PROMOTING HUMAN POSITIVE FUNCTIONING THROUGH THE INTEGRATION OF POSITIVE PSYCHOLOGY AND AGEING PSYCHOLOGY WITH DESIGN AND ENGINEERING RESEARCH

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Abstract

The promotion of human positive functioning is nowadays a central objective of different areas of research. Positive Psychology has demonstrated, through numerous studies, in synergy with Design, that it can give life to effective projects for health and well-being in the different stages of life. An example, which will be explored in greater depth, concerns the emerging area of research on the relationship between frequenting art venues, particularly museums, and the psychological and social well-being of people of all ages. This result, which is linked to various individual psychological processes under study, is also the fruit of the construction of stimulating and appropriate environments for experiencing knowledge, personal growth, stress reduction, a field of research and intervention of Design and Engineering. A second area of research concerns the phenomenon of population ageing, which is defined by the WHO as a true "global challenge". It requires multidisciplinary research and intervention efforts, in order to promote active, independent and quality ageing for the greatest possible number of people. Even in this field of research, the synergy between Psychology in its various theoretical declinations, Design and Engineering can represent a valid response to this social challenge. Indeed, new areas of research demonstrate interesting connections between healthy lifestyles and cognitive, physical, and social functioning, highlighting the role of resources such as creativity in longevity. Research in Engineering and Design could provide new tools to improve or enhance these transversal skills and abilities.

Keywords: *Positive Psychology; Positive Ageing; psychological well-being; museums attendance; Design; Engineering.*

INTRODUCTION. A changing World; numerous challenges that it faces, the necessity of new approaches to well-being and positive development of people.

The contemporary world is characterized by rapid changes at social, economic, climatic, technological, demographic level. The climate change, for example, will produce (or is producing) substantial changes in agriculture, ways of living (e.g. facing more frequently with events such as floods, hurricanes). Demography, as we can see, is now radically changing the proportion of age cohorts. All these changes bring with them challenges that can expose individuals to difficulties, stress, conflicts, requesting for these reasons new ways of thinking and acting at individual and collective level. The COVID-19 pandemic evidenced the frailty of our societies in the face of extraordinary critical events, requesting effective projects, strategies, actions and competencies for facing them and for preventing them, or their worse outcomes.

For these above mentioned, but not limited to, changes at planetary level, all the disciplines, all the research areas are called to give their contribution for tracing and identifying effective strategies, ways to approach them and, at the same time, to encouraging and promoting the positive development of individuals, groups and societies, helping in finding new solutions, new approaches to these challenges, strengthening the efficacy of individuals and communities.

The integration of different research areas can improve the discovering of new ideas, new answers, new ways of thinking and acting for these challenges, avoiding, were possible, worse outcomes and promoting a positive development for all people, helping to find effective strategies against stress and

other adverse conditions that these challenges can bring with them. Taking into consideration these premises, we discuss, in this article, the possibility of integration between two areas of Psychology, namely Positive Psychology and Ageing Psychology with Design and Engineering research for improving the life quality and the overall well-being of people.
For the joint contribution of Positive Psychology and Design, we discuss some issues about an emerging area of research, the contribution of museums for reducing stress, improving the well-being of people.
Positive Psychology, indeed, together with Positive Design, can help people to reach a better well-being through places of culture: as stated Ryff [1] [2] "the arts, broadly defined, have long nourished human flourishing, including during times of difficulty", and that "the merging of arts, science and practices constitutes a worthy vision of the future". [2].
The second area of research, the population ageing, corresponds to one of the major challenges of the Planet, and requests new approaches in order to reduce the risk of disability, to prolong the autonomy of old people and to assure to them the best choices for participating to the development of the society. Psychology, Design and Engineering are called to work together for reaching these objectives.

