanying staff throughout a workday. These data, together with a SWB focus point that was given to them, helped students in defining a potential SWB-threat, and eventually designing an intervention that had the potential of augmenting the experience of SWB of residents.

In what follows in our discussion of the design cases, we screen the results of four design cases from this exercise to distill and capture ways in which the modified PERMA parameters are present in each design.

Discussion of design results

In this section, we will discuss four design cases from this design exercise. We opted to report on four cases since they have a great variety in concept and design outcome, and all provided us with new and unique ways of carrying in them the modified PERMA parameters. In this phase we try to capture the spatial options students have applied to tackle this design for SWB challenge, and we fill in the spatial affordances created for each modified PERMA parameter, which is shown in the table below the case description. In this way, we transform modified PERMA parameters which are human 'abilities', into spatial 'affordances'. The latter being a more suitable worktool for designers.

In figure 4 below, an image per design case is given.

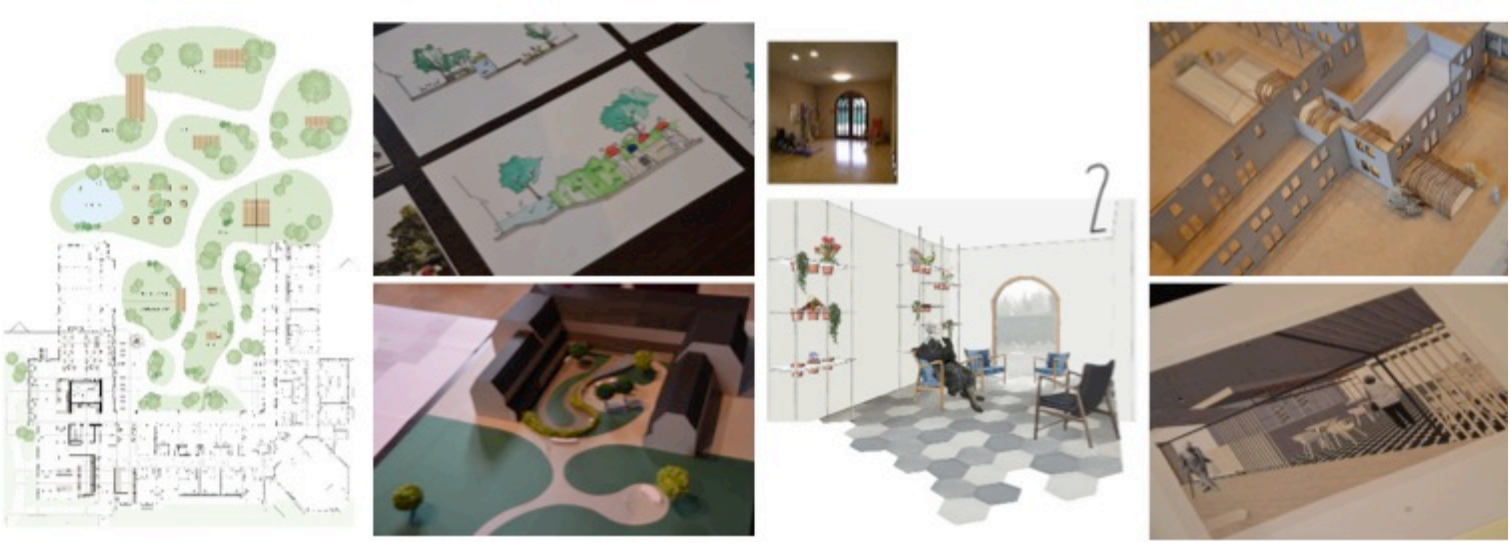

Figure 4. Images of design results From left to right: design case 1, 2, 3 and 4.

A first group of students integrated a children's animal farm into the structure of the RCC, accompanied with workshop spaces, a coffee house and small retail function. The concept is to attract outsiders to the RCC, let children and residents adopt a small animal and let them take care of it. Products of the animals (milk, eggs, wool, etcetera.) can be used to, on the one hand, organize workshops to create a product (pies, cakes, knitted items, etcetera.) and on the other hand sell these "home-made" items to visitors. This idea should bring together visitors and residents into meaningful activities and fortify the social network of the neighbourhood. In the following table 2 we indicate how the results of this group of students relate to the modified PERMA model in the spatial setting of RCCs.

