Original Research

Successful Aging and Positive Psychology: Two Empirically Related Perspectives

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Abstract

*Background***:** In the last two decades, successful aging (SA) and positive psychology (PP), the two paradigms of health have received great attention. They originate from different approaches, theoretical background, and objectives. Although they share many characteristics, their association remains understudied. This article aims to empirically analyze their possible interrelation.

*Methods***:** In this cross-sectional study, 169 healthy, old adults completed several questionnaires to assess the central framework for successful aging and positive psychology. Participants were recruited from recreational centers for older adults.

*Results***:** Confirmatory factor analyses with a two-latent-factor structure (SA and PP) showed an adequate fit between them. A unidimensional solution is clearly supported, implying that PP and SA variables actually share the same latent factor. Latent profile analyses revealed that all SA and PP variables shared the same trend: three classes were identified which had

variations on the level of the whole set of variables, without qualitative differences between SA and PP variables.

Conclusions: This work provides evidence for the conceptual similarity between SA and PP approaches.

1. Introduction

Successful aging (SA) has been an extremely influential concept on aging for more than three decades of research since its first known articulation by Rowe and Kahn [1] and remains a central concept in social-gerontology research [2]. Basically, the SA model challenges the presumption of aging as a period of decreasing health and social losses and tries to identify older adults who experience a satisfactory aging process, defined as a combination of a lack (or low probability) of disease or disability, adequate cognitive and physical functions, and engagement with life. However, the initial model, with a primary focus on the absence of disease and the maintenance of functionality as criteria of success, has been widely criticized and reviewed [3] because defining successful aging mainly on the basis of the absence of disease has major theoretical limitations and empirical implications.

With increasing age, particularly in later life, suffering from some type of chronic disease becomes a normal experience [4]. Despite this, and the fact that physical health and functionality are relevant factors when determining the sense of general well-being, older adults can experience happiness and well-being regardless of their physical problems by compensating for them through psychosocial resources [5]. To achieve SA, diverse key psychosocial components (e.g., social engagement, life satisfaction, attitudes toward oneself) have been identified [6-11].

Older people's perception is one of the most overlooked aspects in relation to SA that can most affect its conceptualization is older people's perception [12]. Jeste et al. [13] noted that, when a majority of people were asked, they believe they are aging well and, in fact, they generally meet the psychosocial criteria. Considering this, some authors [13] draw attention to the great disparity between definitions from research and the common population: "… *there is a gulf between researcher and lay definitions–the former describes freedom from disease and disability, and the latter focuses on adaptation, meaningfulness, and connection.*" (p. 82), while indicating the inclination to reach biopsychosocial definitions that integrate both subjective and objective elements. This conceptual advancement would enable us to better interpret some empirical evidence, for example, that a significant number of people consider they are living well until the end of their lives (> 90 years of age), revealing the possibility of aging successfully even in the presence of chronic health problems [4].

Although the multidimensional nature of SA has been currently recognized in the literature [5], the difficulties of characterizing usual aging versus SA and the lack of consensus about the fundamental components of SA persist. Further, the lack of consistency in the operational definition of this concept remains a major limitation for research in this area. Cosco et al. [6]

systematically reviewed literature between 2011 and 2013 from six databases (e.g., PubMed, PsycInfo, etc.) to identify operational definitions of SA. They could identify 105 definitions in 84 studies, of which 92.4% referred to physiological aspects, 49.5% to engagement (e.g., volunteering), 48.6% to aspects related to subjective well-being, and 25.7% to personal resources, such as resilience, and only 5.7% referred to external resources (e.g., economic). Considering the criteria included in the definition of the concept, they found that 34 definitions included a single construct and the rest included two to five constructs. One of the most striking findings in this work was that the definitions applied in the included studies identified between <1% and >90% participants as successfully aging, thereby showing, like previous studies, that adopting one or the other definition of SA has dramatic consequences in the proportion of individuals perceived to be experiencing SA. In another systematic review of 28 studies apropos definitions and predictors of SA, Depp and Jeste [14] observed that successful agers ranged from 0.4% to 95%. Likewise, a similar wide range was observed when considering a group of studies using physical or cognitive criteria. The variations in these results seem to reflect the heterogeneity of SA definitions and the use of a variety of criteria in each definition. Recently, an original review of the literature on SA was carried out using citation network analysis based on scholars' definitions of this concept and how they weighed the contribution of health and functioning to estimate their extent of accomplishment [15]. On analyzing the literature from 1902 through 2015, two distinct citation networks were identified. The first cluster focused on SA from the perspective of the elderly themselves, highlighted concepts such as coping strategies, psychosocial engagement, and cultural differences. The second cluster on SA was based on objective measurements as determined by researchers. The authors concluded that in "*the current literature, two mutually exclusive concepts of successful aging are circulating that depend on whether the individual himself or an outsider judges the situation. These different points of view help to explain the disability paradox, as successful aging lies in the eyes of the beholder*" (p. 4).

