

Original article (full paper)
**Validity of body image scales for
Brazilian older adults**

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Abstract—The aim of this study was to translate the Body Appreciation Scale (BAS) and Aging Perceptions Questionnaire (APQ) for older adults into Brazilian Portuguese, and evaluate the psychometric properties of these instruments. A sample of 606 participants aged 60 to 98 years were recruited from hospitals, rest homes, physical activity centers, leisure centers, churches/religious institutions and from the general community. All participants were personally invited and voluntarily accepted to participate in the research. A confirmatory factor analysis showed a good fit to the original APQ model and to a new bidimensional model for BAS after excluding some items. We also observed satisfactory evidence of internal consistency, convergent, discriminant, concurrent and divergent validity. Regarding validity, significant variation of scores from the two scales in both, physically active and sedentary participants was herein highlighted. In conclusion, the BAS and APQ appear to be valid and reliable scales for Brazilian researchers to study older adults.

Keywords: validation of scale, body image, older adults

Resumo—“Validade de escalas de imagem corporal para idosos brasileiros.” O objetivo deste estudo foi traduzir e validar a *Body Appreciation Scale* (BAS) e *Aging Perception Questionnaire* (APQ) para idosos brasileiros. Uma amostra de 606 participantes, de 60 a 98 anos, foram recrutados de hospitais, casas de repouso, centros de atividade física e lazer, instituições religiosas e comunidade. Os idosos foram convidados a participar da pesquisa voluntariamente. A Análise fatorial confirmatória mostrou, após a eliminação de alguns itens, um bom ajuste para o modelo original da APQ e para um novo modelo bifatorial da BAS. Evidências satisfatórias de consistência interna, validade convergente, discriminante, concorrente e divergente foram aqui observadas. Em relação a esta última, destaca-se a variação significativa nos escores das duas escalas entre os participantes fisicamente ativos e sedentários. A BAS e a APQ parecem ser instrumentos válidos e confiáveis para uso de pesquisadores brasileiros em estudos sobre o tema em idosos.

Palavras-chave: validação de escala, imagem corporal, idoso

Resumen—“Validez de las escalas de la imagen corporal de ancianos brasileños.” El objetivo de este estudio fue traducir la *Body Appreciation Scale* (BAS) y *Aging Perception Questionnaire* (APQ) para los ancianos en el portugués de Brasil y evaluar sus propiedades psicométricas. Una muestra de 606 participantes, de 60 a 98 años, fueron reclutados de hospitales, casas de reposo, centros de actividad física, centros de ocio, iglesias/instituciones religiosas y la comunidad en general. Todos los participantes fueron invitados por vía oral y voluntariamente participaron en la investigación. El análisis factorial confirmatorio mostró un buen ajuste a lo modelo original de APQ y a lo modelo bidimensional de BAS, después de la eliminación de algunos artículos. También se observó evidencia satisfactoria de la consistencia interna, de validez convergente, discriminante, concurrente y discriminante. Respecto a esto último, hay que destacar la variación significativa en las puntuaciones de las dos escalas entre los participantes fisicamente activos y sedentarios. En conclusión, la BAS y el APQ parecen ser escalas válidas y fiables para su uso por los investigadores brasileños para el estudio de las personas mayores.

Palabras clave: validación de la escala, imagen corporal, mayores

Introduction

Body image can be defined as the mental representation of the body's identity (Tavares, 2003). An individual's surroundings, perceptions of others, internal emotions, and integrity and fragility of bodily elements are central components of this representation (Schilder, 1978, Tavares, 2003). Body image dynamically includes interrelated conscious and unconscious aspects that continuously interact with the external world (Schilder, 1978). From this perspective, the social, physiological and psychological variables are integrated into the perception of the body as a whole (Schilder, 1978). Body function and appearance are aspects that deeply affect how others react to our body, how we interact with the social world, and our internal view of our own body (Cash, 2000).

