Article Portuguese Version of the Aging Attitudes Questionnaire (AAQ): Validation of the Psychometric Properties

Margarida Pedroso de Lima,¹ Paulo Martins ^{2*} and António-José Gonzalez ³

- ^{1.} Department of Clinical Psychology, Faculty of Psychology and Educational Sciences, University of Coimbra, Coimbra, Portugal
- ² Laboratory of Sport Psychology, Faculdade de Motricidade Humana da Universidade de Lisboa,1499-002 Cruz-Quebrada, Portugal; <u>pmartins@fmh.ulisboa.pt</u>
- ³ ISPA University Institute of Psychological, Social and Life Sciences, Lisbon, Portugal, <u>gonzalez@</u>ispa.pt
- * Correspondence: <u>pmartins@fmh.ulisboa.pt</u> e-mail@e-mail.com; Tel.: (optional; include country code; if there are multiple corresponding authors, add author initials)

Abstract: Scientific literature shows increased interest in the aged and the aging phenomenon. The Aging Attitudes Questionnaire - AAQ was validated for the Portuguese population to understand the importance of attitudes towards old age and their impact on the subjective well-being of the elderly. A sample of 400 subjects (from 18 to 93 years) answered a socio-demographic questionnaire, and the AAQ was composed of three subscales (psychosocial losses, physical change, and psychological growth). The CFA confirmed the tri-factorial structure with very good adjustment of the model to the data with the Cronbach alpha of the total scale scoring .84 and ranging from .65 to .77 for each factor. A total of 9 items were omitted both for poor factor loadings (< 0.50. Notwithstanding, 3 items below the criteria were maintained, as they conceptually fit into the factor. Of the final 15 AAQp items, 5 belong to the Psychosocial Loss factor, 6 to Physical Change, and 4 to Psychosocial Growth. This tree factor model explained 50.1 % of the total variance. In conclusion, this study supports that AAQ has acceptable validity, confirming the composite reliability and the discriminant validity, but not the convergent validity. Through multi-group analysis, the invariance of the scale was confirmed. This validation is of pivotal importance once it allows measuring the attitudes towards aging, thus facilitating the promotion of wellbeing across the lifespan.

Keywords: Aging; Attitudes; Subjective Well-being; Positive Affect

1. Introduction

We are witnessing an exponential increase in the number of older people. This phenomenon, extensively described in gerontological literature [1], manifests itself worldwide. By 2050, according to WHO (2022), the world's population of people aged 60 years and older will double (2.1 billion), and the number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million [2]. In Portugal, in 2021, the percentage of the elderly (those aged 65 and over) was 23.7% of the total population. This age distribution led to an aging ratio of 184.9 elderly per 100 young people [3]. Globally, it is estimated that the age group above 80 will be the fastest growing within the elderly population [4], so older people will occupy a considerable portion of the age pyramid. This growth requires us to reflect on and pay due attention to the increasingly evident specificities, needs, and demands of elderly individuals. Faced with the changes in their age group, they develop and reinvent themselves in an increasingly challenging modern daily life. Although the increase in average life expectancy may be considered a social conquest and a challenge, it is, above all, a universal process that constitutes an unparalleled subjective experience for human beings. It is influenced by numerous factors, such as gender, physical condition, environment, social and behavioral determinants, psycho-

(cc)

logical strategies, and culture [5, 6]. However, it is not only essential to quantify the increasing proportion of older adults but to describe the quality of their experience. In this context, the construction, validation, and study of instruments that allow this type of assessment becomes especially relevant for research in Psychogerontology.

However, we can observe that: a) most instruments to assess the subjective experiences of older subjects were not specifically built for this age group - quite the contrary, the development of research in the area of psychological assessment of older people is recent [7]; b) the discussion of the subjective experience of what it is to experience old age is made by subjects of other age groups, namely young adults and middle-aged adults when it would be more relevant for the elderly subjects themselves to do so [8]; c) although the experience of aging is a cross-cultural phenomenon, it is largely influenced by each country's culture and not all instruments consider these aspects [9].

Attitudes towards aging represent a fundamental cognitive process that determines the affective valence with which this process is experienced. At this level, there is a notable shortage of psychological assessment instruments adapted to the Portuguese population.

In addition to the scientific community's need to invest in the psychological assessment of older adults, there is an increase in the concerns related to the promotion of wellbeing in adulthood in the transition from a pathogenic paradigm, where the primary focus of interest is on disease etiology, to a salutogenic paradigm which is dedicated to exploring the causes and consequences of health and positive functioning [10]. From the latter perspective, it is important to explore the factors that promote well-being rather than those that cause illness since they act in a preventive and therapeutic way on mental and physical health [11-13].

In this realm, the United Nations General Assembly declared 2021–2030 the Decade of Healthy Ageing and challenged WHO to lead the implementation of a global collaborative action to foster longer and healthier lives and reduce health inequities and improve the lives of older people, their families, and communities through collective action. One of these concerns is changing how we think, feel and act toward age and ageism [14]. To change attitudes toward aging, we need to assess these attitudes.

Concerning research on well-being in old age, the literature also indicates that older people are no less satisfied with life than other age groups, regardless of the problems they may eventually have. Affective well-being evolves throughout life due to the increased ability to regulate emotions [15]. This ability depends, in part, on the attitudes that subjects have towards their aging, which is greatly influenced by ageist stereotypes [16].

From definition to the assessment of attitudes towards aging

From the perspective of the life cycle developmental approach, old age has been considered a vital stage with specific contours [17]. To better understand what this stage implies for the person experiencing it, it is important to understand the cognitive, affective, and behavioral processes it includes.