Positive Psychology: fostering the well-being of individuals, groups, society

The issue of human well-being has been the subject of reflection and research since 1960s. In particular, with the Social Indicator Movement [3] research has highlighted how it is not only objective parameters such as income, that determine the well-being of individuals, but rather more subjective dimensions such as the perceived quality of life.
It was at the beginning of the 2000s that Positive Psychology was officially born, which, turning back the traditional objective of psychology, emphasizes the promotion of positive experiences, and the study of well-being of individuals, groups, society, instead of maladjustment and suffering [4].
The study of well-being, and the possibility to create models of intervention for improving it, started with two fundamental, individual perspectives, rooted into ancient Greek philosophy, namely the Hedonic well-being and the Eudaimonic well-being.

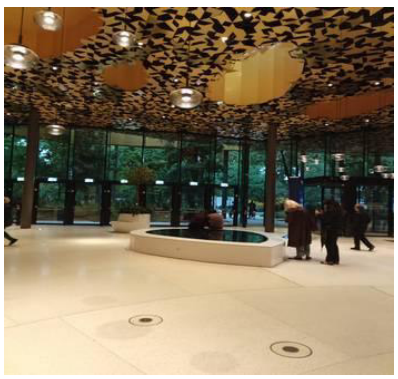
The Well-being in a ″hedonic" perspective interprets well-being (and the achievement of happiness) in its affective dimension (presence of positive emotions, reduction of the experience of negative emotions) and life satisfaction [5] (from the Greek philosophy of Aristippus, concept of hedonè). The concept of Hedonic well-being is characterized by a hierarchical structure with well-being at the apex; at the lower level there are four components: Life satisfaction: how close one's life is to the ideals, to the values of the person; Satisfaction for specific areas: how close one's life is to one's ideal in the emotional, work, relational areas; Positive affects: how much positive experiences and emotions are experienced in the last few week; Negative affects: how much negative experiences and emotions are experienced in the last few weeks. In these last decades, studies on hedonic well-being and its relevance for positive functioning confirmed that positive affect, life satisfaction, and happiness predict numerous disease outcomes, including fewer clinical colds [6], lower hospital readmission rates, [7] lower body mass index (BMI) among adolescents, [8], lower risk of stroke [9] and lower risk of incident coronary heart disease and hypertension [10]. Different from the Hedonic perspective of well-being, the Eudaimonic well-being corresponds to the actualization of talents and potentials of individuals, for reaching common good (from the Greek philosophy of Aristotle, Nicomachean Etic; [11], [1], [12]. The well-being, for this perspective, is related to the possibility of growing as person and have projects in life (Little et al., 2007) [13], and is conceptualized as composed by six dimensions: Self-acceptance; Autonomy; Positive relations with others; Purpose in Life; Personal Growth; Environmental Mastery. Other eudaimonic perspectives comprehend the model by Ryan & Deci of Self-Determination, [14] that consider three fundamental human needs: Autonomy; Relatedness; Competence. Extensive research [1] [2] has linked purpose in life, one of the core dimensions of Eudaimonic well-being, to multiple disease outcomes, including reduced incidence of Alzheimer's disease and mild cognitive impairment, [15] reduced risk of stroke,[16] myocardial infarction among those with coronary heart disease [16] and performance-based and subjective cognitive outcomes [17]. Considering the alternative directional influence, poor health or disease has also been associated with compromised Eudaimonic well-being [18]. Eudaimonia is also connected to ego development and maturity in developmental stages of life [19].

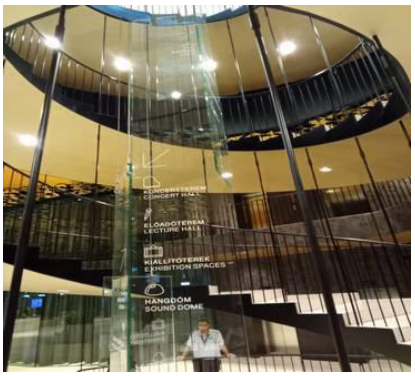
The places of culture for improving different kind of well-being and reducing stress. The "case of museums".