In a recent review of literature on SA, Fernández-Ballesteros [8] presented 17 most representative definitions of this and other related terms (i.e., successful, healthy, active, and productive aging), concluding that, collectively, they include diverse criteria (19), which can be grouped into four domains: (1) health and functionality, (2) physical and cognitive functioning, (3) positive affect and control, and (4) participation and engagement. Accordingly, Fernández-Ballesteros proposed a multidimensional definition of SA as "*the life course adaptation process for arriving at optimal functioning and health, psychological (optimal physical and cognitive functioning and emotional-motivational regulation) and social participation in old age … four domains are included for this way of aging: health maintenance and activities of daily living preservation, physical and cognitive fitness, positive affect and control, and social participation and engagement*" (p. 12). As evident, it is a multidimensional definition integrating subjective and objective aspects, as per the necessary conceptual progress in the definition of SA.

Young et al. [5] proposed a multidimensional definition of SA that besides including the dimensions described in the above definition, integrates people's subjective perception of the quality of their own aging: "*A state wherein an individual is able to invoke adaptive psychological and social mechanisms to compensate for physiological limitations to achieve a sense of well-being, high self-assessed quality of life, and a sense of personal fulfillment, even in the context of illness and disability*" (pp. 88-89). This multidimensional definition is relevant to our study because it emphasizes the subjective facets of SA, self-rated quality, and the perception of one's own aging

process. In addition, it is consistent with Ryff's remark [16] about the need for a match between how one theoretically perceives well-being and the values and ideals of the people to whom this concept is applied, as well as for empirical research to contribute to such a match and to examine the consequences of following one or the other concept of positive psychological functioning. This statement is especially pertinent in relation to aging.

Because of it, SA lays emphasis on subjective elements related to well-being, positive psychological resources, realization of personal capacities as well as purposeful engagement in life, and thus, has been proposed to be one extreme of a concept developed almost on a parallel timeline, although, on a relatively separate trajectory, as it does not usually focus on aging but on Positive Psychology (hereafter, PP). Thus, Ranzijn [17] proposed that aging research should adopt concepts from PP to develop a PP of aging. A recent review also provides reasons to contemplate concepts of PP when trying to explain SA and prevent health problems in older adults [18].

The PP approach emphasizes the need for a positive approach to study people's psychological strengths, beyond the usual focus on psychopathology. Seligman and Csikszentmihalyi [19] state that PP is a science of subjective positive experiences, positive individual traits, and positive institutions aimed at identifying factors that make better individuals, communities, and societies. For decades, psychology has focused on studying mental health problems instead of positive aspects of human beings, such as resilience, optimism, or positive affect [20]. With the emergence of PP, happiness and well-being have become aspects of great interest. The aspects of subjective well-being, such as life satisfaction, positive emotions, and mental health include emotional and cognitive elements [21, 22]. Further, PP has helped in expanding the concept of happiness, integrating elements from a hedonic perspective of well-being (e.g., positive emotions, pleasure) and aspects of positive functioning, typical of a eudaimonic approach, such as purposeful engagement in life, enlightened self-knowledge, and personal fulfillment [14, 23]. There is increasing evidence to support the importance of psychological well-being in human functioning and the protective role of psychological well-being in health, lowering the risk of disease and disability and increasing longevity [14]. According to Seligman [24], well-being is the basis of PP and can be operationalized by five concepts, including 1) positive emotion, 2) engagement, 3) meaning, 4) positive relationships, and 5) accomplishment. Positive emotion refers to the experience of feeling good, gratification, or happiness. Engagement is a subjective experience of being absorbed in a task when time seems to stop [25]. Meaning is interpreted as a sense of purpose in life, and there is evidence that it is one of the most relevant elements in health maintenance [26]. Accomplishment is associated with the notion of achievement and/or mastery for one's own personal gain. Finally, positive relationships are related to the pursuit of meaningful relationships. These five elements are essential components of well-being and considered key aspects of the design of interventions based on PP [24].

One of the most relevant contributions of PP is its emphasis on human resilience, that is, the ability to experience and maintain well-being, despite life's challenges and difficulties (e.g., losses, unexpected negative events, chronic adverse circumstances) [14]. Resilience is one of the most significant factors of positive functioning with reference to aging because, at this stage of life, people must usually cope with adverse situations frequently. While PP does not fully explain older people's behavior, it is an excellent model for understanding old age and the development of emotions in SA and the adaptation process [27]. The aspects of PP are associated with better physical and mental health [28], and the intervention programs aimed at improving PP facets in

individuals have been shown to be effective at improving physical and mental functioning and averting health problems [29, 30]. These types of interventions, focusing on facets of PP, have been recently applied to older adults with promising results [31-35].

In summary, SA and PP share many common aspects, and they have been theoretically integrated into the conceptual term *positive psychology of aging* (PPA) [18]. However, while applying the main concepts of PP in older adults a relevant but largely unexplored issue concerns the extent to which the primary variables related to both paradigms are actually interrelated, i.e., whether variables defining PP and SA in effect refer to the same or similar constructs and can be assumed to represent a unidimensional factor of PPA. Additionally, assuming the unidimensional hypothesis, we aim to explore potential specific differential profiles or types of people, according to the distribution of their SA and PP variables. Simply put, we explored whether specific subtypes of people (e.g., high PP with low SA, or low PP with high SA) actually exist across the primary variables of both paradigms. These could potentially include, for example, profiles combining some PP variables associated with only some SA variables.

