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**כותרת עברית**

**כותרת אנגלית**

**יפעת רום**

**מנחים דר מיכל איזקסון ופרופסור יובל פלגי**

Abstract:

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# Introduction

Increasing longevity has expanded the number of people who are frail and who are living with chronic disease or functional disabilities. This population poses significant challenges, since they require high levels of care. Many are unable to have their needs met at home and thus the demand for long-term care (LTC) solutions is rising, and is expected to continue to grow. Long-term care facilities (LTCF) strive to offer a living environment that not only provides shelter and optimal care but that serves as a new home for impaired older adults. LTC solutions differ according to the severity of their residents’ cognitive and physical disabilities and the level of support they require in activities of daily living (ADLs). Various types of care may be subject to rules and restrictions. Some facilities offer only housing and housekeeping services, while others also provide personal care, medical services, or special programs for people with Alzheimer’s disease and other types of dementia.

For new residents, relocation to an LTCF is a significant life event that may add new traumatic layers to the many age-related losses (e.g. cognitive, social, physical, and health-related) that they may have already experienced (Bridges, Flatley, & Meyer, 2010; Chaudhary, 2003).Residents may experience a sense of being enclosed and cut off; they may be uncomfortable with the facility’s formally administered routine; and may mourn the loss of control over their everyday personal routines and environment, their ability to make autonomous decisions, their privacy, and aspects that have defined their identity (e.g., status, sentimental possessions, and critical social relationships). These cumulative losses may result in depression, withdrawal (which could lead to further physical or cognitive decline (Brooke, 1989), poor self-esteem, and a decrease in perceived well-being (Iwasiw C., Goldenberg D., MacMaster E., 1996; Sharma & Sharma, 2010).

In order to support residents’ sense of self and identity, and overall quality of life and well-being, LTCFs often highlight a person-centered approach that aims for successful transition and adaptation to the new environment. Person-centered care (PCC), which emphasizes viewing the resident as a whole person, is a concept that has been defined and implemented in a variety of frameworks, and has driven numerous studies throughout the world. Following the introduction of this concept, new PCC movements and LTCF solutions emerged in the U.S. and Europe that diverge from earlier LTCF concepts. Institutions have been established that aim to address the issue, emphasizing a home-like environment (Fitzpatrick & Tzouvara, 2018; Fraher & Coffey, 2011; Standards & Committee, 2015; Sury et al. 2013).

Increasing knowledge about PCC has led to new reforms and laws (e.g., OBRA, 1987). These focus on one hand on following strict regulations that enable monitoring the quality of care (as per ministries' of health regulations), while on the other hand, emphasize services that sufficiently attain and maintain the residents’ highest practicable physical, mental, and psychosocial well-being (Fazio, Pace, Flinner, & Kallmyer, 2018; Koren, 2010). Since then the growing growing body of scholarly knowledge on the association between different dimensions of an environment’s physical layout, well-being (WB) and Quality of Life (QoL) has led to advanced New laws and regulations including design regulations and guidelines that aim to utilize such terms such as psychosocial well-being, quality of life , and physical well-being. the LTCFs design, guidelines and recommendations are often written by a panel of experts that include gerontologists, governmental health policymakers, and architects. Despite being detailed and in-depth, these guidelines often fail to reflect LTCF residents’ actual needs, which would enhance their WB and QoL (Regnier, 2003). The design of an LTCF’s physical layout which is often a reflection of the personal viewpoint of architects regarding LTCFs have created a need for defining, measuring and understanding the dimensions of these subjective concepts This need??? has generated numerus studies that focus on the importance of an environment’s role in creating suitable, person-centered LTCFs have occupied environmental gerontology researchers worldwide.

 The current study aims to investigate and deepen the knowledge of physical layout as a “silent partner” in the WB and QoL of LTCF residents. The following literature review will focus on environmental gerontology and on up-to-date research about the relationship between physical layout, WB, and QoL.