An emergent area of research is represented by the studies that try to evaluate the role of places of culture such as the museums for improving the well-being of people at all stages of life. This new area of research is multidisciplinary in nature, collecting several different areas of knowledge such as Psychology, Design, Education. Indeed, recent studies accomplish on the relevance of integration between Psychology and Design for making the visits able to improve the well-being of people [20].
As state Cotter & Pawelski [21], a growing area of research focuses on the connection between arts and humanities engagement, and flourishing. They highlight the Positive Humanities as an emerging field of research and application, connected to the core dimensions of Positive Psychology. Indeed, large-scale studies suggest that greater engagement with the arts is associated with living longer and lower mortality risk,[21], [22] maintains that Eudaimonic well-being can be enhanced through the active engagement in arts.

Positive Design represents a new area of study that intercepts these issues, proposing new ideas, approaches and methodology, integrating Positive Psychology principles within it [23],[24].This approach, firstly elaborated at Delft Institute of Positive Design, is aimed at improving the positive state of mind, the well-being of communities, and stimulating the development of knowledge that supports designers in their attempt to design for human flourishing. Desmet & Pohlmeyer [23] strongly believe that "it is our responsibility as design researchers generate knowledge that enables designers to formulate effective strategies in contributing to the happiness of people". Positive design, for this reason and theoretical premises, can give a strong contribution to the environment of museums, to the usability of interactive tools, to the fascination effect [25] inside the rooms and for the contemplation of the art product, technical products and scientific discoveries. (see figure n. 1 and n. 2).
Numerous studies, with broad samples, suggest that the assiduous involvement in the art is associated at a higher longevity and a lesser risk of mortality [26], less loneliness [27] and to a better perception of health [28]. Research have also evidenced that visual art, its observation, is accompanied by a decrease of stress [29], a decrease of cortisol, the "stress hormone" [30] [32] and an increasing in subjective Hedonic well-being.
Smith [31], speaking about the places of culture, defines a real "museum effect": research suggests that the visitors get involved in reflections on themselves, the future and on broad questions during the visit, that are considered among the most important and long-lasting effects, since they give life to an authentic transformation of the person [32].

Figure n. 1 and Figure n. 2. The "House of Sound" in Budapest. You can stay inside, can listen to music, and enjoy the suggestive design (*photos of the author of the article)*





Several authors have elaborated theoretical models for explaining the possible effects of museum attendance on visitors.

Pelowski et al.,[33] have proposed the Viennese Integrated Model of Art Perception (VIMAP), which considers the perceptual and cognitive responses to museums visit experience and that comprises five possible outcomes:1. Simple and superficial experience; 2. A new and insightful experience, where people experience a certain surprise but do not engage deeply with art; 3. A negative experience in which negative emotions prevail, which determines distancing from art; 4. A harmonious experience thanks to which people experience a range of conditions such as flow, emotion and feeling this experience as pleasant; 5. A transformative experience in which people engage with art, reflect on their pre-existing schemes, modifying them on the basis of new acquisitions.
Shim et al., [34] have proposed the RAISE model, that identifies five mechanisms that contribute to the experience of flourishing in relation to art: 1. Reflection. Changing habits, values through art; 2. Acquisition. Gaining new skills and knowledge; 3. Immersion. Experience of flow; 4. Socialization. Having meaningful conversations during art engagement. 5.Expression of emotions. Express oneself.

The Museum Malmerendi study: an example of integration between Positive Psychology and Positive Design for improving psychological well-being of people. Interactive and immersive tools for psychological personal growth and positive emotions.