Although recent, the number of studies about body image in older adults is increasing. One possible explanation for this interest is the rise of the older population worldwide. Therefore, we need to better understand this age group to find ways to promote a healthy aging (Clarke & Griffin, 2008; Clarke, Griffin, & PACC Research Team, 2008; Ferraro *et al.*, 2008; Halliwell & Dittmar, 2003).

A large number of recent research on body image and aging is focused on chronic illness (especially cancer, diabetes, hypertension, obesity, and Parkinson's disease) and disabilities. These studies have analyzed the impact of disease, chronic pain and disabilities on the development of body image (Barber *et al.*, 2007; Browall *et al.*, 2008; Ebbskog & Ekman, 2001; Grimm, Novotny, Heberling, & Wirth, 2007; Haes, Curran, Aaronson, & Fentiman, 2003; Kornblith *et al.*, 2007; Lieberman, Probart, & Schoenberg, 2003; Nordin *et al.*, 2001; Tung & Targonski, 2005). The relationship and association between age and body dissatisfaction are also important topics in studies about body image of older adults (Barreto, Fernandes, & Guihard-Costa, 2011; Bedford & Johnson, 2006; Ferraro *et al.*, 2008; Grippo & Hill, 2008; Halliwell & Dittmar, 2003; Pook, Braehler, & Tuschen-Caffier, 2009; Tiggemann, 2004; Ziebland, Robertson, Jay, & Neil, 2002).

In body image studies, the focus on aging from a pathological perspective (i.e., focusing on negative aspects of body image and disease) is currently being shifted to a more positive approach (Tylka, 2011). The main factor driving this change in this area is the recent interest in positive psychology. There are topics, other than pathology or dissatisfaction issues, that contribute to maintain psychological health (Seligman & Csikszentmihalyi, 2000).

The purpose of this new approach is to focus on adaptive human functioning, which includes individual's psychological traits and positive experiences (e.g., optimism, well-being, happiness, and resilience) (Seligman, 2004; Seligman & Csikszentmihalyi, 2000). This perspective is particularly interesting for studies involving the concept of "successful aging," which first appeared in the field of gerontology in 1960. In this framework, aging is not considered synonymous of disease and decline in human development; instead, focuses on positive aspects of aging, and the potential for development at an advanced age (Neugarten, 1996; Neugarten, Havighurt, & Tobin, 1961).

Proper tools for data collection in research help to develop better judgement in the understanding of the aging process and acceptance of body image. The Body Appreciation Scale (BAS) (Avalos, Tylka, & Wood-Barcalow, 2005) is particularly useful for assessing body image in older individuals. The theoretical background of this questionnaire relies on positive psychology, and focuses on disclosure of body image traits that are presented in a positive manner. The BAS data are primarily linked to how well an individual accepts and likes oneself, despite body "imperfections." Because this body image scale does not focus on pathological changes, it can be a useful tool to assess progress during health promoting and/or quality of life social programs. The BAS has already been cross-culturally adapted and validated for young Brazilian adults (Swami *et al.*, 2011), with satisfactory psychometric results.

On the other hand, the Aging Perceptions Questionnaire (APQ) is a novel and multidimensional instrument that evaluates the perception of the positive and negative aspects of aging. The scale is deeply connected with the perception of health (Barker, O'Hanlon, McGee, Hickey, & Conroy, 2007) and is theoretically based on the Leventhal's self-regulation model (Leventhal, Nerenz, & Steele, 1984). The APQ considers aging a normal stage of human development, and was designed to evaluate self-adaptation to the context of aging (Barker *et al.*, 2007). Findings using the APQ would help to assess how health programs for older adults can contribute to positive aging.

In order to promote local and transcultural understanding of these perspectives about aging in Brazilian research, the purpose of this study was to transculturally adapt the BAS and the APQ into Brazilian Portuguese language, and to verify their psychometric properties (e.g., factor structure, internal consistency, construct, concurrent and divergent validity) in a sample of Brazilian older adults. The availability of the BAS and APQ in different languages—in this case, in Brazilian Portuguese—will undoubtedly provide scholars with tools for studying how attitudes toward the aging body are developing around the world.