In line with previous SA and PP formulations, we selected a set of variables in this study, which represent both perspectives and have special value in relation to aging. On the one hand, the four main domains defined by Fernández-Ballesteros [8], of *health, physical* and *psychological functioning, participation* and *engagement* were included. This was supplemented with variables that emphasize people's subjective perception such as *satisfaction with aging* or *attitudes toward one's own aging* [5]. Contrarily, we included the PP dimensions that reflect the difference between hedonic well-being (positive affect, happiness) and eudaimonic well-being (personal growth, resilience, meaning in life) [11, 23] as well as Seligman's main proposals of *strengths*, with special emphasis on *optimism* or *gratitude*, that have shown a predictive value for well-being among older individuals [33, 36]. Finally, among the PP variables, we included the dimension *will to live*, which represents the optimistic expectations about the aging process and is currently considered an important variable for older people's well-being [37].

2. Materials and Methods

2.1 Participants and Procedure

The sample consisted of 169 adults between 54 and 88 years of age (mean = 71.8; SD = 7.0), 87.0% of whom were women. The participants were recruited from senior citizen centers in Madrid (Spain). All the individuals were participants of social activities at these centers. Through a written announcement, the users of the senior centers provided a written, informed willingness to collaborate in the investigation. Two psychologists trained for this purpose explained the objectives of the study and detailed their collaboration with the participants through telephonic conversation. An appointment was made in case they agreed to participate. For the present study, only individuals with no diagnoses of dementia, anxiety, depression, or any other neurological or pathological disorder that would affect their cognitive capacity were selected. On the Mini-Mental State Examination, all participants had a score higher than the cut-off of 23, indicating no signs of cognitive impairment.

The study participants basically represent the older population of Spain. Most participants were poorly educated, with 65% lacked formal education or only had primary education. Only 15% had

completed higher education. Half the participants were married, 40% were widows or widowers, and 15% were experiencing economic difficulties. The women in the sample were more poorly educated and had more financial difficulties. All these sociodemographic data correspond with current data from the National Institute of Statistics of Spain (INE; www.ine.es). Although the threshold of "old age" is necessarily arbitrary and depends on functional ability, the limits of 55, 60, 62, or 65 years have often been used in research in Western populations. Considering that the participants were involved in activities in senior centers, and that the requirements for registration in such centers in Spain is the age of 54 years or older and being retired, for this study, we considered the entire range of people involved in the aging process (from late adulthood to late old age), and decided to include 54 years old individuals who agreed to complete the questionnaires.

This study followed the ethical research criteria of the Autonomous University of Madrid and international ethical standards [38] and was approved by the Ethics in Research Committee of the authors' academic institution (Reference CEI–31–795).

The participants were informed of the objectives and duration of the study, the voluntary nature of their participation, and the processing of the information collected. Finally, the participants and researchers both signed informed-consent forms before commencing the study.

2.1.1 Procedure

The participants were also asked to be part of a larger study on well-being during old age and were provided with general information regarding the primary objective of the study. Those who agreed to participate received detailed information about the study and specific instructions on how to complete the questionnaires correctly. In most cases, the questionnaires were applied collectively, although in a few cases of some specific sensory or motor impairment, they were individually attended to.

2.2 Measures

2.2.1 Positive Psychology

Will to live was measured with a single item ("How often do you think the benefits of living outweigh the adversities of life?") rated on a five-point Likert scale ranging from 1 (hardly ever) to 5 (almost always). This term was generated from the research of Levy et al., in which they observed a pattern suggesting that will to live affects survival and is a balance between perceived benefits and adversities of life [37]*.*

Positive affect was measured by applying the Positive Experience subscale of the Scale of Positive and Negative Experience (SPANE) [39]. The Positive SPANE questionnaire consists of six items that assess positive feelings, using a five-point response format. Cronbach's alpha in our sample was 0.86.

Resilience was assessed via the four-item Brief Resilience Coping Scale (BRCS) [40]. BRCS is a unidimensional outcome measure designed to evaluate whether an individual copes with stress adaptively. The response format for the items had five options; higher scores denote coping with greater resilience. Cronbach´s alpha for this sample was 0.74.

Flourishing was measured with the Flourishing Scale (FS) [39]. FS is a summarized eight-item measure of the respondent's self-perceived success in important areas such as relationships, self-esteem, purpose, and optimism. FS items are rated on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). FS furnishes a single psychological well-being score. Cronbach's alpha for this sample was 0.74.

Meaning in life was assessed using the Meaning in Life Questionnaire (MLQ) [41]. The ten-item MLQ evaluated both an individual's perception of the degree to which his or her life is meaningful and the motivation to find meaning in life. Each item was rated on a seven-point Likert-type scale ranging from 1 (absolutely untrue) to 7 (absolutely true). Cronbach's alpha for this sample was 0.82.