This study started for examining the effect of visiting this small prehistoric museum, located in Faenza (Italy), on the Hedonic and Eudaimonic well-being of adult visitors. It integrated two research areas: the Positive Design (that includes, in this case, the construction of new immersive virtual or interactive tools, the creation of a guide that facilitate the visit) and the Positive Psychology, which evaluate the perception of well-being after the visit of the museum. Flow was hypothesized as the connecting experience between the design of artifacts and the well-being outcomes, the experience of positive emotions and the personal perception of growing through the visit to the museum.
The creation of immersive and interactive artifacts/tools and the valuation of flow experience, Hedonic (emotions) and Eudaimonic well-being (personal growth), as outcomes for visiting the museum in a sample of adult people were the main purposes of this research, conducted on 138 adult visitors during the summer 2024.

Figure n. 3.The Malmerendi Museum (Faenza, Italy).

The museum collections and new immersive tools created for the research [35].

Figure n. 4 and Figure n. 5. The prehistoric grouper as fossil and as immersive animated reconstruction.

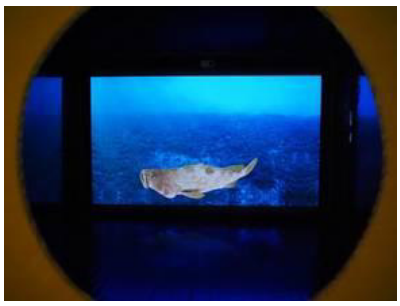


Figure n. 6. And Figure n. 7. The Mammoth of Oriolo, Faenza (Brizio S. 2025, above cited). The fossil and the dynamic virtual reconstruction of the animal and its habitat.

Main results of the study

The statistical analyses confirm the high level of personal growth for visiting the Malmerendi museum (M= 3.81); the high level of positive emotions experienced (M = 3.82) and the high level of flow experience (M = 4.21). At the same time, these study variables show significant intercorrelations (see figure n.8). The highest level of positive emptions has been reached by the oldest segment of visitors (see figure n.9)

Figure n. 8. Pearson's zero order correlations among study variables: Eudaimonic growth for visiting the museum Malmerendi; Personal Growth as general dimension; Flow experience; Positive emotions; Negative emotions. (**p< 0.05; ** p<0.01; ***p<0.001)*

variables	Eudaimonic growth museum	PWB personal growth Flow	Flow experience	Positive emotions	Negative emotions
Eudaimonic growth museum	-----				
PWB personal growth Flow	0.20*	-------			
Flow experience	0.67***	0.27**	---------		
Positive emotions	0.69***	0.29**	0.61***	----------	
Negative emotions	0.00	0.07	-0.3		------

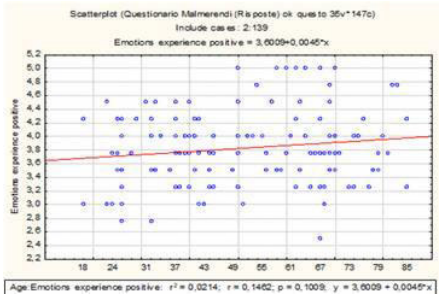


Figure n. 8 Pearson's correlation matrix.
Figure n. 9. Age and positive emotions experienced for the visit at Malmerendi Museum (graphic)

Considerations on results.

Tracing some brief considerations upon the results, we can see how new immersive tools contribute to the flow experience, the personal growth and the positive emotions of visitors of Malmerendi Museum. Positive design confirm itself as a central dimension for cultural places. Integration of psychology (theories and methods, as in this case, from Positive Psychology) and design for creating tools, renewal of rooms, inclusion of immersive tools for improving flow experience and positive dimensions of overall well-being can be a fruitful area of integration [36].

The challenge of the population ageing.