Methods

Participants

A non-probabilistic sample of 606 older adults were recruited from hospitals, rest homes, physical activity centers, leisure centers, churches /religious institutions, and the general community in the State of São Paulo. The participants self-reported their demographic information, namely age, gender, marital status, level of education, occupation, income, religion, frequency of physical activity and whether or not the subject lives alone. All participants were older than 60 years, with a mean age of 68.7 (0.98) years. Seventy percent of the participants were women, and 53.9% were physically active (i.e., routinely engaged in physical exercise). With regard to living conditions, 43.2% of the participants lived with a spouse/partner, 18.3% lived alone, and 4.3% lived in rest homes. Eighty-three percent of the participants were Catholic, 14.5% followed other religions, and only 2.5% declared themselves atheist. In terms of education, the majority of the participants had elementary school

education (77.6%), while 13.6% attended high school, and only 8.6% had college education. Majority of participants were retired (67.7%), 7.6% were still working, and 13.7% were working while receiving retirement pension. The average income of the participants was 1,240.00 ($SD = 1,652.00$) BRL.

Materials

The BAS measures body appreciation with respect to a positive body image (Avalos, Tylka, & Wood-Barcalow, 2005), and it was originally developed and validated using four independent samples of middle-class Caucasian schoolgirls. The scale includes 13 items, with answers displayed in a Likert scale. The never (score 1) and always (score 5) reflect the extreme rank intervals about body appreciation (i.e., the higher the score, the higher the body appreciation). The items were based on four characteristics of a positive body image: (1) a favorable opinion about the body, (2) body acceptance, regardless of weight, (3) respect for the body, fulfilling its needs and adopting “healthy behaviors” and (4) protecting body image against stereotypical ideas of thinness. Higher scores indicate higher body appreciation.

The APQ was developed and validated for older Irish adults aged 65 to 102 years in order to evaluate their self-perception of aging in eight domains (Barker *et al.*, 2007). The first part of the APQ is a Likert type scale with seven domains and 32 items: *timeline acute* (TA) evaluates the sequence of chronic events related to aging; *timeline cyclical* (TC) evaluates the sequence of cyclic events related to aging; *consequence positive* (CP) evaluates the positive results of events related to aging; *consequence negative* (CN) evaluates the negative results of events related to aging; *control positive* (CTLP) evaluates the positive control of the events related to aging; *control negative* (CTLN) evaluates the negative control of the events related to aging and *emotional* (E) evaluates the results of events from the subjects’ emotional viewpoint. The second part of the scale, with 17 items, is a dichotomous subscale, and is only composed of the *identity* dimension, which evaluates the experiences of health-related change. The first seven dimensions of the scale are scored using a 5-point scale that varies from 1 (“totally disagree”) to 5 (“totally agree”). The control negative and consequence negative dimensions are scored in reverse. Higher mean scores for each subscale indicate greater approval of a specific perception. The *identity* subscale evaluates the experience of health-related change and consists of 17 possible changes in health. The participants indicate whether they have experienced such change in the last 10 years. The answer possibilities are “yes” (1) or “no” (0). For affirmative responses, the participants are asked to identify whether they attribute these changes to getting older (1 = yes, 0 = no). The percentage of health-related changes attributed to aging is then computed as a proportion of the number of health-related changes experienced.

Demographics: the participants self-reported their demographic information, namely age, gender, marital status, level of education, occupation, income, religion, frequency of physical activity and whether or not the participant lives alone. In the second part of the demographic survey, the participants were asked to answer

five structured questions using a scale from 0 to 10 points. The first question evaluated the participant’s current mood, the second evaluated the participant’s satisfaction with his or her appearance, the third evaluated satisfaction with his or her body, the fourth question asked how competent the participant feels when performing activities of daily living (ADL), and the last question evaluated the participant’s perception of his or her current health status.