Dispositional optimism was measured through the Life Orientation Test (LOT-R) [42]. Dispositional optimism is a personality characteristic that is perceived as a general expectation that good things will happen. LOT-R is a 10-item measure of optimism versus pessimism. Respondents were assessed for each item on a five-point Likert scale ranging from strongly agree to strongly disagree. Cronbach's alpha for this sample was 0.66.

Happiness was measured with the Subjective Happiness Scale (SHS) [43]. Using their own happiness criteria, individuals make an overall judgment about how happy they are. The unique perspectives of the respondents on their own happiness were assessed through this four-item questionnaire of SHS. Each item was completed by choosing one of seven options to finish a given sentence fragment. Cronbach's alpha for this sample was 0.67.

Gratitude was assessed via the six-item Gratitude Questionnaire (GQ–6) [44]. Gratitude is the "generalized tendency to recognize and respond with grateful emotions to the roles of other people's benevolence in the positive experiences and outcomes that one obtains" [25]. Each item is answered on a seven-point Likert-type scale ranging from 1 (absolutely untrue) to 7 (absolutely true). Cronbach's alpha for this sample was 0.80.

2.2.2 Successful Aging

Satisfaction with aging was measured with a single query ("How satisfied do you think your life is as you grow older?"), rated on the Visual Analog Scale (VAS), or "feeling thermometer," through a direct evaluation of the individual's satisfaction level, on a scale of 10, with 10 indicating maximum satisfaction and 0 indicating an absence of satisfaction.

Social functioning is a measure comprising three dichotomous items: 1) the presence of a confidant; 2) living with a family member or other close companion, and 3) carrying out satisfactory activities. The range of final score was from 0 to 3 points, depending on the number of social functioning criteria reached.

Life satisfaction was determined on the Satisfaction with Life Scale (SWLS) [45]. SWLS is a five-item instrument designed to measure global cognitive judgments of satisfaction with one's life. SWLS is frequently used to measure the life-satisfaction component of subjective well-being. Participants rated the queries on a five-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha for this sample was 0.86.

 Depression was assessed using the Patient Health Questionnaire (PHQ–2) [46]. The PHQ–2 comprises the first two items of the PHQ–9 and enquires about the extent to which an individual

has experienced depressed mood and anhedonia over the previous two weeks. Cronbach's alpha for this sample was 0.75.

Perception of successful aging was assessed by asking respondents whether they had achieved the 15 criteria in terms of beliefs about physical, functional, social, and psychological health for successful aging that were previously identified as important by older people [5]. Cronbach's alpha for this sample was 0.75.

Physical and mental health was evaluated through the Short Form–12 Health Survey (SF–12) [47]. The SF–12 (version two) is a brief multi-purpose health survey that includes 12 items taken directly from the SF–36. The SF–12 yields eight scale scores (physical functioning, role physical, body pain, general health, vitality, social functioning, role emotional, and mental health), from which the physical component (domains 1–4) and mental component (domains 5–8) summary scores can be computed. Cronbach's alpha for this sample was 0.81.

Attitudes toward one's own aging were measured with the five-item Attitudes Toward Own Aging (ATOA) subscale of the Philadelphia Geriatric Morale Scale [48, 49]. ATOA is a frequently used measure of subjective aging and includes items that refer to an older person's attitude toward the aging process that they are experiencing. ATOA is also viewed as a reflection of societal beliefs and stereotypes about aging. The respondents are asked to indicate whether they agree (score = 1) or disagree (score = 0) with several statements. The total score ranges from 0 (most negative ATOA) to 5 (most positive ATOA). Cronbach's alpha for this sample was 0.70.

2.3 Statistical Analyses

First, all variables were analyzed descriptively, both for the total number of participants and for men and women separately. Scores on each variable were compared according to gender through T-tests for independent samples. The significance level was adjusted to control for family-wise Type I error due to multiple comparisons as $p = 0.05/15 = 0.0033$. In any case and given the small number of male participants, effect sizes (Hedges' g) were estimated for those variables in which a trend toward significance (a p-value close to or below 0.05) was observed.

Then, the possible structure of the different variables included in the study according to the theoretical frame yielded through confirmatory factor analysis (CFA) was tested. The initial hypothetical model consisted of two latent factors, one including eight variables clearly related to the assessment of positive psychology (PP) and the other including eight variables adopted from the main definitions of SA. Correlations between the two latent factors were freely estimated, correlations between errors were set to 0, coefficients between measurement errors and each variable were fixed at 1, and the loading for one variable and each latent factor was fixed at 1 for statistical identification of the model. Maximum likelihood was the estimation method, and several fit indices were used to assess the model to fit data, according to the usual recommendations [50-52]: a) lack of significance of χ^2, b) comparative fit index (CFI > 0.90), and c) root mean square error of approximation (RMSEA < 0.06). The model was corrected, catering to modification indices and theoretical considerations, to find a model with an adequate fit that made theoretical sense.