A radical and irreversible change in the population is now occurring, that can be defined as an authentic demographic revolution. This radical change was starting in the developed countries EU, USA, but is now spreading around the world, with relevant consequences for the whole societies as well. The population of the Planet, indeed, is increasing in age, and in life expectancy. As EUROSTAT [37] shows, the best graphic that depicts the age cohorts proportion is similar to a rectangle (decreasing the births, a large proportion of adults, an increasing proportion of old people), and not to the "classic age pyramid", with a large base and a narrow apex. The expected population trend in EU, for example,

identify in the Fourth age, the octogenarians, the age group that will growth more in the next decades, posing several challenges and questions to the entire society.
The issue of positive ageing, and of healthy ageing, constitute indeed nowadays one of the major planet challenges.
As states W.H.O. [38], reaching a healthy ageing and maintaining functional ability constitute two fundamental outcomes for people when they grew older. WHO defines healthy ageing as "the process of developing and maintaining the functional ability that enables well-being in old age. Functional ability is about having the capabilities that enable all people to be and do what they have reason to value" (p. 1). Reaching a healthy ageing means that people possess the following abilities: - meet their basics needs; learn, growth and make decisions; - be mobile; - build and maintain relationships; - contribute to the society.
These core dimensions of healthy and active ageing were established at the end of the previous century by the researcher Rowe & Khan [39], that identified in the so called "successful ageing" the more desirable and favourable outcome for the third and fourth age. For them, successful ageing is the result of systemic interwoven among three systems: physical (having resources from adopting a healthy diet, physical activity, low probability in diseases); cognitive (memory efficiency, problem-solving skills; creative skills); social (active participation to the society, that represents the convergence of the two previous large spectrum of resources in the social dimension). The systemic model of successful ageing represents the first attempt to adopt the systemic paradigm in the study of ageing, which was then adopted by the majority of researcher and that gave life to other complex models of positive ageing (see Kahana et al.[40], the complex model of proactive ageing) and by the WHO [38].
Other theoretical perspectives emphasize the role of competencies and skills for slowing/contrasting the declines and living in autonomy, safeguarding health and bio-psycho-social efficiency and continue to growth. Coming from the Capability Approach of Sen [41], the "Competent ageing" highlights the capabilities as a set of opportunities and freedom available to persons for reaching life styles and /or conditions in accordance with their values. The concept of "Competent Aging " [42] is referred to the improvement of Life Skills (WHO, 1996; [43], [44], that enable old people to choose in competent ways the best options for reaching a positive bio-psycho-social functioning (see figure n.10). For example, the Life Skill Critical Thinking can contribute at increasing digital competencies and positive attitudes toward health, the autonomy and connection with new technology (AI).
Rolandi et al., [45] in a longitudinal study, delineate the characteristic and the dimensions of the "resilience phenotype" in old age (see figure n.9). Bearing in mind that the resilience as outcome in old age is partially rooted in the early experiences and social conditions, other dimensions can be improved, e.g. the level of performance in fluid intelligence, the social contacts, the leisure time, the walking sped, the adherence to Mediterranean diet. This resilience model tells us that it is possible to modify in better ways several dimensions that are implicated in the emergence of the resilience in this stage of life and that the resilience is the result of historical but also biological, psychological and social features posited in the present time.

Figure n. 9. The Resilience phenotype. (Rolandi et al., 2024).

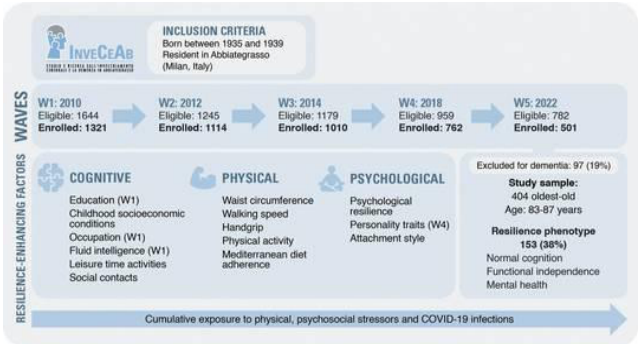


Figure n. 10. The Competent Ageing. (Zambianchi, 2025)

For figure n. 10. *Translation*. The Competent Aging. LSE competent behavior (LSE *comportamento competente*); Autonomy (*autonomia*); creative approach to daily problems *(approccio creativo ai problemi quotidiani*); physical health (*salute fisica*); contrast of cognitive declines (*contrasto ai declini cognitivi*); social ties (*legami sociali*); psychological well-being (*benessere psicologico*). (Zambianchi M. 2025. Life Skills Education in old age. Franco Angeli ed. Milan, Italy)