Translation of the scales

The Brazilian Portuguese versions of the two scales were developed according to guidelines from the *American Academy of Orthopedic Surgeons/Institute of Work & Health* (Beaton, Bombardier, Guillemin, & Ferraz, 2002), which standardize the translation and cultural adaptation of scales. The first step in this process was to translate the scales from English to Brazilian Portuguese. The scales were independently translated by two Brazilian translators fluent in English. In the second step, the two translators and a recording observer worked together to synthesize the results of the translations, and produce a single version in Brazilian Portuguese. In the third step, the syntheses of the scales were used as a basis for independent back-translations from Portuguese to English by two native English-speaking translators fluent in Brazilian Portuguese.

In the fourth step, all of the material produced (the translations, syntheses and back translations), the previous BAS version (Swami *et al.*, 2011), and the original version of the scales were submitted to a bilingual committee of experts that include: translators, back-translators, a methodologist, a physician who is also a psychoanalyst, a linguist, and an older person, as recommended by Ferreira, Campana, Campana, and Tavares (2011). The experts evaluated semantic, idiomatic, cultural and conceptual equivalences of each item in the scales. Final versions of the scales were produced by the committee and submitted for pre-testing.

The fifth step was the pre-test, in which eight participants older than 60 years were recruited. Each participant completed the pre-test scales and subsequently took part in an interview to verify item and instruction comprehensibility, the adequacy of the layout, and congruence between the desired answer and the indicated answer (which was especially important for negative items and situations with double negatives). Ambiguity was observed regarding item 1 of the BAS and items 6, 27 and 30 of the APQ. The items were rediscussed and re-written, and a new pre-test was administered to eight different participants, older than 60 years. This second pilot indicated that there were no further problems with the BAS or the APQ and that each scale was considered clear, adequate, and understandable. Through this process, final versions of BAS (Appendix A) and APQ (Appendix B) were prepared in Portuguese for use in the present psychometric study.

Procedures

The original authors of the scales gave their authorization for the translation, cultural adaptation and validation of the scales into Brazilian Portuguese. The study was approved by

the Research Ethics Committee of University of Campinas, on 03/24/2009 (process number 0116.0.146.000-09; approval number 158/2009).

The researchers visited community centers, physical activity centers, social projects, the waiting rooms of health care services for older adults, religious centers and older individuals from the community. After an oral explanation of the objectives of the research, prospective participants were invited; those who accepted were asked to sign a consent form. The participants then answered the two instruments and the sociodemographic questionnaire. Participation was voluntary and non paid.

Scale models

The factorial structures of both of the scales included in this study have already been determined with exploratory factor analysis and/or confirmatory factor analysis in initial or subsequent validity studies, with the BAS being studied the most (Avalos, Tylka, & Wood-Barcalow, 2005; Barker *et al.*, 2007; Ingrand *et al.*, 2012; Sexton, King-Kallimanis, Morgan, & McGee, 2014; Swami & Chamorro-Premuzic, 2008; Swami, Özgen, Gökçen, & Petrides, 2014; Swami, Stieger, Haubner, & Voracek, 2008; Swami *et al.*, 2011).

The three identified psychometric studies of the APQ (Barker *et al.*, 2007; Ingrand *et al.*, 2012; Sexton *et al.*, 2014) used confirmatory factor analysis. All studies confirmed the original seven factor solution, and one also presented a brief version of APQ (Sexton *et al.*, 2014) that suggests overlap in the content of the observed variables. Indeed, the lack of factorial variance for the APQ might be the result of its strong theoretical background, of which Baxter and colleagues (2007) note:

A key assumption of this model is that an individual forms a representation of their health threat or illness that can be divided into a series of logical themes or dimensions: identity (beliefs about the label and nature of the illness and the link with symptoms), timeline (beliefs about the duration and course of the illness, specifically whether it is acute, chronic or cyclical in nature), consequences (beliefs about the impact of the illness on one's life), control (beliefs about personal ways of managing one's illness), cause (beliefs about the likely cause of the illness) and emotional representations (emotional response generated by the illness). (p. 2)