Finally, a latent profile analysis (LPA), a statistical technique used to empirically discern discrete subpopulations of individuals by probabilistically assigning participants to classes based on similar item-response profiles, was performed. The best fitting and most parsimonious model were

determined using multiple-fit indices. The primary focus was given to Bayesian information criteria (BIC), a function of the log-likelihood (LL) statistic that considers sample size and a number of parameters (BIC = (−2LL +[(# of parameters)*log (sample size)]). The lowest BIC generally indicates the best-fitting model [53]. The Akaike information criteria (AIC) - which resemble BIC, but do not incorporate sample size - are provided in the fit indices for comparison. Attention was also paid to classification error, which indicates the percentage of the sample that may have been incorrectly classified [54]. When selecting the final best-fitting model, it is also important to consider parsimony and sample size within each class. Lastly, the bivariate residuals were examined to make sure that the assumption of conditional independence was met.

The LPA strategy was exploratory, i.e., we did not anticipate specific profiles (or classes), and the decision on which classes were to be retained was made based both on empirical criteria (see above) and interpretability of the results in relation to theoretical backgrounds from PP and SA. Based on the main hypothesis of the present study, we expected to find quantitative, but not qualitative differences within the entire set of PP and SA variables. In this case, the classes to be found would have approximately constant or parallel differences in the mean estimates for all PP and SA variables in tandem; otherwise, one would expect crossed lines between variables. In the extreme case, classes higher in PP variables and lower in SA variables could be found together with classes lower in PP variables and higher in SA variables. No additional analyses were planned to check the characteristics of classes to be found or for their comparison. To address the goals of this work, evidence from CFA and LPA would inform us about a potential empirical relationship between theoretical approaches of PP and SA.

All CFA modeling and LPA were carried out using Mplus (version 4.21) [55]. Descriptive and group-comparison analyses were performed using Stata release 11.2 [56].

3. Results

3.1 Descriptive Data

Table 1 provides descriptive data (mean and SD) for all study variables. Only one variable, physical functioning, showed statistically significant differences between men and women, with a higher score, indicating better functioning for men (p = 0.047). After adapting the p-level for multiple comparisons to reduce the possibility of family-wise Type I errors (p = 0.05/15 = 0.0033), these differences were clearly nonsignificant. For this comparison, the effect size, however, was medium-high for physical functioning (g = 0.47; 95% CI [0.01, 0.92]). In the remaining comparisons, no difference, or even tendencies toward difference, were observed. Overall, it can be assumed that the results of the present work were not affected by the gender of the participants.

Table 1 Descriptive statistics for the different variables related to successful aging and positive psychology.

Variables	Mean (SD)		Total Mean (SD)	p
	Men N=22	Women N=147		
Positive Psychology (PP)				
Will to Live (pp1)	3.05 (1.13)	2.84 (1.15)	2.86 (1.14)	0.426
Positive Affect (pp2)	23.14 (5.73)	23.50 (4.79)	23.45 (4.91)	0.745
Resilience (pp3)	11.36 (3.74)	11.72 (3.02)	11.67 (3.11)	0.619
Flourishing (pp4)	46.45 (5.41)	45.90 (6.48)	45.97 (6.34)	0.702
Meaning in life (pp5)	16.27 (4.99)	16.94 (3.38)	16.85 (3.62)	0.550
Optimism (pp6)	15.73 (3.17)	15.77 (3.48)	15.76 (3.43)	0.961
Happiness (pp7)	17.53 (4.70)	17.80 (4.74)	17.77 (4.72)	0.805
Gratitude (pp8)	34.64 (5.01)	35.02 (6.19)	34.97 (6.04)	0.782
Successful Aging (SA)				
Satisfaction with Aging (sa1)	7.36 (2.46)	7.55 (2.32)	7.53 (2.33)	0.726
Social Functioning (sa2)	2.14 (0.64)	2.06 (0.83)	2.07 (0.80)	0.660
Life satisfaction (sa3)	24.95 (6.40)	23.78 (6.98)	23.93 (6.90)	0.739
Depression (sa4)	1.14 (1.83)	1.44 (1.46)	1.40 (1.51)	0.378
Perception of SA (sa5)	12.27 (3.55)	12.32 (3.46)	12.31 (3.46)	0.953
Physical Health (sa6)	**49.79 (7.79)**	**45.75 (8.75)**	**46.36 (8.71)**	**0.047**
Mental Health (sa7)	46.71 (11.63)	46.54 (9.48)	46.56 (9.74)	0.941
Attitudes Toward own aging (sa8)	2.55 (1.68)	2.61 (1.65)	2.60 (1.65)	0.871

* Rows in bold indicate a statistically significant difference (p < 0.05).

3.2 Confirmatory Factor Analysis

The weights of all variables were statistically significant in their theoretical latent factors. Further, the fit of the model was found to be slightly inadequate: χ^2 (103) = 210.2, $p < 0.001$; *CFI* = 0.889; *RMSEA* = 0.078, 90% CI [0.063, 0.094]. In addition, when checking modification indices, there was an obvious relationship between the measurement errors of the two measures of health - physical and mental - and the SF12. Therefore, the correlation error between these two variables was freely estimated, and a slight increase in fit was found for this new model, which could be considered as adequate: χ^2 (102) = 197.1, $p < 0.001$; *CFI* = 0.901; *RMSEA* = 0.074, 90% CI

[0.059, 0.090]. Given the goals of the present analyses, this fit was considered sufficient, and no further modifications of the models were pursued.