The construct "attitude" privileges access to the processes mentioned above because it translates the set of cognitive operations (beliefs/values), affections (basic emotions/feelings), and behaviors (actions) that are formed and transformed throughout the environment-subject interaction [18]. Although several studies address the developmental tasks and challenges the aging population faces, few examine their attitudes towards aging and their impact on the resolution of these tasks [19]. Changing how we think, feel, and act toward age and ageism is one of the main concerns of the Decade of Healthy Ageing 2021– 2030 [14] declared by the United Nations General Assembly.

Attitudes toward aging are an integral part of the culture of each society, reflecting how the older adult is seen and treated within it and conferring identity to the members of this age group, who, internalizing the attitudes they have learned from their socialization process, transmit them from generation to generation. Thus, from the point of view of socialization, the elderly themselves become agents of socialization that convey perceptions of the aging process and of being old, just like their relatives, peers, institutions, and the media. Given the lack of instruments to assess the culturally imbued experience of becoming and being old, the AAQ instrument was built.

Attitudes to Ageing Questionnaire

The Attitudes to Ageing Questionnaire (AAQ, Laidlaw et al., 2007) is a self-report measure that aims to assess older people's attitudes towards their aging process and was developed based on current gerontological and psychometric knowledge.

The authors of the AAQ, Laidlaw, Power, and Schmidt, in collaboration with the WHOQOLD-OLD Group, argue that older people themselves are the best experts in this field and that they can and should be consulted regarding attitudes towards aging. In fact, the initial step in developing the instrument was to set up a focus group, in Scotland, with thirty-five older adults with a mean age of 75 years (MIN=62; MAX=95), mostly (67%) female. This way, the general attitudes of these older people towards different aspects of their lives (past and present) were assessed. From the ideas generated by the group, five main conceptually relevant domains were built: the psychological domain; the physiological health domain; the social and interpersonal domain; the economic domain; and the social status and role of the elderly. These domains could have a positive or negative value. The experiment was then repeated in four groups with people from fifteen Scottish Day Care Centers. In addition to these groups, two groups of caregiver subjects were created: one composed of informal caregivers (family members) and the other of formal caregivers (health professionals).

In a second step, the authors used the "Delphi Technique", which includes, on the one hand, the review of the existing literature on attitudes towards aging and, on the other, the preliminary analysis of the topics and items generated. For the scale development, these contents were worked on by researchers from fifteen research centers.

The pilot version resulted in a forty-four-item scale with an equal number of positive and negative sentences. The items were grouped into the five domains generated by the focus groups: physical, psychological, social, economic, and role/social status. After translation and back-translation into the different languages by bilingual translators, the scale was applied to 1356 subjects from the 15 centers mentioned above. Each center collected a minimum of 60 participants with an equal number of subjects of each gender and was distributed into three age groups (60-69; 70-79; 80+). Subjects with a terminal illness, dementia, or other cognitive limitations that could significantly bias their perception of old age were excluded.

As a result of the analyses mentioned above, the final version of the AAQ was left with three subscales: the subscale of psychosocial losses, according to which old age is seen primarily as a negative experience, where loss occurs at the psychological and social levels; the subscale of physical changes, which addresses aspects such as health, exercise, and the experience of the aging process itself; the subscale of psychological growth, which focuses mainly on positive aspects such as wisdom and growth that reflect gains in the way subjects relate to themselves and others. Each of these subscales contains eight items and can be scored independently, giving a total score for each subscale. Note that in the subscale psychosocial losses, the items are inverted, so the higher the score, the more negative the perception of old age in this domain. In the remaining scales, the higher the score, the more positive the perception of old age will be.

It should be noted that an instrument to assess the AAQ is an important contribution to the understanding of aging, and particularly so in the literature related to gerontology. Therefore, considering previous research, the current study looks to examine the psychometric properties of AAQ within Portuguese subjects. Though every new application of an instrument is, inherently, a contribution to its continual validation efforts, the development and validation of the AAQ adapted for the Portuguese language assumes an important contribution to a better understanding of attitudes to aging. Hence, this study expects to help clear up how attitudes to aging are perceived in the Portuguese context.

Furthermore, the specialized literature in aging points out the need for further studies, not only correlational but also randomized clinical trials [20], for which valid psychometric instruments are needed. Finally, several authors [21, 22] suggested studies that would bring AAQ to different cultural contexts. This being said, our work aims to address these concerns, making AAQ a stronger and more valid instrument, and allow the development of the theoretical model that connects the aging process and mental health variables [1, 23]. As stated above, evidence shows that higher levels of self-perceived attitudes to aging and creative adaptation are strongly connected, suggesting that high levels of personal psychological growth facilitate attitudes towards aging. This could be seen as a cornerstone for coping with life's challenges and critical events, such as, for instance, the recent demands connected to the COVID-19 pandemic situation [24, 25].

Finally, AAQ is the most used attitude towards aging test in the international investigation community, making access to a robust Portuguese version an important goal. For these reasons, this study aims to validate AAQ in its Portuguese version further and test its three factors dimensionality, offering social, psychological, and educational researchers and practitioners the possibility of using a valid instrument for evaluating and diagnosing in their daily practice.

2. Materials and Methods

2.1. Participants

To obtain a heterogeneous sample, we included participants from different regions of Continental Portugal with a minimum age of 18 years, using convenience sampling. Thus, 400 literate subjects (142 male and 258 female), in the age spectrum between 18 and 93 years, participated in this study (M=56.76, SD=18.75). As for their place of residence, most come from rural and suburban areas (83.5%). 45% of the subjects reported good subjective health and 31% fair, with an average of 3.66 (scores vary from 1 to 5). Men presented better subjective health than women.