These models, together, solicit a reflection from not only psychological sciences, but also from areas of research such as Design and Engineering: if several factors can be modified, improved, which could be the role of these mentioned areas of study? How they can work together with Psychology for improving, e.g. creativity (fluid intelligence) in old age? How allow old people to make activities such as walking, bicycling, climbing? How to facilitate the leisure time activities? Psychology and its research theoretical declinations (e.g. cognitive, social, temporal) can be integrated into the knowledge-expertise of designers and engineers for projects, tools featured specifically for the needs of the older?
The AI represents of course an emergent area of research and application suitable for the positive functioning in old age. New robotic technology, such as human-following robots and exoskeletons, can represent examples of Engineering and Design applications for these age cohort. The integration of areas of research such as Psychology with them can add information, contents that facilitate to plan new tools, application that fit their needs and, at the same time, help in creating positive attitudes towards these technologies. Li et al., [46] in a study on human-following robots, which constitutes an example of collaboration of multiple knowledges, from engineering to sociology, highlighted the role of older representations, perceptions, emotions towards this new technology. The research team evaluated, through a qualitative methodology (semi-structured interviews) the needs and requirements of older people regarding the human-following robot. The 17 interviews helped the researcher to better adjusted this technology, as already stated by Roscoe et al., [47] that encourage "bridging Psychology and Engineering to make technology work for people".
The cultural contexts, together with more individual factors, such as personality traits, attitudes, stereotypes, time perspective organization, could influence the openness (or the closeness) to these new opportunities. Knowing them, it is possible to work together in order to dissipate fears and doubts. The design communication can draw important indications from the results that emerged on these factors to better fit the messages toward this target.
In Japan [48] old people are rapidly increasing, with a record of 28 per cent of people aged 65 or older. To encourage older people to stay in or remain in the workforce longer, several tech companies in Japan have developed exoskeletons.
But, they are suitable not only for work, but also for leisure time, as demonstrated in China, where old people use them for climbing the mountain (source: Xinhua, editor: huaxia, 2025,https://english.news.cn/20250210/5e81bae2b5904d77b4bcd1b32f1d4906/c.html).
A question is the following: are our old people (from other Countries not Japan or China) available for adopting these technology resources? Do they possess positive attitudes towards them, or not? Do they perceive them as a gain ("I can continue to climb mountains, despite the advanced age"), or as a loss ("I remember, when I see to them, the physical resources that are lost"...)? Since the perception of them as a gain or, on the contrary, as a loss, can make the difference.
How it is possible, to create positive attitudes towards these new technologies in this ageing cohorts?
Several suggestions can concern: for Designers, to create projects that include an integration with and in line with the most relevant cognitive dimensions (e.g. usability; affordance; principles of good designs, see for example Norman, [49]; social dimensions (e.g. integration with the body image of the person, her/his identity); emotions and well-being (eg. positive emotions, perceived life-quality). For the engineers, the AI seen as a robust resource for smart technologies aimed at improving autonomy, living homes, human following robots.

For closing

The relevance of these areas of study for engineers and designers has been highlighted through an informal conversation with students at Obuda University. Talking with them, during an Open day of the University, about a like-human robot they made (see figure n. 12), asking if they believe it can be suitable

for old people, they answered to me that this constitutes a completely unknown question and issue. But, after my brief explanation, they concluded that the issue of positive aging was very relevant and interesting, “a good idea”.

Figure n. 12. The like-human robot of Obuda University

The introduction of areas of study such as Psychology, in qualities and declinations useful for their professional competencies such as, e.g., Positive Psychology and Ageing Psychology, could help them to enrich those cultural and scientific competencies that can emphasize their creativity devoted to the development and well-being of humans.

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