The structure of the final model is presented in Figure 1. Standardized weights for each variable in the two factors are presented in Table 2 (please note that the unstandardized weights for one variable in each factor—namely pp1 and sa1—were set to 1). Interestingly, the correlation estimate between PP and SA was high at 0.91. This means that a unidimensional solution is clearly supported by these results, implying that PP and SA variables actually share the same latent factor.

Table 2 Regression coefficients in CFA for variables related to PP and SA.

Variables	Unstandardized		Standardized
	Weight	SE	
Positive Psychology (PP)			
Will to Live (pp1)	1.0	---	0.469
Positive Affect (pp2)	6.583	1.130	0.720
Resilience (pp3)	3.230	0.628	0.557
Flourishing (pp4)	8.908	1.504	*0.755*
Meaning in life (pp5)	4.680	0.816	0.694
Optimism (pp6)	3.345	0.676	0.524
Happiness (pp7)	6.674	1.139	0.759
Gratitude (pp8)	5.988	1.185	0.532
Successful Aging (SA)			
Satisfaction with Aging (sa1)	1.0	---	0.756
Social Functioning	0.074	0.037	0.160*
Life Satisfaction (sa3)	3.118	0.298	0.797
Depression (sa4)	-0.539	0.068	-0.628
Perception of SA (sa5)	0.895	0.158	0.456
Physical Health (sa6)	1.269	0.403	0.257**
Mental Health (sa7)	2.571	0.440	0.465
Attitudes Toward own aging (sa8)	0.619	0.072	0.662

All weights were significant with p < 0.001, except *p= 0.048 and **p= 0.002.
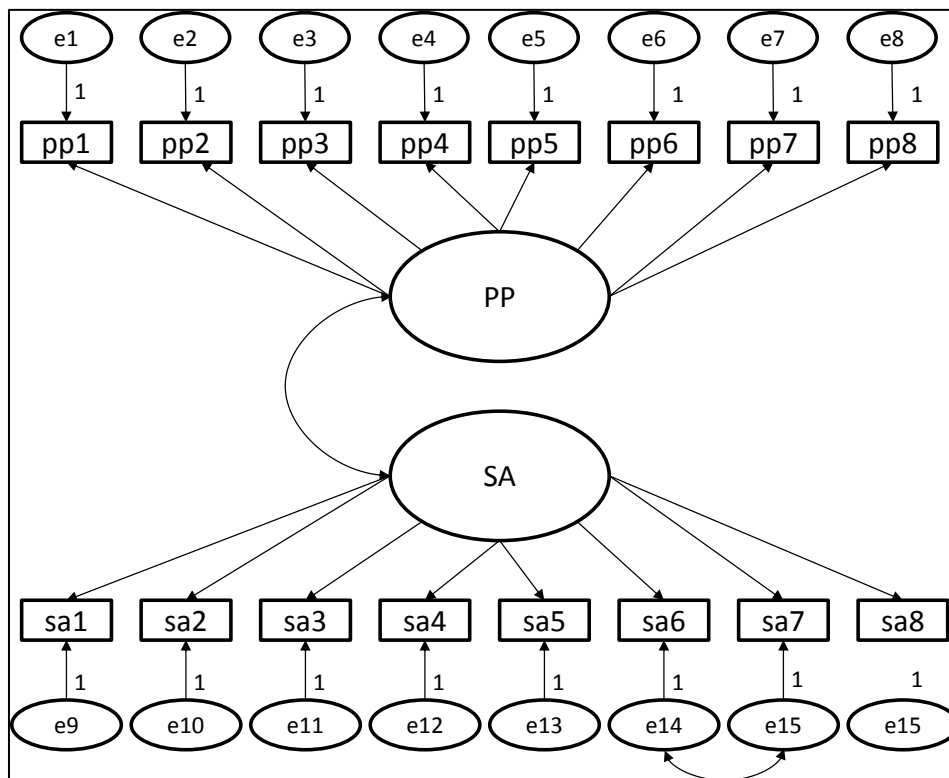
Figure 1 Graphical representation of the two factor CFA structure, PP (Positive Psychology) and SA (Successful Aging), with a free estimation of the correlation between physical (sa6) and mental functioning (sa7).

3.3 Profile Class Analysis

The three-profile model had the lowest *BIC* (13830.31), *AIC* (13623.73), statistically significant Bootstrap Likelihood Ratio Test (*BLRt*), and *p*-value ($p < 0.0001$), which indicated the best model fit [57]. Next, we compared entropy, which measures the clarity of profile distinction across all models. Entropy values over 0.80 are considered strong, and values approaching 1 indicate good model fit [58]. The entropy recorded here was 0.895 for the three-profile model, which was higher than that for alternative models. In addition, the Vuong-Lo-Mendell-Rubin adjusted likelihood ratio test (LRT) had a *p*-value of 0.0032, and the Lo-Mendell-Rubin LRT test had a "p" value of 0.033. These tests suggest that two classes are not sufficient and that three classes are required. Based on these criteria, we identified the three-profile model as the most parsimonious and best-fitting model.