2.2. Instrument

We used the Attitudes towards Aging Questionnaire (AAQ) from Laidlaw, Power, and Schmidt [9], which comprises 24 items divided into three subscales of eight items each (Psychosocial Losses, Physical Change, and Psychological Growth) (Table 1). Respondents are asked to indicate their level of agreement on a 5-point Likert scale. The higher the score, the more positive the assessment of old age, except for the subscale Psychosocial Losses, where the items are inverted.

This instrument has been translated into many other languages. Examples are the Spanish version [26], the French version [23], and, more recently, the Malay Version [21], attesting its interest and actuality. And recently, short versions of the questionnaire have been proposed [22].

Table 1. Dimensions, description, and corresponding items from the original tri-factorial version of the AAQ (Laidlaw et al., 2007).

Factors	Description	Items
	Measures the perceived negative experiences of ag-	
	ing and functions as a proxy for negative attitudes	
Psychosocial Loss	to aging, where old age is seen primarily as a nega-	3-6-9-12-15-17-20-22
	tive experience involving psychological and social	
	loss.	
	Focuses on items primarily related to health and the	
Physical Change	experience of aging itself; therefore, a subjective indi-	7_8_11_13_11_16_23_24
i nysicai change	vidualized psychological perspective on health is as-	7 0 11 13 14 10 23 24
	sessed.	

Pauchalagical Crowth	Explicitly positive and could be summarized as 'Per-	
	sonal	1 2 4 5 10 10 10 21
r sychological Growin	Wisdom' as it recognizes a lifespan development per-	1-2-4-3-10-10-19-21
	spective on aging as viewed by the individual.	

2.3. Procedures

The Attitudes to Aging Questionnaire [9] was translated to Portuguese and then back-translated into English to minimize discrepancies between the original and the translated versions[27]. This process included having the AAQ instrument initially translated into Portuguese by two researchers and an experienced Portuguese psychologist. Afterward, to test the equivalence of the items, two native Portuguese speakers also fluent in English carried out back-translation into English. To verify the items' accuracy, a bilingual expert was asked to assess differences in meaning between the original and the backtranslated items. The latter comparison established that the two instruments were conceptually equivalent.

All participants agreed to participate voluntarily under the guarantee of the anonymity and confidentiality of responses. In the follow-up, they were instructed as to the purpose and procedures of the study before filling out an informed consent form. The questionnaires were self-administered, and completion took approximately 10 minutes.

2.4. Statistical Analysis

Data analysis was performed using structural equation modeling (SEM) available on SPSS/AMOS 28.0 software (SPSS Inc, Chicago, IL). As described by Byrne we performed a confirmatory factor analysis to assess the factorial validity of the AAQp [28]. As said, AAQ comprises a negatively worded factor. Thus, we reversed the "Psychosocial Loss" items before conducting data analysis. Then, we performed the maximum likelihood method [29]. To verify both the normality and the inexistence of outliers, we calculated the skewness and kurtosis coefficients and the Mahalanobis distance (D²), respectively [30]. For the assessment of the adequacy of the model, we calculated the chi-square statistic (χ^2); the Ratio of chi-square by degrees of freedom (χ^2/df), considering that χ^2/df with a value less than 5.0 indicates an acceptable fit of the model to the data, and a value less than 3.0 indicates a good fit of the model to the data [30, 31]. Then the Comparative Fit Index (CFI), Goodness Fit Index (GFI), and the Tucker-Lewis Index (TLI) indices were also calculated. Values greater than 0.90 and greater than 0.95 indicate good and very good fit, respectively [30]; CFI, GFI, and TLI indices, where values ranging from 0.60 to 0.80 indicate good fit and values greater than 0.80 indicate very good fit, were also tested. Finally, the Root Mean Square Error of Approximation (RMSEA) was checked. When this index is less than 0.06 with a probability $P[rmsea \le 0.05]$ not significant, it indicates a good fit of the model [29]. The significance of the structural weights was assessed using the Z-tests produced by AMOS for structural model fit and to test the relationships between the constructs, considering Z \ge 1.96 and statistical significance when p \le 0.05 [32]. To assess the consistency of the factors, we calculated both the Cronbach alpha and the composite reliability [33], while to assess composite validity, we calculated the average variance extracted (AVE) values [34]. Cronbach alpha values equal to or greater than .70 are considered good, composite reliability equal to or greater than 0.70, and AVE equal to or greater than .50 are indicators of reliable and valid constructs [34]. Discriminant validity was established when AVE for each construct exceeded the squared correlations between that construct and the remaining ones [34]. In addition, for cross validity assessment, we performed a multi-group analysis. The model's invariance in both populations was verified by comparing the unconstrained model with constrained models (factor loadings fixed and variances/co-variances fixed). According to the χ^2 statistic [35], factorial invariance was accepted when the models did not differ significantly (p>.05).

Considering several tests, the normal distribution couldn't be confirmed. Namely, that skewness and kurtosis values are below 3 and 7 (Table 2), [31] and the Mardia coefficient indicated no multivariate distribution (Coefficient = 105.96) [30]. Complementary, the Kolmogorov-Smirnov test didn't reveal the normality of distribution [K-S (439)=0.085, p=0.001)]. Thus, we used Bollen and Stine's bootstrapping (B-S) [36] procedure to adjust the p-value of the chi-square statistic.

The overall assessment of the structural model [$\chi 2(249)=838,185$, B-S p<0.001; $\chi 2/df = 3.336$; CFI= 0.73; GFI=0.84; TLI =0.70; RMSEA=0.077 ; 90% CI [0.072 - 0.084] indicates a poor to acceptable fit of the model to the data. Not all values (namely, CFI and TLI) meet the recommended criterion (>.80) for acceptable fit [36]. In addition, not all estimated factor loadings (Table 3) met the recommended cutoff point of .50 [35].