# Literature review

## Environmental gerontology

The correlation between the physical layout of LTCFs and the WB and QoL of older adults living in them is a rich, multidisciplinary subject that has occupied many environmental gerontology researchers. The field of environmental gerontology emerged in the late 1950s, when the discussion of person-environment considerations expanded to including the aging population. Proponents from the field claimed that understanding the aging process and the existing problems of habitation (private or institutional settings) could help society design proper housing and neighborhoods for older adults. These new arguments prompted theoretical, empirical, and solution-focused initiatives by diverse professionals, including psychologists, sociologists, architects, health professionals, community planners, and social policy advocates. Such professionals combined their knowledge to help older adults cope with their immediate environment according to their needs, resources, and behavioral requirements (Samuel, 2017) . The most significant interdimensional intervention in environmental gerontology from this early era to the present was the “environmental press model” (Nahemow, L., & Lawton, 1973).

The environmental press model took into account the fact that older adults experience age-related losses, such as health-related or cognitive loss as well as a decline in competence, and as a result, they may perceive their environments as more demanding, problematic, and stress-evoking. High levels of competence result in a more positive outcome and lead to better adaptation to a broader range of environmental pressures, which the model terms “environmental press.” On the other hand, deficit or excess of press, relative to competence, can cause maladaptive behavior and adverse effects (Bowling et al., 2015).



Figure 1. Graphic presentation of an ecological theory of adaptation and aging (Nahemow, L., & Lawton, 1973)

This model stimulated a wide range of innovative theoretical improvements, practical applications, and theoretical developments regarding the relationship between environment and older adults (Ferdous & Moore, 2014). These revised theoretical improvements mainly focus on person-centered reform, to enable a better fit between an individual’s needs and the resources available to them, and have led to advanced thinking about WB and QoL in old age.

## Subjective Well-being and quality of life in old age

In order to understand Subjective Well-Being (SWB) and Quality of Life (QoL) in old age it is important to define them in general and highlight the changes that might be affected by longevity, age-related losses, health-related problem, and increased dependencies. SWB and QoL are key concepts describing the experience, capacities, states, behaviors, appraisals, and emotional reactions to circumstances. The literature describes the relationship between SWB and QoL as inconclusive, and often these terms are used interchangeably. This misuse highlights the confusion about the theoretical difference if they are similar or the same (Camfield & Skevington, 2008; Peasgood, Brazier, Mukuria, & Rowen, 2014).

Defining the term SWB addresses the term as an assessment (and not an achievement) of a person's life, focusing on the person's experience that include subjective cognitive evaluations and their positive and negative aspects (Diener E. D.; Emmons R. A.; Larsen R. J.; & Griffin s., 1985). However, defining the term QoL is challenging, complicated, and is commonly inconsistent because of the full span of multidimensional diverse components and indicators that define it, and especially when addressing both overall QoL and health-related QoL (R A Kane, 2003a; Rosalie A. Kane et al., 2003b). Furthermore, focusing on QoL of the older adults is even more complexed. On one hand, it is hard to define QoL of the older persons who experience physical, social and psychological losses and usually need help to maintain a high level of the QoL (D. L. Gerritsen, N. Steverink, 2004). On the other hand, it is hard to measure and validate the different frameworks since there are discrepancies between the assessment of QoL of the older person by self-rated, informant-rated, or by proxy-rated questionnaires. studies have found that staff members, aides, and family members defined the quality of life mainly in terms of care and the residents' perceptions of quality of life focused mainly on their social and psychological needs (Hyde, Wiggins, Higgs, & Blane, 2003; Steverink, Lindenberg, Spiegel, & Nieboer, 2019).