The three-profile model is graphically presented in Figure 2. The estimated scores for the three profiles were observed to be parallel for all variables (except for depression), indicating a difference in the extent of the general trait of the proposed unidimensional PPA model, instead of qualitative differences between the types of variables or groups of combined variables. Similar patterns were obtained for models considering two or four profiles and are available upon request from the corresponding author. While interpreting Figure 2, please note that it represents estimated means with different scales for different variables, i.e., the strength of association cannot be compared between variables. No additional comparisons were performed, as these would extend beyond the scope of the present study.
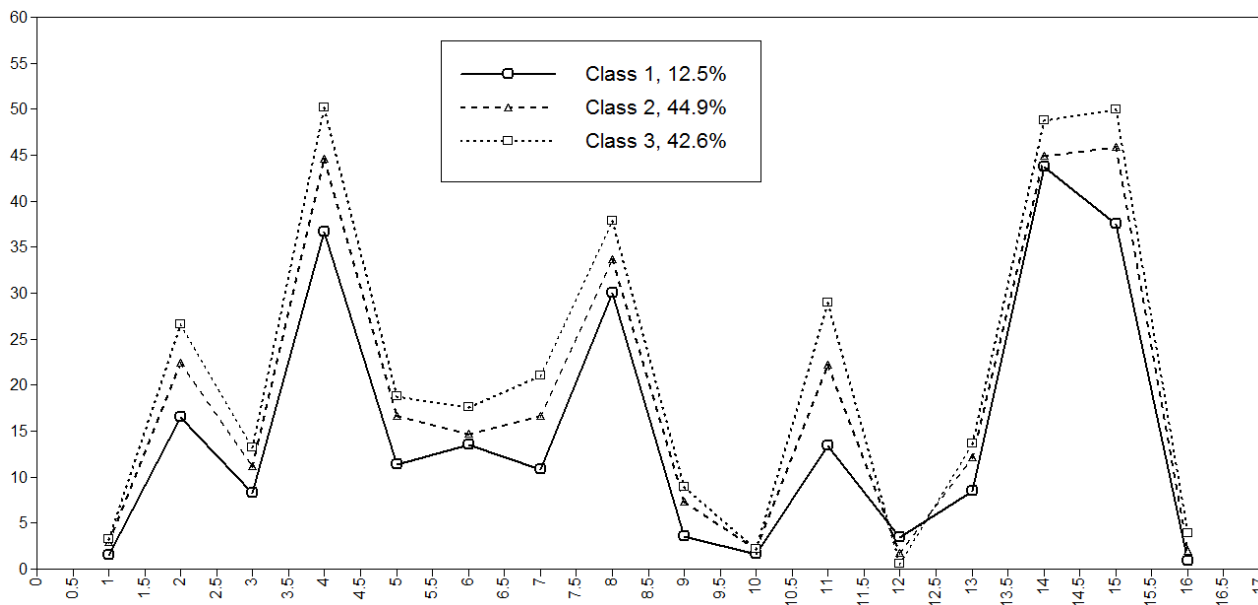
Figure 2 Estimated means for each criterion of Successful Aging and Positive Psychology for of each of the three profiles extracted from the analysis. Each class represents levels of endorsing Successful aging variables, from low (class 1) to high (class 3), but not qualitative differences or in the pattern of relationships, as the three lines are practically parallel across variables. (Note: *POSITIVE PSYCHOLOGY*: 1 = Will to Live, 2 = Positive Affect, 3 = Resilience, 4 = Flourishing, 5 = Meaning in life, 6 = Optimism, 7 = Happiness, 8 = Gratitude; *SUCCESSFUL AGING*: 9 = Satisfaction with Aging, 10 = Social Functioning, 11 = Life Satisfaction, 12 = Depression, 13 = Perception of Successful Aging, 14 = Physical Health, 15 = Mental Health, 16 = Attitudes Toward Own Aging.)

4. Discussion

The outcomes of both CFA and LCA indicate that PP and SA assess a similar or unidimensional construct. First, a model for CFA in which all variables, except one for PP (Social Functioning, which was barely significant), had clear statistically significant weight in the theoretical factors provided an adequate fit, after freely estimating the correlation between two variables from SA. A very high correlation between PP and SA latent factors (0.91) suggests that both factors, in fact, measure a very similar construct, which could tentatively be named as the PP of Aging (PPA). Two relevant methodological observations are important here. First, post-hoc modifications of the CFA models have been repeatedly examined and are only recommended if they are theoretically and practically plausible [59]. Given the overall exploratory approach of the present study, as well as the minimal modifications carried out, we believe that this condition is, in general, fulfilled here. However, we acknowledge that this modification (free estimation of covariance parameter between two variables) "should be viewed as tentative until cross-validated in an independent sample" [59]. Considering these, and although the fit of the model was only slightly over the usually recommended thresholds (i.e., *CFI* = 0.901), no additional changes were needed for the exploratory goals of this study.