Thus, to improve the model fit, we decided to remove the items with loadings below .50, and if the items are theoretically relevant, the criterion below .45 loading was used. Namely, in the *Psychosocial Loss* factor, we removed item 9 ("I find it more difficult to talk about my feelings as I get older") and item 17 ("As I get older I find it more difficult to make new friends") since they had a factor loading of .28 and .31, respectively. In the *Physical Changes* factor, items 7 ("It is important to take exercise at any age") and 24 ("I keep myself as fit and active as possible by exercising") were removed, since they had a factor loading of .30 and .45 respectively. In the *Psychological Growth* factor, we removed items 4 ("Wisdom comes with age"), 18 ("It is important to pass on the benefits of my experience to younger people"), 19 ("I believe my life has made a difference") and 21 ("I want to give a good example to younger people"), since they had a factor loading of .25, .40, .38 and .42, respectively. Further, the RMSEA showed an acceptable fit [10, 11].

Table 2. Descriptive statistics of the 3-factors AAQp.

Item	Μ	SD	Min	Max	Ass.	Kurt.
Psychosocial Loss						
3. Old age is a time of loneliness	3.26	1.07	1	5	278	755
6. Old age is a depressing time of life	3.46	1.12	1	5	595	458
9. I find it more difficult to talk about my feelings as I get older	3.53	1.05	1	5	431	729
12. I see old age mainly as a time of loss	3.41	1.01	1	5	251	789
15. I am losing my physical independence as I get older	3.35	1.05	1	5	194	872
17. As I get older I find it more difficult to make new friends	3.26	1.16	1	5	134	-1.11
20. I don't feel involved in society now that I am older	3.73	.99	1	5	674	162
22. I feel excluded from things because of my age	3.86	.92	1	5	687	006
Physical Change						
7. It is important to take exercise at any age	4.55	.59	2	5	-1.33	2.46
8. Growing older has been easier than I thought	3.20	.94	1	5	252	539
11. I don't feel old	3,60	1.10	1	5	720	243
13. My identity is not defined by my age	3.82	1.07	1	5	-1.10	.632
14. I have more energy now than I expected for my age	3.23	.97	1	5	142	672
16. Problems with my physical health do not hold me back from do- ing what I want to do	3.21	1.07	1	5	296	811
23. My health is better than expected for my age	3.20	.96	1	5	296	143
24. I keep myself as fit and active as possible by exercising	3.68	1.01	1	5	773	.135
Psychological Growth						
1. As people get older, they are better able to cope with life	3.67	.90	1	5	844	.508
2. It is a privilege to grow old	3,62	1.5	1	5	568	439
4. Wisdom comes with age	3.60	.97	1	5	620	216
5. There are many pleasant things about growing older	3.54	.96	1	5	813	.082
10. I am more accepting of myself as I have grown older	3.69	.87	1	5	612	.034
18. It is important to pass on the benefits of my experience to younger people	3.87	.81	1	5	595	.370

Item	Μ	SD	Min	Max	Ass.	Kurt.
19. I believe my life has made a difference	3.66	.82	1	5	298	.044
21. I want to give a good example to younger people	4.09	.70	1	5	695	1.44

In the version after the removal of the items (see Table 3), the overall assessment of the structural model [$\chi 2(87) = 287.318$, B-S p<.001; $\chi 2$ /df = 3.303; CFI=.87; GFI=.90; TLI=.84; RMSEA=.076 ; 90% CI [LO=.067 - HI=.087] indicates an acceptable model fit to the data. The values of CFI and TLI meet the recommended criterion (>.80) for acceptable fit, and the GFI value meets the recommended criterion for good fit. RMSEA also showed a good adjustment [32, 33].

Table 3. Factor loadings, Z-values, Communalities of the original scale with 24 items and Cronbach alpha and Composite reliability of the re-specified model of the AAQp with 15 items.

Factors / Items	λ	Z-value	С	α	CR
Psychosocial Loss				.77	0.78
3. Old age is a time of loneliness	.64	9.10	.48		
6. Old age is a depressing time of life	.77	11.81	.62		
9. (-) I find it more difficult to talk about my feelings as I get older	.28	4.99	.23		
12. I see old age mainly as a time of loss	.69	11.05	.45		
15. I am losing my physical independence as I get older	.55	9.24	.42		
17. (-) As I get older I find it more difficult to make new friends	.31	5,49	.37		
20. (-) I don't feel involved in society now that I am older	.45	7.70	.39		
22. I feel excluded from things because of my age	.55	9.15	.40		
Physical Change				.72	.72
7. (-) It is important to exercise at any age	.30	5.05	.13		
8. Growing older has been easier than I thought	.54	5.26	.47		
11. I don't feel old	.61	5.37	.40		
13. My identity is not defined by my age	.48	5,08	.31		
14. I have more energy now than I expected for my age	.54	4.86	.44		
16. Problems with my physical health do not hold me back from doing what I want to do	.51	5.01	.29		
23 My health is better than expected for my age	58	5.00	13		
25. My field it is better that expected for my age	.56	5.00 4.84	.45		
24. (-) I keep mysen as in and active as possible by exercising	.45	4.04	.27	70	65
1 As people get older, they are better able to cone with life	40	5 11	26	.70	.05
1. As people get older, they are better able to cope with the	.49	5.11 7.41	.20		
2 It is a privilege to grow old	.52	2.52	.20		
4. (-) Wisdom comes with age	.25	3.52	.35		
5. There are many pleasant things about growing older	.66	7.94	.41		
10. () I am more accepting of myself as I have grown older	.52	7.53	.29		
18. (-) It is important to pass on the benefits of my experience to younger people	.40	4.72	.56		
19. (-) I believe my life has made a difference	.39	5.11	.49		
21. (-) I want to give a good example to younger people	.42	5.14	.55		

Notes: λ = factor loading; Z-value = Critical ratio; C = Communalities; α = Cronbach alpha; CF = Composite reliability; ***p<0.00, (-) items removed from the re-specified model.