### QoL models, frameworks, predictors and measuring instruments

This complexity, accentuated the need for investigating the content of the vast array of QoL models, frameworks, predictors and measuring instruments and the need to focus on the changes that occur in old age (Langlois & Anderson, 2002; Skevington, S. M., & Böhnke, 2018). Maslow's theory of human needs that was established in 1962 was the first to proclaim that the need for satisfaction is hierarchical, progressing from satisfying the lower level of physiological needs (health-related) to those of safety, belongingness, esteem, and self‐actualization (Maslow A, 1968). The theory led to further interest in other universal basic and psychosocial needs, and especially focused on social needs that were found to be strong predictors of several QoL dimensions (Diener, Ng, Harter, & Arora, 2010; Steverink et al., 2019)

The numerous models and frameworks highlight the different approaches that represent their researchers' perspective of life when addressing SWB and QoL, and especially when addressing the WB and QoL of the dependent older adults living in LTCF. In 2004, Gerritsen, Steverink, Ooms, and Ribbe addressed this subject and searched for an adequate existing framework that will optimize the WB and QoL of frail LTCF residents by addressing existing QoL frameworks and models (n=719). The models were evaluated and filtered according to three criteria: (1) comprehensiveness (QoL for all human beings in general). (2) Clearly described dimension, relationships between the dimensions, and their contribution to QoL, (3) taking into account the individual preferences. The research found six leading models that included at least two criteria were: 1) Lawton's four sectors of the good life; 2) Faulk's board and care home hierarchy of needs (which is based on Maslow's hierarchy of human needs); 3) Hughes' QOL-network; 4) Katz and Gurland's challenges to adaptation; 5) Balls QOL domains; and 6) The theory of Social Production Functions; which was found to be the most suitable framework for QoL assessment tool.

### The social production function theory

The SPF theory (Lindenberg, 1996) asserts that the daily function of people is an outcome of the general aim to achieve two universal goals (physical and social well-being) and five instrumental goals by which these universal goals are achieved (status, behavioral confirmation, and affection for social well-being and stimulation and comfort for physical well-being). The SPF theory was generated by combining Lindenberg's Behavioral Theory with different goals theories such as Maslow's need hierarchy, the multiple discrepancy theory by Michalos,the resource theory by Schulz,), the life domain theory by Andrews and Withey, and other basic need-theories, that link well-being in some ways to objective conditions (A. Nieboer, Lindenberg, Boomsma, & Van Bruggen, 2005),

The SPF theory also asserts that even though these goals are hierarchical, the existence of higher levels in the hierarchy can be substituted to compensate for lower-level deficiencies. For example, when opportunities to gain status (e.g., at work) decrease, an individual may intensify social contact (affection). Therefore, it is needed to create higher-level resources reserves that will be available as buffers in times of decline and deficiencies (A. Nieboer & Lindenberg, 2002). Moreover, the SPF theory also addresses the broad consensus that the overall SWB is measured by life satisfaction (cognitive evaluation of a person's overall well-being measured by Cantril's Ladder) and by positive and negative component (affective component measured by the PANAS (A. Nieboer & Lindenberg, 2002)).



Figur 2. Social production function theory explaining the hierarchy of well-being.

(A. P. Nieboer & Cramm, 2018b)

The SPF-IL questionnaire was developed as a complementary, reliable, and valid tool to measure well-being addressing need-related domains (affection, behavioral confirmation, and status for social well-being, comfort, and stimulation for physical well-being (Lindenberg, 1996) and was translated to Dutch to English and Turkish. In addition, Nieboer et al. developed a short version of the scales with three items for each social and physical need (SPF-IL(s)). The short version has been used in many studies among chronically ill patients and frail older people in various countries (Cramm, J. M., Jolani, S., Van Buuren, S., & Nieboer, 2015; Cramm & Nieboer, 2014, 2015)(A. P. Nieboer & Cramm, 2018a), and was validated again with various samples of older populations (all Cronbach's alpha values were acceptable, with ranges of 0.631–0.836 for the frail older sample) (A. P. Nieboer & Cramm, 2018b). Recently the SPF was also used as a framework in a research that adressed the social needs of older persons (n=over 13,000 people). The research has validated again the need for close relationships and respect from others and found them to be strong predictor of happiness and positive feelings (Steverink et al., 2019).