PERMA	modified PERMA	CHILDRENS'S FARM
positive emotion	**mindfulness & enjoyment**	enjoying company of animals looking at children playing reminiscing about pets one has had
engagement	**involving action**	adopting an animal taking care of an animal making things out of animal products, e.g. Cake selling things made from animal products maintaining the children's farm
relationships	**satisfying social needs**	resident-animal resident-child resident-visitor
meaning	**control belief**	co-maintaing the farm having control over the adopted animal assisting children in taking care of animals sharing knowledge in workshops
accomplishment	**self-actualization**	being able to take care of an animal being able to make things yourself being able to help maintaining the farm

Table 2. The design case of the children's farm applied to modified PERMA

A second group of students tried to upgrade the inner courtyard of the U-shaped RCC by developing several unique experiences in the garden, for example time capsules, sound covers, etcetera, and create a coherent, mind-arousing garden design that offered an interesting vista during daytime but also at night through different light schemes. Also, the inner courtyard had a separate part for the residents of the dementia ward, for which students designed a more elegant and experience-focused garden design. The old wired fence that was used as a physical barrier to enclose the garden for people residing in the dementia ward was replaced by a garden design on different spatial levels using a fish tank and garden boxes as separating items. Also, students developed a safe and barrier-free garden, in a way that residents could enter the garden without help and could be free to do so whenever they feel like it. See table 3.

PERMA	modified PERMA	INNER GARDEN
positive emotion	**mindfulness & enjoyment**	enjoying a seasonal garden sound/small/sight of natural items experiences: time capsules, sound covers, etc. surprising views daytime vs. nighttime
engagement	**involving action**	gardening, maintaining the garden feeding the fish putting things in the time capsules choosing different sounds to put in the sound covers
relationships	**satisfying social needs**	resident-visitor resident-nature (greenery & fishtank) entertain guests in garden guide visitors through the garden
meaning	**control belief**	being able to go into the garden without escort being able to enter garden at any moment in time
accomplishment	**self-actualization**	maintaining the garden

Table 3. The design case of the inner garden applied to modified PERMA

A third group of students refurbished the living area of the dementia ward. The students were particularly inspired by the reminiscing theory, and tried to let people with dementia relive their memories through sensory experiences. Students created wander paths with textured walls, personalized doors to private rooms with mailboxes, decorational objects with pictures of themselves, resting places that looked out onto picture walls with images of the collective past or recognizable activities (images of the Belgian Expo 1958, children playing in the snow, people dancing, etcetera). These were all small- scale interventions specially developed for people with dementia disorder to increase their feeling of well-being. See table 4.

PERMA	modified PERMA	DEMENTIA WARD
positive emotion	**mindfulness & enjoyment**	sensuous stimuli: colours, sounds, smell, etc textures on the wall -> feel the wall as guidance enjoying images that takes one back to the past
engagement	**involving action**	reminiscing the past
relationships	**satisfying social needs**	resident-visitor resident-staff resident-resident
meaning	**control belief**	being able to wander being able to reminisce about the past being able to move through the ward wihtout guidance
accomplishment	**self-actualization**	finding the proper room through recognition

Table 4. The design case of the dementia ward applied to modified PERMA

A fourth group of students featured the RCC with a ‘backdoor’. In Belgium, the backdoor of one’s home is the entrance used by family members or close friends and it has a ’no-need-to-knock-just-walk-in’ policy. Students found out that visitors currently experienced the entrance of the RCC as too formal, and therefore, they came up with the metaphor of a ‘backdoor’. In their design, the backdoor was incorporated by an added volume that was visible from the street in the shape of a greenhouse that pierced the RCC and stretched all the way into the inner courtyard. In the volume, small garden activities were organized, in a way that visitors were immediately submerged in a ‘full-of-life’ atmosphere, and had a chance to mingle with residents and other visitors. The added volume directed visitors to the inner courtyard, but also drew them into the existing communal spaces that were pierced by the added greenhouse. The ‘backdoor’ could in many ways be seen as a social catalyst. See table 5.