It should be noted that in this model, factor 1 ("Psychosocial loss"), item 20 ("I don't feel involved in society now that I am old") didn't meet adequate factor loading (\geq .50) nor adequate individual reliability (R2 \geq .25), scoring .16, and so we decided to remove it from the model Notwithstanding, the remaining items displayed adequate individual reliability ranging between .45 and .83. The Z-test values also indicated statistical significance ranging between 7.27 and 12.38 [33]. Composite reliability for *Psychosocial Loss* and

Physical Change factors was achieved, with values of .77 and .72, respectively, thus exceeding the recommended minimum. However, the *Psychological Growth* factor scoring of .65 didn't meet this criterion, so the composite reliability criteria were not fully met [37]. Also, there's no evidence of convergent validity since the AVE values were below .50, which is the recommended cut-off value for this index [34, 38]. Additionally, the total scale obtained a mean of 3.47 (SD=0.56), and the mean and standard deviation values by gender were 3.44 (0.61) for women and 3.53 (0.46) for men and this difference (p= .139) was not significant.

Additionally, a Cronbach's alpha of 0.84 was obtained, a value that may be considered very good for the reliability of the overall instrument. Concerning the reliability of the subscales, namely, the Psychosocial Loss subscale obtained Cronbach's alpha of 0.77, which is considered an indicator of very good reliability, the Physical Change subscale obtained Cronbach's alpha of 0.72, indicating good reliability, and the Psychosocial Growth subscale obtained Cronbach's alpha of 0.70, thus qualifying for good reliability.

The communalities were also satisfactory since, although several items had low values, on average, they reached the cutoff point of .40. Figure 1 shows the re-specified 3-factor with 15 items AAQ model.





The average variance extracted and the squared correlation of the factors are presented in Table 4. The evidence of discriminant validity was accepted since none of the squared correlations of the factors exceed the AVE values.

		Correlations matrix						
Factor	AVE	1	2	3				
1. Psychosocial Loss	0.42	1.00						
2. Physical Change	0.30	0.26**	1.00					
3. Psychological Growth	0.32	0.17**	0.20**	1.00				

Table 4. Mean (M), standard deviation (SD), and squared factor correlations.

*Note.*** *p*<.01.

3.1. Cross validity

The stability of the model was also studied by checking cross validity (Table 5). Specifically, a multi-group analysis was performed on two equivalent samples. (Women*Men) (Sample 1 = 258; Sample 2 = 142). As shown in Table 5, the fit of the free model [Model 1: χ^2 (174) = 419.188; PCFI = 0.70; PGFI = 0.63; CFI = 0.84; GFI = 0.87; RMSEA = 0.05] displayed an acceptable fit [32].

Similarly, the models with fixed variances [Model 2: χ^2 (186) = 436.357 (B-S p < 0.029); PCFI = 0.74; PGFI = 0.67; GFI = 0.86; CFI = 0.84; RMSEA = 0.06] and the model with fixed residuals [Model 3: χ^2 (192) = 464.559 (B-S p < 0.011); PCFI = 0.75; PGFI = 0.68; GFI = 0.85; CFI = 0.82; RMSEA = 0.06], which showed an acceptable fit as well. The χ^2 statistic showed significant no differences between Model 1 and Model 2 (χ^2 dif (12) = 17.1; B-S p = 0.029) or Model 1 and Model 3 (χ^2 dif (18) = 28.2; B-S p = 0.011). Thus, the results did display an invariance of the model in both samples, showing that the factor structure of AAQpdoesn't differ between genders [32, 35].

Table 5. Results of the CFA Multi-Group Analysis of the AAQp 3-Factor.

	Models	X ²	gl	$\Delta \chi^2$	Δgl	B-S p	PCFI	PGFI	GFI	CFI	RMSEA	IC 90%
	Model 1	419.188	174				0.70	0.63	0.87	0.84	0.06]0.052, 0.067[
	Model 2	436.357	186	17.1	12	0.143	0.74	0.67	0.86	0.84	0.06]0.051, 0.065[
	Model 3	464.559	192	28.2	18	0.730	0.75	0.68	0.85	0.82	0.06]0.053, 0.067[
1												

Note. Sample 1: n=303; Sample 2: n=136.

4. Discussion

The purpose of this work was to study the characteristics of the Portuguese version of the Attitudes to Aging Questionnaire in a 3-first-order factors version (Psychosocial Losses, Physical Change, and Psychological Growth), following the suggestions of the original authors [9, 22].

Old age continues to be portrayed mainly as a negative experience involving psychological and social loss [2]. One in every two people are ageist against older people, and in Europe, younger people report more perceived ageism than other age groups. Many misleading myths and misconceptions about aging are treated as facts and truths, although they are false. Nevertheless, they impact personal well-being and are responsible for the low adherence of the elderly to many social and health interventions.

Ageism is a compound of stereotypes (how we think), prejudices (how we feel), and discrimination (how we act) towards others or ourselves based on age, enforming what we call attitudes towards age, the aging process, and the elderly.

Therefore, measuring attitudes towards aging, especially knowing the opinions of those in the last phase of the life cycle, is a more realistic approach than characterizing a phase of the life cycle according to ageist projections and stereotypes. Bringing gender, cohort, historical and cultural perspectives to the equation allows us to have a much more variegated approach to the aging process and experience.