The SPF theory claims that for purposes of distinguishing between all needs and tracing their consequences in general, and in old age specifically, one should be able to distinguish their alleged possible different deficits and understand the consequences of these deficits. When distinguishing between deficits that are connected to the physical layout, it is essential to define the different aspects of the physical layout and their connection to the QoL dimensions. Therefore, the current study has found the SPF to be a useful methodological platform that will be able to associate the different physical and social WB need to the well-researched QoL oriented physical layout variables. This review will address the existing literature on the connection between the physical layouts to each specific need. In addition, since literature addresses privacy autonomy and control as substantial QoL dimensions (the SPF address these dimensions briefly), they will be reviewed separately along with the existing literature on their connection to WB and QoL.

## The connection between the physical layout and the physical WB needs

Most Environmental Models focus on the connection between physical well-being and competence and refer to environmental demand levels such, physical comfort and Physical stimulation ((Indart et al., 2012); (Bowling et al., 2015)). Physical comfort is a psychological subjective state based on absence of basic needs (e.g., thirst, hunger, pain, fatigue, fear, and the like) (Ormel et al., 1999) and is achieved by the ability to control the environment, and therefore it is not directly connected to the built environment. However, the dependency on external help to control the environment by staff or visitors might be related indirectly to the environment (e.g., walking distance and availability)**.**

The physical stimulation refers to the environmental stimulators that trigger a cycle of goal-directed behaviors (e.g., planning, actions, intentions, affective responses, and outcome evaluation), affects the individual’s motivation, and therefore has an additional role in the SWB of the LTCF residents (Y. L. Jao, Algase, Specht, & Williams, 2016a). The environmental stimuli, in order to become substantial, must be present at an accessible distance, noticeable, evident and at the same time, must contain tailored interpersonal interactions that actively involve the resident and prompt their engagement. The Environmental stimulation can be influenced by the physical layout (size, distance) by the physical environment (furniture arrangement, decoration, and noise levels of the room), and by the social environment, (the people, activities, and conversations surrounding the resident). furthermore, Responsiveness to environmental stimulation, a deficit of motivation, and reduced goal-directed behaviors were found to be connected to apathy, and therefore they affect the SWB and QoL of the residents (Y.-L. Jao, Liu, Williams, Chaudhury, & Parajuli, 2019; Y. L. Jao, Algase, Specht, & Williams, 2016b).

## The connection between the physical layout and the Social needs

Fulfilment of Social needs, such as the need for relationships, approval, empathy, and respect from others, are crucial predictors of subjective well- being, happiness, and positive feelings (Diener et al., 2010). In contrast, deficits and deprivations in social needs fulfillment have been shown to lead to aversive and pathological outcomes.

### Social engagement

Subjective well-being for older individuals is connected to their social engagement and social support (Baltes M M, 1996; Mendes de Leon, Glass, & Berkman, 2003) that act as satisfiers of different social needs. Social engagement is defined as interpersonal social relationships and active participation in social activities that involve social interaction with at least two people, social support, and social exchange (giving something or receiving something from others) (R. H. Prohaska, T. R., Anderson, L. A., & Binstock, 2012). Social engagement is also associated with the sense of belonging that was identified as the third most significant basic human need to self-realization (Maslow, 1943) and therefore is meaningfully associated with psychological well-being (Lambert et al., 2013; Park, 2018).

The nature of the social engagement changes drastically as the person transfers from a private home to an LTCF and is considered one of the most significant changes in an older person's social life (Pirhonen, Tiilikainen, & Pietilä, 2018). The adjustment to the new LTCF may lead to immediate withdrawal, loneliness, and isolation, and the establishment of new social connections with other residents takes time (Goffman & Helmreich, 2018; (Jang, Park, Dominguez, & Molinari, 2014). Following the period of adjustment, new social networks are formed. These new social interactions are divided into three separate social worlds: connection with the staff, connection to family and old friends and the connection with peer residents.