PERMA	modified PERMA	BACKDOOR
positive emotion	**mindfulness & enjoyment**	natural stimuli: garden and harb boxes enjoying visitors entering: outside action participating in activities
engagement	**involving action**	participating in gardening workshops entertaining guests
relationships	**satisfying social needs**	resident-visitor resident-resident resident-neighborhood
meaning	**control belief**	freedom to have people over whenever they want freedom to invite people to come through the backdoor
accomplishment	**self-actualization**	gardening activities entertaining guests

Table 5. The design case of the backdoor-concept applied to modified PERMA

Formulating spatial design missions

Looking at all four design cases, we notice that a great deal of human actions and experiences that were categorized under the modified PERMA-parameters have been realized through an (interior) architectural design. This implies that the designed environments in these design cases all show promising spatial affordances related to the SWB of residents of RCCs. In other words, we are getting closer to being able to name spatial design missions to design for SWB in this specific setting.

In order to take a first step in determining design missions for SWB and thereby exercise a positive influence on the experience of SWB of residents in residential care, we looked for common design elements, concepts amongst the designed actions and experiences per PERMA-parameter throughout the design cases. We then ”translated” the common design elements students have realized into a spatial design mission, affordances of designed spaces, environments.

For the modified PERMA parameter 'mindfulness and enjoyment', we found many sensory based, mind arousing interventions in the design results we discussed. Further, we also noticed the activity of 'reminiscing' to be present in some design cases. We believe this is also an act of mindfulness, with a specific layered content for elderly persons. 'Mind arousing/reminiscing' therefore seems an appropirate spatial mission for this parameter.

The modified PERMA parameter 'involving action' can be found in the designs as actions that in some way activate the elderly persons, or even assign them to tasks to contribute to the goings in the residential care facility, hence residents are challenged to participate. We found that 'challenging' is a correct spatial mission to translate this parameter in, since the designs presented a wide range of activities ranging from easy up to difficult and intensive. In other words, assisting people in reaching a flow-state in present skills up to learning new skills. The parameter 'satisfying social needs' was in most designs linked to stimulating social interaction between as many different groups of people, however, also an empathic layer was found in the designs. The elderly people were often provided with some form of social responsability, for instance take care of an animal, lead on in workshops, etcetera. Therefore, we labeled 'social skills/empathy' the spatial mission for this parameter. 'Control belief' throughout the designs, could be found as actions linked to giving responsability to the elderly persons (for instance co-maintaining a garden), or give them freedom and the independence to do things on their own. In other words, responsability is given back to residents. Therefore, from a human centered viewpoint, 'self-reliancy' is a correct spatial translation for the mentioned modified PERMA parameter. At last, the parameter 'self-actualization' was actually more or less embedded in all the other spatial missions formulated, because we feel all actions taken, are in someway contributing to the feeling of self-actualization, striving to let residents employ the maximum of their inner resources. Therefore, we labeled this parameter 'empowerment'. It is important that a designer keeps 'empowerment' in mind when thinking of designed activities for the elderly persons, since flourishing is our aim. See table 6 for an overview.

PERMA	modified PERMA		SPATIAL DESIGN MISSIONS
positive emotion	**mindfulness & enjoyment**	*Step 2: Empirical data design practise*	mind arousing reminiscing
engagement	**involving action**		challenging
relationships	**satisfying social needs**		social skills empathy
meaning	**control belief**		self-reliancy
accomplishment	**self-actualization**		empowerment

Table 6. Modified PERMA translated into spatial design missions

In other words, combining and comparing the designed actions and experiences from each design case thus lead us to formulating a number of concepts, spatial design missions that should be read as a list of conditions the interior environment of an RCC should strive to meet, in order to be able to nurture and support the human abilities listed in the modified PERMA model. In this specific research, we formulated seven spatial design missions out of the design results applied to modified PERMA. Note that this is our first attempt to built spatial missions for SWB, and we now have based ourselves on the results of a design for SWB exercise. In future research, this can be repeated with design outcome of architectural offices to explore the validity of this kind of research.

As the overview in table 6 demonstrates, two modified PERMA parameters each have two spatial missions, because this PERMA parameter seemed to be a layered concept when looking at the designs. These specific two missions are 'reminiscence' and 'empathy' (respectively related to the modified PERMA parameters of 'mindfulness & enjoyment' and 'satisfying social needs'). Looking back at literature regarding SWB in old age, we also found notions of these items.