Our option to use a sample of adults aged 18 and over is related to increasing the predictive value of the scale. In this sense, our sample comprised adults between 18 and 93 years old. The possibility of getting to know and, consequently, being able to intervene with younger adults is, as we have seen, fundamental in this area.

In our study, AAQp emerges as a short and valid instrument when one intends to evaluate attitudes towards aging. As found in previous studies, both with the English [9] and non-English versions [13, 21], AAQp showed overall acceptable to good reliability (with Cronbach's alphas ranging 0.77 to 0.65). Furthermore, composite reliabilities were achieved but not the convergent validity, as AVE values were lower than .50.

We used the original tridimensional model, however, some items were removed as in other versions (Qiu et al., 2020). Namely, in the *Psychosocial Loss* factor, items 9 ("I find it more difficult to talk about my feelings as I get older") and 17 ("As I get older, I find it more difficult to make new friends") were removed. In the *Physical Changes* factor, items 7 ("It is important to take exercise at any age") and 24 ("I keep myself as fit and active as possible by exercising") were removed. In the *Psychological Growth* factor, items 4 ("Wisdom comes with age"), 18 ("It is important to pass on the benefits of my experience to younger people"), 19 ("I believe my life has made a difference") and 21 ("I want to give a good example to younger people") were removed. Because the model displays better adjustment indexes without these items, we suggest their withdrawal from the scale. As said, this suggestion is due to two reasons. First, these items show poor factor loading (below-recommended cut-off point) [24]. Secondly, the modification indices (MI) suggested some error correlations, but we could not confirm that these errors, when correlated, significantly improve the model fit. More to the point, examining the content of these items made it clear that they have some degree of redundancy, so they were removed from the model.

As we have seen, other versions of the AAQ did not find the same low loadings or conceptual overlaps we indicated. This may be because these items were translated to Portuguese, and in some cases, they may have an ambiguous interpretation or somehow inadequate interpretation by the youngsters. In future studies, the revision of these items should be considered.

Nevertheless, there is some support for the structure revealed in our study. The 3factor structure with 15 items showed both construct and content validities and acceptable scale reliability. Confirmatory factor analysis revealed an acceptable fit of the model to the data. Composite reliability and discriminant validities were also confirmed [29]. Moreover, although convergent was not achieved we consider that the scale is a reliable tool to measure attitudes toward aging.

Finally, this validation is also an important and necessary step for promoting studies done by the Portuguese-speaking community of practitioners and researchers interested in attitudes towards aging as a precursor of quality of life and mental health. This 3-factor AAQp is a useful tool to assess the levels of attitudes towards aging in various contexts, and it contributes both to enhancing the scientific and the intervention efficacy in this realm.

5. Conclusions

This study validated the 3-factor AAQ scale proposed by Laidlaw et al. [9] for the Portuguese context and assessed its validity and reliability. The original questionnaire consisted of 3-first-order factors (Psychosocial Losses, Physical Change, and Psychological Growth, with 8 items each). As a result of the confirmatory factor analysis, both the Psychosocial Losses and the Physical Changes factors were reduced to 6 items each, while the Psychological Growth factor was reduced to 4 items. Hence, we obtained a 15-item scale. For better clarification of the translation and adaptation of the scale, we included the final Portuguese version of the AAQp as an appendix.

Age, gender, and ethnicity are often the first things we notice about other people. Frequently, they categorize and divide people in ways that lead to damage, disadvantage, and injustice and erode diversity and solidarity. Ageism is pervasive, affects people of all ages, and has serious and far-reaching consequences for people's health, well-being, and human rights. It can be found within institutions, in interactions between people, and within each of us [14]. In this sense, understanding attitudes toward aging can help prevent its negative impact throughout our life. The truth is that there is no other way to live than to grow old. That is, we unfold over time. Understanding the determinants that make this experience meaningful is of urgent importance in the face of demographic changes. All countries face major challenges in ensuring their health and social systems are ready to embrace the demographic shift. Thus, correctly assessing the variables that impact this process is fundamental.

Moreover, using the measure of attitudes towards aging benefits development theory and may help innovate anti-ageism-based interventions [22, 39]. Finally, with the measure now presented, it is possible to correlate attitudes towards aging with creative adaptability in Portuguese-speaking contexts and compare it with other cultural contexts [21, 23].

The Portuguese version of the AAQ questionnaire showed acceptable psychometric properties in a convenience sample of Portuguese adults (young, middle-aged, and older adults).

6. Limitation and future research

As any other research, this study includes some limitations and strategic options. We chose to use a sample of adults between 18 and 93 because we consider that the conceptions about age affecting the experience of old age start to be built many decades before reaching 60. Half of our participants are below 60 years of age, therefore, future studies should increase the number of older participants. Although we have made this choice, we understand and support Laidlaw's and colleagues [9, 22] claim that "older people are experts to be consulted". Actually, this was one of the main reasons for creating attitudes to the aging scale. Although important insights into the aging experience can only be derived from working with the elderly, the importance of measuring attitudes towards aging in younger individuals brings valuable information, making it easier to prevent negative attitudes towards growing older themselves or their attitudes towards older people and therefore minimizing malaise and anguish in the subjective experience of the older individuals. We cannot forget that entering old age is a cultural construction that, in fact, varies with the culture and historical period.

Due to the amplitude of ages of this study, we did not include, like other validation studies [26], participants aged 60 years and older from institutions like community, residential, and primary care centers and associations for the mentally ill and dementia. Considering that the participants are from non-clinical settings, caution concerning using this tool is recommended when assessing levels of attitudes towards aging in these settings.