#### Social engagements and the staff

The staff beyond their everyday caregiving responsibilities, serve as the residents' primary providers of psychological needs by social interaction and support (Marquis, 2002) and therefore the constant need for quality time is essential. Time as a resource depends on the work efficiency and on the motivation of the staff, which are correlated to the caregivers' burnout at work (Cutler, Kane, Degenholtz, Miller, & Grant, 2018). In addition, the constant turnover that is a by-product of the staffs' burnout might also prevent meaningful resident–staff bonding (Grenade & Boldy, 2008), therefore, addressing the staff as well as the patient’s needs, is an essential factor in enhancing the resident's SWB (Danaci & Koç, 2019).

There is ample evidence from the design literature connecting the health-care built environment, to the SWB and job performance of the staff and on the satisfaction of both formal caregivers and patients (Becker, 2007). Studies affirm that design influences the staffs' schedule (time spent in the patient rooms, at the nursing station and time spent going to the supply room) and is connected to the staffs' stress and fatigue (correlated to the walking distance). Other studies, highlighted the importance of the physical layout and its effect on communication with inter-professional team members and peers, which was also associated with the perception of isolation and teamwork, to higher job satisfaction, staffs 'future planning (planned to stay in their job longer), feeling of Safety, and to the burnout score (Durham & Kenyon, 2019).

#### Social engagement and the visitors

The social separation from the outside world causes residents' contact with friends, relatives, and neighbors to decrease (Burton et al., 2011). The quality of the relationship becomes less intimate, triggers feelings of being 'remote or cut off' from society (Pirhonen et al., 2018a). However, the social engagement with external visitors such as family, friends, or paid visitor help to preserve the residents' identity. Family involvement, in particular, maintains the sense of continuity, sense of family life, sense of concern, allows for a break from caregiving, a sense of change in engaged involvement, and a sense of worth (i.e., possessing unique knowledge). Increased social engagement with family also leads to positive psychosocial outcomes(Greene & Monahan, 1982), and decreased mortality (Gaugler, 2010; Kiely, D. K., Simon, S. E., Jones, R. N., & Morris, 2000) . Moreover, families also serve as an assistive tool that helps the staff by providing affection (e.g., holding hands or touching), personal and instrumental care (e.g., grooming), promote better outcomes (e.g., accompanying the residents in their activities) and initiate actions to ensure proper staff/resident relations (Gaugler, 2010)).

The reasons why and how often family members remain involved in the lives of relatives following institutionalization are complexed and are affected by external and internal barriers (e.g., finances, location, culture, family-level factors, health issues and the factor of staff and family relationship (Førsund, Kiik, Skovdahl, & Ytrehus, 2016). However, the most widely reported barrier is the Psychological barrier that poses a challenge for the family members when visiting the LTCF. These barriers include guilt, depression, and feelings of being emotionally overwhelmed, heartbroken, and uncomfortable during visitations (Miller, 2018).

The knowledge about the facility's' physical-environmental characteristics that influence the visitors' satisfaction is still limited. The environmental, physical characteristics that were studied included items related to privacy (when engaged in activities in Private rooms or Private gathering space for family activities)), atmosphere at mealtime, smell, cleanliness, pleasantness, comfort, and safety of the facility (Cutchin, 2003; Ejaz, Noelker, Schur, Whitlatch, & Looman, 2002; Harmer & Orrell, 2008; Stadnyk, Jurczak, Johnson, Augustine, & Sampson, 2013).

#### Social engagement with other residents

Aiming to encourage social connection with other residents is a challenge due to their physical and cognitive impairments (e.g., hearing, visual), depression (Pirhonen, Tiilikainen, & Pietilä, 2018b) and chronic health conditions. This social malfunction can decree social engagements in public spaces and create social withdrawal (residents might spend more time in their room) lack of self-esteem or energy, and lead to boredom and cognitive decline (Jarrott, Gozali, & Gigliotti, 2008). On the other hand, Social interactions, when used systematically as an intervention, can help focus attention and create interest (Dodge, Daly, Huyton, & Sanders, 2013)

regardless of the physical and cognitive abilities (Cohen-Mansfield, Thein, Dakheel-Ali, & Marx, 2010a).