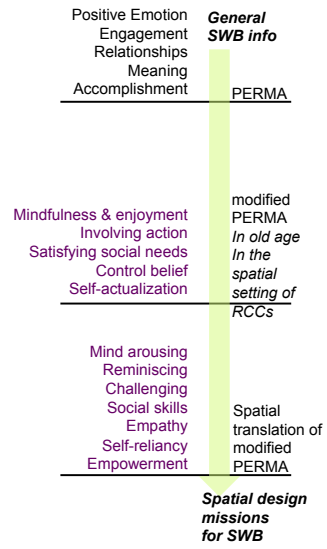

Figure 2. Schematic overview of research results

According to Oswald and Wahl (2005), reminiscence is an important issue for elderly persons in RCC environments, since the significance of home increases with old age. People in RCCs have left their home, and need to make a new one in the RCC. However, they have a lot of memories attached to their former house, their home. Therefore, having a close connection between the home and memory, particularly in the context of the living conditions of the elderly is important. The link with the past, and objects of the past, could contribute to one's identity. In our belief 'reminiscence' and the spatial affordance of providing RCC residents with spaces where they can plunge into thoughts is an important parameter of SWB in the setting of residential care. Therefore we include this parameter to our list.

Also, elderly persons in this RCC usually spend their days sitting and appear to be doing nothing much. However, they seem to fall into a rhythm. They sit quietly and stare out the window, their attention flows out to what happens outside and they become passively active by 'joining in' others activities, or wander off into thoughts. In our belief, this is closely linked to the meaning of the concept of 'empathy', building a relation. This is meaningful information for designers. According to Pallasmaa (2005), empathy in design practice is very important in order to be able to respond through a spatial design to what is observed. Therefore, empathy is another parameter we add to our spatial design strategy list.

To conclude, in the authors' viewpoint, the interior architectural quality of an RCC environment thus lies in the activities and experiences it enables people to do. The use of SWB-spatial design missions (see table 6) in a design process, could positively influence the experience of well-being of residents.
The seven SWB spatial design missions (see figure 3) give clear directions, but are vague enough to not interfere with designerly creativity. In that respect, the seven spatial design missions can be used as an assistence in the design of and the review of RCCs.

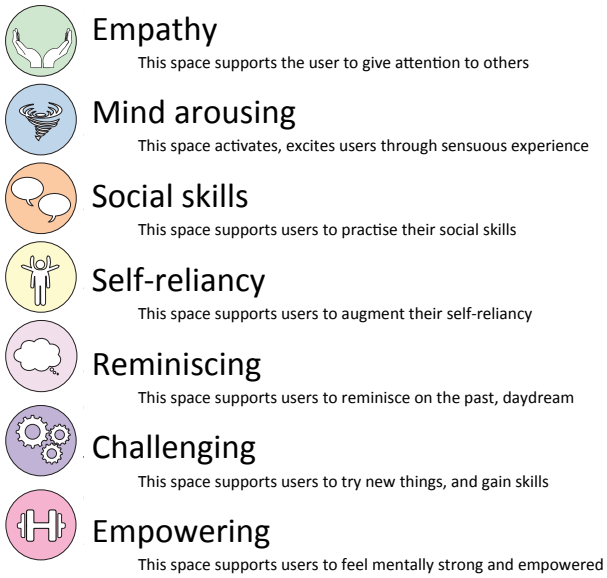

Figure 3. Seven spatial design missions to design for SWB

Discussion and conclusion

In this paper we discussed the link between the built environment of RCCs and the experience of SWB of residents. We presented a first attempt to influence SWB of residents of RCCs through the (interior) architectural design of the built environment. We formulated spatial design missions out of the happiness model of PERMA (Seligman 2011) in order to assist (interior) architectural designers in designing for a positive influence on SWB through their designs.

When thinking out of human centered design missions, (interior) architects can come up with designs that positively influencing SWB. These terms refer to human characteristics that assist people in flourishing, but must be read as affordances of space that enable designers to create the generous environments. Hence, designers should not start from a physical design problem, but base theirselves on human centerend characteristics of space, design missions for SWB. The seven design missions we formulated, fit that scope. Therefore, in future research it is interesting to give these seven terms to students and professional practitioners and evaluate the designs that result from this specific design approach.

Looking at the background of person-environment researchers, we notice that the relation between elderly persons and their physical environment is most of the time researched from the viewpoint of social science researchers (such as sociologists, psychologists, or gerontologists), but hardly from the viewpoint of the designer of interior architectural environments, namely the (interior) architect. In this paper, we used the spatial expertise of the authors (the first author is an architect) and their knowledge in how to design interior architecture as a starting point for determining SWB-increasing spatial interventions.