Author Contributions: Conceptualization: M.L.P..; methodology: M.L.P. and P.M.; software: P.M.; validation: P.M.; formal analysis: P.M.; investigation: M.L.P., P.M. and A-J.G.; resources: M.L.P.; data curation: M.L.P.; writing—original draft preparation: M.L.P., P.M. and A-J.G.; writing—review and editing: M.L.P., P.M., and A-J.G.; visualization: P.M.; supervision: M.L.P.; project administration: M.L.P; and funding acquisition: M.L.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study in accordance with the local legislation and institutional requirements.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

 Lichtenberg, P.A. and B.T. Mast, APA Handbook of Clinical Geropsychology. 2015, USA: APA Handbooks in Psychology Series.

- WHO. Global Report on ageism. 2021 [cited 2022; Available from: https://www.who.int/health-topics/ageism#tab=tab_1.
- 3. Estatística, I.I.N.d. *Statistic Yearbook of Portugal.* 2021 [cited 2022; Available from: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=568170278&PUBLICACOESmodo=2.
- 4. WHO. *Aging and Health: Key Facts.* 2022 [cited 2022; Available from: https://www.who.int/news-room/fact-sheets/detail/.
- 5. Baltes, P.B. and J. Smith, *New Frontiers in the Future of Aging: From Successful Aging of the Young Old to the Dilemmas of the Fourth Age.* Gerontology, 2003. **49**(2): p. 123-135.
- 6. Knight, B., Psychotherapy with Older Adults, 2004: Thousand Oaks, California.
- Simões, M.R., Instrumentos de avaliação psicológica de pessoas idosas: investigação e estudos de validação em Portugal. Revista Ibero-americana de Diagnóstico e Avaliação Psicológica, 2012. 34(1): p. 9-33.
- Boduroglu, A., et al., Age-Related Stereotypes: A Comparison of American and Chinese Cultures. Gerontology, 2006. 52(5): p. 324-333.
- 9. Laidlaw, K., M.J. Power, and S. Schmidt, *The attitudes to ageing questionnaire (AAQ): development and psychometric properties.* International Journal of Geriatric Psychiatry, 2007. **22**(4): p. 367-379.
- 10. Keyes, C.L.M., Satvinder S. Dhingra, and E.J. Simoes, *Change in level of positive mental health as a predictor of future risk of mental illness*. American journal of public health, 2010. **100**(12): p. 2366-71.
- 11. Cohen, S. and S.D. Pressman, *Positive Affect and Health*. Current Directions in Psychological Science, 2006. **15**(3): p. 122-125.
- 12. Diener, E. and M.Y. Chan, *Happy People Live Longer: Subjective Well-Being Contributes to Health and Longevity*. Applied Psychology: Health and Well-Being, 2011. **3**(1): p. 1-43.
- 13. Qiu, W.Q., et al., *Physical and mental health of homebound older adults: an overlooked population.* Journal of the American Geriatrics Society, 2010. **58**(12): p. 2423-2428.
- 14. WHO. *Optimizing brain health across the life course*. WHO position paper 2022 [cited 2022; Available from: https://cre-ativecommons.org/licenses/by-nc-sa/3.0/igo/.
- 15. Mroczek, D.K. and C.M. Kolarz, *The effect of age on positive and negative affect: a developmental perspective on happiness*. Journal of personality and social psychology, 1998. **75**(5): p. 1333-1349.
- Lyubomirsky, S., L. King, and E. Diener, *The benefits of frequent positive affect: does happiness lead to success?* Psychological bulletin, 2005. 131(6): p. 803-855.
- 17. Coleman, P.G. and A. O'Hanlon, *Ageing and Development: Theories and Research: Social and Emotional Perspectives*. 1st ed. 2004, London: Routledge.
- 18. Eagly, A.H. and S. Chaiken, The psychology of attitudes. 1993, Fort North, Ph: Harcourt Brace Jovanovich.
- 19. Baltes, P.B., On the incomplete architecture of human ontogeny: Selection, optimization, and compensation as foundation of *developmental theory*. American Psychologist, 1997. **52**(4): p. 366-380.
- 20. Kalfoss, M.H., G. Low, and A.E. Molzahn, *Reliability and validity of the attitudes to ageing questionnaire for Canadian and Norwegian older adults.* Scandinavian Journal of Caring Sciences, 2010. **24**(s1): p. 75-85.
- 21. Rejab, N., et al., A Malay Version of the Attitude to Ageing Questionnaire: Its Adaptation, Validation and Reliability in the Malaysian Older Adult Population. Annals of geriatric medicine and research, 2022: p. Online ahead of print.
- 22. Laidlaw, K., et al., *Development of a short form of the Attitudes to Ageing Questionnaire (AAQ)*. International Journal of Geriatric Psychiatry, 2018. **33**(1): p. 113-121.
- 23. Marquet, M., et al., A Validation of the French Version of the Attitudes to Aging Questionnaire (AAQ): Factor Structure, Reliability and Validity. Psychologica Belgica, 2016. 56(2): p. 80-100.
- 24. Orkibi, H., Creative Adaptability: Conceptual Framework, Measurement, and Outcomes in Times of Crisis. Frontiers in Psychology, 2021. 11(3695).
- 25. Testoni, I., et al., *The COVID-19 Disappeared: From Traumatic to Ambiguous Loss and the Role of the Internet for the Bereaved in Italy.* Frontiers in Psychiatry, 2021. **12**(564).
- 26. Lucas-Carrasco, R., et al., *Reliability and validity of the Attitudes to Ageing Questionnaire (AAQ) in older people in Spain.* International Psychogeriatrics, 2013. **25**(3): p. 490-499.
- 27. Banville, D., P. Desrosiers, and Y. Genet-Volet, *Translating questionnaires and inventories using a cross-cultural translation technique*. Journal of Teaching in Physical Education, 2000. **19**(3): p. 374-387.
- 28. Byrne, B.M., *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programing.* 2000, Mahwah, NJ: Lawrence Erlbaum Associates.
- 29. Schumacker, R.E. and R.G. Lomax, *A beginner's guide to structural equation modelling 4th ed.* 2015, New York: Routledge Taylor & Francis Group.