Researchers have been trying to understand specific environmental components that affect the social intervention by addressing patterns of the social congregation and their correlation to different characteristics such as the size of the unit and amount of residents in it, the bedroom size, and the size of the windows. The findings of these studies bring out the fact that there are no conclusive results and that additional work is needed to recognize the mechanisms regarding how facility characteristics such as facility design, size, or availability of common spaces can enhance social engagement in LTCF settings.

### Activity involvement

Activity involvement (engaging time and attention) may lead to self-realization, which is considered another domain of social needs for aging people in TLCF who most often spend their time without any activity and with minimum stimulation (Cohen-Mansfield, Marx, & Werner, 1992; Kitwood, 1997; Perrin, T., May, H. and Anderson, 2008; Train, Nurock, Manela, Kitchen, & Livingston, 2005; Van Haeften-Van Dijk, Van Weert, & Droës, 2015). Occupation in the LTCF can involve work, play, and leisure, but also necessary everyday activities such as getting up, eating and drinking, receiving physical care, interest in objects, helping others, social conversation, and more (Smit, Willemse, De Lange, & Pot, 2014). Studies have shown that large variety of meaningful individual or group activities that refer to self-identity (relate to experiences, interests, and hobbies) and are compatible to the residents' disability affected the residents' attitude, duration, and attention and increase SWB (Brooker, Woolley, & Lee, 2007; Cohen-Mansfield et al., 2010a).

However, occupation remains a challenge for the residents of the LTCF that suffer from an increasing dependency on the caregivers and the environment, decreased autonomy, loss of skills to initiate activities (Harmer & Orrell, 2008) and loss of visual or verbal prompting to start an occupation (Cook, Fay, & Rockwood, 2008). Several studies also found a correlation between the environment and activity involvement, especially the location and home-like characteristics (size). Knight & Mellor (2007) have found that location (where the activities occur) that do not meet the needs of the LTCF residents might decrease their involvement and facilitate only superficial interaction with others. In addition, central activity programs that create feelings of living in an institution instead of at home may cause declined activity involvement and can be perceived differently with the existence of a "club area" that was found correlated to improved behavior, nutritional status, and to decrease social isolation (Smit et al., 2014).

Studies that addressed LTCF with the home-like characteristics (smaller number of residents) were found to be a predictor of activity involvement of residents (Cohen-Mansfield, Thein, Dakheel-Ali, & Marx, 2010b) especially participation in household chores and everyday life (Smit, De Lange, Willemse, & Pot, 2012; Verbeek, Van Rossum, Zwakhalen, Kempen, & Hamers, 2009). Surprisingly, there was no correlation between other environmental characteristics, such as visual stimuli (Wood, Harris, Snider, & Patchel, 2005). In conclusion, there is a lack of knowledge concerning the impact of the environmental characteristics on activity involvements and their value, and further investigation is needed.

## The connection between the physical layout and autonomy, control and privacy.

Autonomy control and privacy are addressed as significant physical and social needs in many general QoL models and specifically when addressing the WB and QoL of LTCF residents. The next paragraph will review the large body of literature that addresses the connection between the physical layouts to these dimensions.

### Autonomy and control

When defining perceived autonomy and perceived control, literature is inconsistent, and there is a confusion of whether autonomy is different from control. Patrick and skinner (1993) claim that Control and autonomy are conceptually distinct and distinguish between them by addressing autonomy as the freedom from the interference of others (mainly social), and the control as an intervention in the environment. The separate definitions of autonomy and control change to a single definition when focusing on older people. The increased cognitive impairment leads to decreased physical independence and limited capacity to make decisions(Natrop, 2017) (Natrop, 2017).

Ayalon (2016) refers to the autonomy in old age as multidimensional and divides it into two categories: the physical component of autonomy, and the psychological component of independence. The physical component of autonomy are reflected in the freedom of mobility, environmental mastery (being able to choose and create environments that meet one's specific needs, such as light, smell, temperature, and noise) (Ryff, 2005), and the physical independence (Ayalon, 2016; Ball et al., 2004). The psychological components of autonomy that relate to mental independence are reflected in the freedom of choices and ability and inability to maintain feelings of control and decision‐making regarding their own everyday lives even when physical and cognitive changes and losses occur. The overall the ability to choose, to control and to be autonomous is empowered and enhanced by the personal competence (Ferrand, Martinent, & Durmaz, 2014; Lawton, M. P., & Brody, 1969), and has a positive effect on SWB and QoL, depression, and on the reduced mortality among LTCF residents (Johnson & Namazi, 1992).