Our research set up consisted of the combination of a literature study and empirical design data from design practice. We believe this combination is of value and necessary to contribute to be able to build theory in interior architecture in general and to the knowledge of design for SWB specifically. We feel these methods are complementary, since from within, research in (interior) architecture strives to not only rely on literarly translations of academic literature into a design, but can pass knowledge also via the actual design practitioners, being students or professionals (Petermans 2012).

We based our research on the PERMA model of Seligman (2011). We acknowledge that some terms which we found in literature concerning SWB in old age, might fit in with more than one PERMA parameter, however we chose to draw a straight line. Also, in addition, it can be very interesting to test other SWB or happiness models and try to apply them on our spatial setting of RCCs in order to define spatial missions. We focused on the spatial setting of RCCs (definition: see Stevens et al 2013), however the Belgian residential care landscape consists of many more types of residential care, for example ”small scale living facilities”. It can be very interesting to try to find spatial SWB missions for these kind of facilities, and eventually look at possible differences between the SWB-stategies between different types of residential care. We believe it is also interesting to investigate if the spatial missions we now formulated remain valid when we exploit it to foreign interpretations of residential care centers, or other types of residential care.

We can conclude that this research enabled us to come to the formulation of seven missions that can possibly become ’conditions’ that interior environments in RCCs should comply with in order for them to become truly ’person fit’ SWB-environments, environments in which people truly can ’flourish’.

References

Carp F.M. 1966. *The Impact of Environment on Old People. A Future for the Age.* Austin: The University of Texas Press.

Csikszentmihalyi, M. 1990. *Flow: the psychology of optimal experience.* New York: Harper & Row.

De Botton, A. 2006. *The architecture of happiness*. London: Hamish Hamilton.

Desmet, P., Pohlmeyer, A. 2013. “Positive design: An introduction to Design for Subjective Well-being”, *International Journal of Design,* Vol. 7, No. 3, pp. 5-19.

Davis, S., Crothers, N., Grant, J., Young, S., Smith, K. 2012. “Being involved in

the country: Productive ageing in different types of rural communities", *Journal of Rural Studies*, vol. 28, pp. 338-346.

Fay, R., Owen, C. 2012. "'Home' in the Aged Care Institution: Authentic of Ersatz", *Procedia – Social and Behavioral Sciences*, vol. 35, pp 33-43.

FGOV Statistics Belgium, 2012. Structuur van de bevolking volgens leeftijd en geslacht: België. Available through: Website of Blgian Federal Government. http://statbel.fgov.be/nl/statistieken/cijfers/bevolking/structuur/leeftijdgeslacht/belgie/ [Accessed 20 February 2013]

Gardner, P. 2011. "Natural neighbourhood networks – important social networks in the lives of older adults aging in place", *Journal of Aging Studies*, vol. 25, pp. 263-271.

Hooghe, M., Vanhoutte B. 2010. "Subjective Well-Being and Social Capital in Belgian Communities. The impact of community Characteristics on Subjective Well-Being Indicators in Belgium", In: *Springer Science+Business Media B.V*.

Hujala, A., Rissanen, S., Vihma, S. Eds. 2013. Designing Well-Being in Elderly Care Homes, crossover 2/2013, Finland: Aalto University publication series.

Hyde, M., Wiggins, R. D., Higgs, P., Blane, D. 2003. "A measure of quality of life in early old age: the theory, development and properties of a needs satisfaction model (CASP-19)", *Aging & mental health*, vol. 7, no. 3, pp. 186–94.

Iwarsson, S., Isacsson, A. 1997. "Quality of life in the elderly population: an example exploring interrelationships among subjective well-being, ADL dependence, and housing accessibility*", Archives of Gerontology and Geriatrics*, vol. 26, pp. 71-83.

Kane, R.A., Kling, K., Bershadsky, B., Kane, R., Giles, K., Degenholz, H., Liu, J., Cutler, L. 2003. "Quality of life measures for nursing home residents", *Journal of Gerontology: Medical Sciences,* vol. 58, no. 3, pp. 240-248.

Knudstrup, M.-A. 2011. "The relationship between architectural design and subjective well-being", In: Fundación Caser para la Dependencia and Fundación Pilares para la Autonomía Personal*, International Conference Innovations in nursing homes for people in situations of dependency: Architectural Design and Care Model*, Madrid, Spain, December 2011.