- 30. Bentler, P.M., *On tests and indices for evaluating structural models*. Personality and Individual Differences, 2007. **42**(5): p. 825-829.
- 31. Kline, R.B., *Beyond Significance Testing: Reforming Data Analysis Methods in Behavioral Research*. 2004, Washington, DC: American Psychological Association.
- 32. Marôco, J., Análise de equações estruturais: fundamentos teóricos, software & aplicações. 2010, Lisboa: Report Number.
- 33. Hair, J.F., et al., Multivariate data analyses. 7th ed. 2009, New York: Prentice Hall.
- 34. Fornell, C. and D.F. Larcker *Structural equation models with unobserved variables and measurement error: Algebra and statistics*. Journal of Marketing Research, 1981. **18**, 382-388 DOI: https://doi.org/10.2307/3150980.
- 35. Loehlin, J.C., *Latent variable models: An Introduction to factor, path, and structural equation analysis.* 2003, Mahwah: Lawrence Erlbaum Associates.
- 36. Bollen, K.A. and R.A. Stine, *Bootstrapping goodness-of-fit measures in structural equation models*, in *Testing structural equation models*, L.J. Bollen, Editor. 1993, SAGE Focus Edition: Newbury Park. p. 111-135.
- 37. Bagozzi, R.P. and S.K. Kimmel *A comparison of leading theories for the prediction of goal-directed behaviours*. British Journal of Social Psychology, 1995. **34**, 437-461 DOI: https://doi.org/10.1111/j.2044-8309.1995.tb01076.x.
- 38. Anderson, J.C. and D.W. Gerbing *Structural equation modeling in practice: A review and recommended two-step approach*. Psychological Bulletin, 1988. **103**, 411-423 DOI: https://doi.org/10.1037/0033-2909.103.3.411.
- 39. Kisvetrová, H., et al., *Dignity and attitudes to aging: A cross-sectional study of older adults*. Nurs Ethics, 2022. **29**(2): p. 413-424.

Appendix Questionário de Atitudes face ao Envelhecimento (AAQ-15)

Este questionário pretende saber como se sente relativamente a envelhecer. Por favor responda a todas as questões. Se não tem certeza sobre que resposta dar a uma pergunta, escolha aquela que lhe pareça mais apropriada, de acordo com os seus valores, expectativas, gostos e preocupações. Por exemplo, pensando como se sente no geral, poderíamos fazer a seguinte questão: Eu não gosto de envelhecer.

Nada	Pouco	Moderadamente	Muito	Extremamente
Verdadeiro	Verdadeiro	Verdadeiro	Verdadeiro	Verdadeiro
1	2	3	4	5

Nesse caso, escolhia uma das opções consoante a sua opinião. Assim, pode circundar o número 4 se não gosta de envelhecer "muito", ou circundar o número 1 se não está "nada" preocupado com envelhecer. Por favor, leia cada questão, avalie os seus sentimentos e circunde o número, na escala, que melhor corresponda à sua opinião.

As perguntas seguintes questionam sobre o seu grau de concordância com as seguintes afirmações. Por exemplo, se concorda muito com as afirmações circunde o número por baixo do "concordo fortemente"; se não concorda de todo com as afirmações, circunde o número por baixo do "discordo fortemente".

1.	À medida que as pessoas envelhecem tornam-se mais capazes de lidar	1	2	3	4	5
	com a viua.					
2.	É um privilégio envelhecer	1	2	3	4	5
3.	A velhice é um tempo de solidão.	1	2	3	4	5
4.	Há muitas coisas agradáveis no envelhecer	1	2	3	4	5
5.	A velhice é um tempo triste da vida.	1	2	3	4	5

As questões seguintes pretendem saber o quanto são verdadeiras as seguintes afirmações para si. Por exemplo, se a afirmação é "extremamente" verdadeira para si, circunde o número junto ao "extremamente verdadeiro". Se as afirmações não são de todo verdadeiras para si, faça um círculo à volta do número a seguir ao "nada verdadeiro".

	6.	Envelhecer está a ser mais fácil do que pensava.	1	2	3	4	5
	7.	Aceito-me melhor a mim próprio(a) à medida que fico mais velho(a).	1	2	3	4	5
	8.	Não me sinto velho(a).	1	2	3	4	5
	9.	Vejo a velhice sobretudo como um tempo de perdas.	1	2	3	4	5
	10.	A minha identidade não é definida pela minha idade.	1	2	3	4	5
	11.	Tenho mais energia agora do que esperava ter para a minha idade.	1	2	3	4	5
	12.	Estou a perder a minha independência física à medida que envelheço.	1	2	3	4	5
	13.	Problemas com a minha saúde física não me impedem de fazer aquilo que quero.	1	2	3	4	5
	14.	Sinto-me excluído(a) das coisas, por causa da minha idade.	1	2	3	4	5
	15.	A minha saúde é melhor do que eu esperava, para a minha idade.	1	2	3	4	5
1							

Itens das Sub-escalas Perdas Psico-sociais: 3,5,9,12,14 Perdas Físicas: 6,8,10,11,13,15 Crescimento Psicológico: 1,2,4,7