The preferences for autonomy in LTCF clashes with various ethical principles concerning healthcare providers and makes it challenging to provide conditions for personal autonomy. The respect for autonomy versus patient safety troubles the healthcare providers. There is a gap between the will to ensure safety (constant observation that addresses risk factors for falls and other accidents) and the outcome of restricted privacy, dignity and restricted freedom of movement of older adults (and extreme use of restraints, such as unnecessary diapers and sedatives instead of taking other measures such exercise) (Preshaw, Brazil, McLaughlin, & Frolic, 2016).

Finally, it is known that the environment can support the residents' needs and independence by enhancing perceived control and perceived autonomy. However, there is a lack of studies investigating factors associated with stimulating alternatives for autonomy in LTCF, and to their connection to the physical layout in a broader sense (A. Schopp et al., 2018).

### Privacy and control

Privacy is considered one of many dimensions of autonomy, and its components resemble the different aspects of control. The need for privacy is subjective, and studies have found that an Individual's perceived need or loss of privacy is connected to culture (norms and rules), demographics, gender, and age (Anja Schopp et al., 2008). Privacy has different multidimensional definitions that are divided into four categories: physical privacy, psychological privacy, the privacy of information, and social privacy (Leino-kilpi, Va, Scott, & Arndt, 2001). The physical privacy relates to the human ability to control (environmental mastery) visual, noise, and smell intrusion into the personal space and the individual territory (Hsieh, 2014). Psychological privacy refers to the ability to control self-value, self-perception, affection, and spiritualism. The privacy of information refers to the control over personal information (collection and distribution); and the social privacy is related to the ability to control social exchange and contact (frequency, length, and participation) (Hughes, 2004).

All four categories of privacy are connected through environmental characteristics that play an essential role in the control of privacy (Y. Hsieh, 2010). The Aged LTCF residents become progressively dependent on others and are unable to rely on their resources to maintain their subjective privacy needs. A significant number of studies investigated the privacy in LTCF and addressed different environmental components that contribute to creating a sense of privacy among residents. The finding indicated that the highest perceived privacy strongly related to the residents' bedroom privacy in the LTCF (Morgan & Stewart, 1999) (Hsieh, 2010) and that the design components of individual patient rooms (e.g., shared room versus the single room, fewer patient beds, and a larger area per bed) were strongly correlated to higher perceived privacy. In addition, the residents had no privacy during person- staff interaction (treatment, exercise, changing diapers, and improved staff-patient communication), no privacy during private social interaction (family, guests or other informal caregivers), and more probability of medication errors (Schopp et al., 2008; van de Glind, van Dulmen, & Goossensen, 2008). Moreover, residents living in double bedroom were more likely to develop territorial behavior and might have territory related conflicts with their roommates that can lead to aggressive or violent behavior and on the contrary, develop seclusion (Hsieh, 2014). However, The Double- occupancy rooms were connected to lower rate of falls and loneliness (Singh, Subhan, Krishnan, & Edwards, 2016).

Other room- privacy components include the distance from the nursing station and the visual view of the room, (wayfinding, walking distance, noise, number of directional changes to the nursing station- measured with spacial syntax) also affects residents' complexed perceived privacy (Grant, Degenholtz, Cutler, Kane, & Miller, 2011). Studies revealed that some LTCF residents might be willing to accept reduced privacy in exchange for increased visual surveillance and visibility to the nursing station (Lu, Cai, & Bosch, 2017). The evidence for preference is considered inconclusive, and these different perceptions emphasized the need for a mix of room types that can support person-centered care and fit the residents' personal needs (Taylor, Card, & Piatkowski, 2018).