Krippendorff, K. 2006. *The semantic turn; a new foundation for design*. Boca Raton: Taylor & Francis.

Lawton, M.P., Nahemow, L. Ecology and the ageing process. In: Eisdorfer M, C. Ed. 1973. *The Psychology of Adult Development and Aging,* Washington, DC: American Psychological Association.

Miller, H., Kälviäinen, M. 2006. "Design for Well-being", Paper presented in Design & Emotion Conference, Chalmers University, Gothenburg, Sweden, 27-29 September 2006.

Morelli, A., Dilani, A. 2005. "Health promotion by design in elderly care." Research Center Design and Health (PDF). Available on: http://www.designandhealth.com/uploaded/documents/Publications/Papers/Alan-Dilani-Morelli--WCDH-2005.pdf [Accessed 02 Octobre 2014]

Nussbaum, M. 2001. *The fragility of goodness. Luck and ethics in Greek tragedy and philosophy*. Cambridge: Cambridge University Press.

Oswald, F., Wahl, H.-W. 2005. "Dimensions of the meaning of home", In G. D. Rowles & H. Chaudhury (Eds.), *Home and Identity in Late Life: International Perspectives* (pp. 21-45). New York: Springer.

Pallasmaa, J. 2005. *The eyes of the skin. Architecture and the senses*. West Sussex: Wiley.

Petermans, A. 2012. ”Retail design in the experience economy: conceptualizing and ’measuring’ custormer experiences in retail environments”, Unpublished doctoral thesis, Hasselt University.

Popham, C., Orrell, M. 2012. ”What matters for people with dementia in care homes?”*Aging & Mental Health,* vol. 16, no. 2, pp. 181-188.

Rioux, L. 2005. “The well-being of aging people living in their own homes”, *Journal of Environmental Psychology*, vol. 25, pp. 231-243.

Rissanen, S., Hujala, A., Helisten, M. 2010. ”A state and future of social service enterprises: A Finnish case”, *European Journal of Social Work,* vol. 13, no.1, pp. 1-19.

Seligman, M. 2003. *Authentic Happiness*. London: Nicholas Brealey Publishing.

Seligman, M. 2011. *Flourish.* North Sydney, N.S.W.: Random House Australia.

Smith, D., Metcalfe P. & Lommerse, M. 2012. “Interior Architecture as an agent for Wellbeing”, *Journal of the HEIA*, vol 19, no. 3, pp. 2-9.

Stevens, R., Petermans, A., Vanrie, J., Van Cleempoel, K. 2013. “Well-being from the perspective of interior architecture: Expected Experience about residing in residential care centers”, In: Kobayashi, Akiyo; Takatera, Masayuki; Zhang, Jue; Shiraishi, Manabu; Nagamori, Yusuke; Yamanaka, Toshimasa; Ono, Kenta; Kobayashi, Natsumi (Ed.). Consilience and Innovation in Design 5th International Congress of IASDR 2013 Proceedings and Program, p. 5627-5638

Stevens, R., Petermans, A., Vanrie, J. 2014. “Designing for Subjective Well-Being in Interior Architecture: A Design Roadmap”, Paper accepted for and presented at: Interior Educators, *The Body and Space Conference*, London, United Kingdom, 18-19 September 2014.

Topo, P., Kotilainen, H. 2009. “Designing Enabling Environments for People with Dementia, Their Family Carers and Formal Carers”, *In Dementia, Design and Technology*, eds. P. Topo & B. Östlund. IOS Press, Amsterdam, pp 45-60.

Wahl, H.-W., Iwarsson, S., Oswald, F. 2012. ”Aging Well and the Environment: Toward an Integrative Model and Research Agenda for the Future”, *The Gerontologist*, Vol. 0, No. 0, pp 1-11.

Wahl, H.-W., Oswald, F. 2010. ”Environmental Perspectives on Ageing”, *The Sage Handbook of Social Gerontology,* pp. 111-124.

Weenig, M. and Staats, H. 2010. “The impact of a refurbishment of two communal spaces in a care home on residents’ subjective well-being”, *Journal of Environmental Pychology,* vol. 30, pp 542-552.

Woonzorglijn, 2011. Jaarverslag Woonzorglijn 2011 (PDF), Available on: http://www.zorg-en-gezondheid.be/Publicaties/Jaarverslag-Woonzorglijn/ [Accessed 10 June 2013]