Second, an explanation is required to free a parameter associated with a general assumption of CFA models: zero correlation between measurement errors. We consider that the presence of correlated errors could make sense in this case, as physical and mental functioning are parts of the same scale, with a very similar structure of the questions and the same format in the response scales. A systematic measurement error covarying for both variables is not unexpected in this case. Furthermore, physical and mental health indicators are usually strongly associated.

Regarding the LPA models, a three-profile model seems to be the best elucidation. Given the characteristics of these profiles, these results also support the idea of a one-dimensional distribution of PP and SA, in accordance with the proposed PPA profile. Further, differences between the three profiles are apparently quantitative (to the extent to which each person has the whole set of PPA characteristics), instead of qualitative (groups of people endorsing a set of variables differing from other groups of people endorsing a different set of variables). Please note that the variables are assessed using different scales, so it is not possible to compare their relative relevance herein. The key point is the differences in the profiles of the selected classes, which develop practically parallel to the whole set of PP and SA variables. The only variable in which the line crosses the profiles is Point 12, which corresponds to depression. Depression was reversely assessed (it is the only negative variable, and a higher score indicated poorer PP), so this was entirely expected and agrees with the nearly-parallel three-profile pattern, only reflecting differences in the endorsement of variables (actually, there are differences in the estimated means here) for the three different profiles. Therefore, the most rational interpretation of these profiles is that all variables function in the same dimension and that different profiles are basically the result of differences in the extent to which different individuals are placed in low, intermediate, and high levels of both SA and PP. Put differently, there are no classes specifically related to differential levels of SA or PP. Instead, these make up a common dimension, or two different, but very closely associated, dimensions.

From a life-course perspective, it has been emphasized that interpersonal heterogeneity in SA, especially concerning subjective components such as engagement in life, is subject to personal preferences and interests developed along the life cycle as a function of lifestyle [60]. One of the main criticisms of Rowe and Kahn's model of SA has been that it does not consider this life-course perspective [3, 61]. If SA can be conceptualized as a consequence of applying general PP characteristics to specific events and situations associated with aging and perceptions of aging processes [18], then PP and SA would be expected to be highly and positively correlated. The results of this study are congruent with this hypothesis. An integrated transition across the life-span, from the availability of positive resources to coping with stress and a positive attitude to an ability to cope successfully with new problems that emerge with aging, also agrees with Young's definition of SA [5], particularly when conceiving the possibility of SA even when chronic and pervasive illnesses are present.

The limitations of this study include the cross-sectional design, the selection of a convenience sample, the relatively small sample size, and a gender gap in the sample. The cross-sectional design of this work did not allow us to reach conclusions regarding a more detailed relationship between PP and SA variables. Moreover, as per the contention that successful aging should be examined within a life-span theory [63], a longitudinal design would be required to model the possible transition over the lifespan from one set of variables to another. Moreover, preliminary results of this work must be viewed with caution. First, the study only aims to provide preliminary

evidence for a conceptual relationship between PP and SA, and the findings reported herein do not allow the extraction of more speculative conclusions, apart from the existence of a close relationship between them in a sample of older adults. The lack of a random sample limits the generality of the study, especially if we consider that the participants were recruited in senior citizen centers and, therefore, there is not enough variability and representation in social participation—a variable of special interest among older people. Further, the low percentage of men seriously limits the generalization of these results to the entire population, and this is probably especially notable in the segment of younger participants. Although this is a usual limitation in research on aging, gender-based comparisons in structural models were beyond the aims of this work, and further research is required to extend the results of this study taking gender into account.

It is not clear to what extent the results obtained from this sample are applicable to different contexts, cultures, socioeconomic levels, and other psychosocial dimensions that have been found to greatly affect the prevalence of SA in the general population [14]. Nor do we know the extent to which the three classes obtained as optimal results in the LPA models represent "natural categories," i.e., whether they indicate potentially useful cut-offs to prevent unsuccessful aging. To achieve the goals of the present study, it is sufficient to know that practically all PP and SA categories operated in tandem in each of the three classes, and no additional comparisons can be made. Further studies could test the validity of these classes and their potential usefulness.

Finally, as pointed out before, it must be acknowledged that the findings of this study support a conceptualization of SA as related to PP, providing an empirical foundation to interventions focused on PP facets recently applied to the older population. These interventions seem promising for the prevention of physical health problems and the promotion of well-being [31-34, 64], which is consistent with the fact that PP and SA seem to be intrinsically related theoretical contexts, and posits that the type of interventions that include PP facets should be encouraged as a new way to promote successful and healthy aging. The integrative approach in this study suggests the means through which empirical support can be provided for the positive psychology of aging. On expanding the conceptual approach to successful aging, this framework points to a promising future direction for promoting healthy aging and the experience of well-being in old age.

Author Contributions

MI and IM conceived and designed the experiments, MI, RN, and IM collected and analyzed the data, and drafted and revised the manuscript.

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Competing Interests

The authors have declared that no competing interests exist.

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