The physical layout, as reviewed above , is an essential factor in promoting well-being in health care facilities (Chaudhury, Cooke, Cowie, & Razaghi, 2017). The factors that create a well-designed physical layout, and especially the physical layout, are still relatively unexplored. Evaluation methods that aim to define the appropriate design of high-quality healthcare environments are limited, and most of the design guidelines and recommendations are based on sporadic information from credible research and evaluation of completed buildings (Sloane et al., 2003; Ulrich, Berry, Quan, & Parish, 2011).

## Assessing the quality of the physical layout - Evaluation methods

In general, the Post-Occupancy Evaluation (POE) (Zimmerman & Martin, 2001) and Evidence-Based Design (EBD) have been used as assessment models that ensure a high-quality environment. POE assesses how users appraise the design and how it supports certain activities (by interviews), whereas EBD is a reflective process (in particular the impact of different architectural design solutions on people, costs, and management). However, the use of EBD for LTCF environments requires a valid and usable instrument that can evaluate the environmental design based on building elements that are known to relate to positive health care outcomes and SWB (Craik K. Femer N., 1987). The appropriate instrument must be able to standardize the information and enable the researcher to compare different environments, offers insights into how environments can be better adapted to patients’ and staff needs, and identify strengths and weaknesses in the environment.

Space Syntax (SPS), which has been applied to the study of healthcare facilities since the late 1990s, is a robust quantitative assessment tool that creates a precise quantitative identification and measurements of spaces concerning human behavior and cognition. SPS captures behavioral movement environmental characteristics (uses axial maps), connectivity (connections between spaces), step depth and integration (the shape of the corridors), and axial lines (the set of fewest walking paths to go to all the spaces). SPS also document visibility from particular points within a layout , isovist maps that offer a number of geometrical measures such as properties like isovist perimeter and area (Yu, Gu, & Ostwald, 2011), and arrangement of programmatic spaces that explore the physical accessibility of space .

Other specific instruments for assessing the quality of the physical layout in healthcare (n=23) were reviewed by Elf et al. (2017). Most of the instruments were developed for LTCF (N=17) (e.g., MEAP (Lawton, Weisman, Sloane, & Calkins, 1997)) and SCEAM (Parker et al., 2004)). Some instruments were developed explicitly for use in dementia care settings (e.g., EAT (Fleming, 2011)), Evidence-Based model (Zeisel, Hyde, & Levkoff, 1994)) , and some focused only on the Green Houses (e.g.BREEAM (Schweber & Haroglu, 2014),and LEED (Shulman k, 2003)).

 The findings of the review (Nordin & Elf, 2019) revealed that most of the instruments demonstrated a rather weak empirical base and have not been used after their development, or have not been used by other researchers (which creates a weak base for assessing the applicability and feasibility of the instruments). Only three of the instruments were found to be more commonly used; the TESS-NH (Sloane et al., 2003), the MEAP (Moos & Lemke, 1996)and the PEAP (Lawton et al., 2000) ,which were both developed in the 90’s and therefore are less relevant to a contemporary LTCF that focus on person-centered care. Furthermore, Both MEAP (Moos & Lemke, 1996) and PEAP (Cutler, Kane, Degenholtz, Miller, & Grant, 2006) are described as complex to use. In conclusion, this review highlights the need for more research that will develop instruments that are theoretically well-grounded, rely on current or emerging models of care and modern healthcare environments (including LTCF), and focus on SWB and QoL.

## The current proposal

The main goal of this current proposal is to deepen the existing knowledge on the correlation between the physical layout to Well-Being and QoL of the LTCF's residents. In order to achieve this goal, this study aims to produce a robust, theoretically based tool that will help create WB and QoL oriented assessment tool of LTCF BASED ON architectural plans. These typologies will be used by consecutive studies that intend to understand the contribution of each different architectural factor (separately or as a group, directly or indirectly) on the QoL and WB of the LTCF residents. To build this tool, a set of criteria will be built on which to examine architectural plans of LTCF in Israel.

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