Given these facts and a lack of theoretical evidence to support any model other than the original, we only analysed the adequacy of the original factor structure of the APQ for Brazilian older adults. The factorial model of the APQ is composed of 32 items and the seven first dimensions: *timeline chronic* (TA), items 1, 2, 3, 4, and 5; *timeline cyclical* (TC), items 27, 28, 30, 31, and 32; *consequences positive* (CP), items 6, 7, and 8; *consequences negative* (CN), items 16, 17, 18, 19, and 20; *control positive* (CTLP) items 10, 11, 12, 14 and 15; *control negative* (CTLN), items 21, 22, 23, and 24; *emotional representation* (E), items 9, 13, 25, 26 and 29. Due to the dichotomous nature of the eighth dimension, *identity*, and following previous studies (Barker *et*

al., 2007; Ingrand *et al.* 2012; Sexton *et al.*, 2014), a nomological approach was used to check for divergent validity of *identity* (I).

On the other hand, previous psychometric studies have indicated that the BAS can have a satisfactory solution with both a unidimensional (Avalos, Tylka, & Wood-Barcalow, 2005, Swami *et al.*, 2008, Swami, Hadji-Michael & Furnham, 2008, Swami *et al.*, 2014) and a bidimensional (Swami & Chamorro-Premuzic, 2008; Swami *et al.*, 2011) factor structure. Considering these results, we ran two statistical models to determine which one provided the best fit for our data. Model 1 groups all 13 items in a one-factor solution (BAS) and is supported by previous studies (Avalos, Tylka, & Wood-Barcalow, 2005; Swami, Hadji-Michel, & Furnham, 2008; Swami *et al.*, 2008, Swami *et al.*, 2014). Model 2 groups the variables in a two-factor solution, in which the factors are called *Body Valorization* (BV) (items 2, 3, 4, 5, 8, 10 and 13) and *Body Care* (BC) (items 1, 6, 7, 9, 11 and 12).

Data analysis

First, the listwise deletion criterion was adopted for missing data, which resulted in the elimination of questionnaire responses with missing answers (Jöreskog & Sörbom, 1999) in the PRELIS™2 version of the LISREL® system. After generating the PRELIS file, the SIMPLIS model was used, which is an encoding of the LISREL® 8.51 system. A confirmatory factor analysis, which allows the parameters of the construct's measurement model to be evaluated, was then conducted. Given the fact that our data were not normally distributed, the unweighted least square method of extraction was used because this method is not sensitive to determine multivariate normality (Garson, 2006).

We considered the following fit indices for *model adjustment*: goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normed fit index (NFI), non-normed fit index (NNFI) and comparative fit index (CFI). According to the literature (Hair, Black, Babin, & Anderson, 2009), these indices should be $> .90$. The Root Mean Square Error of Approximation (RMSEA), which has an acceptance value of $< .08$, was also considered. All of the results regarding these indices are presented as absolute values. Factor loadings, residual factors and LISREL modification indices were considered for further adjustments in those cases exhibiting poor initial fit. In order to compare BAS models, three parsimony fit indices were considered: Akaike's information criterion (AIC), parsimony normed fit index (PNFI), and parsimony goodness-of-fit index (PGFI). There are no reference values for those indices, but smaller AIC values and greater PNFI and PGFI values are preferable (Hair *et al.*, 2009).

To analyze the *measurement model*, construct validity (discriminant and convergent), divergent and concurrent validity and internal consistency were examined. Cronbach's alpha and construct reliability were measured to establish internal consistency. While Cronbach's alpha values $> .60$ are acceptable in an initial evaluation of psychometric properties investigation (Nunnally, 1978), values $> .70$ are preferred. For construct reliability, values $> .70$ are preferred (Hair *et al.*, 2009).

To establish convergent validity, *t*-values and the factor loadings of the observable variables were analyzed. Item factor loadings > 0.50 were preferable and item factor loadings > 0.70 were considered ideal (Hair *et al.*, 2009). In the present case, *t*-values > 1.96 were considered acceptable (Garver & Mentzer, 1999). Convergent validity was also estimated by the Average Variance Extracted (AVE). An AVE value > 0.50 was indicative of adequate convergent validity (Hair *et al.*, 2009).

For discriminant validity, we compared the AVE values for the factors of the scales with the squared correlation estimates for each scale. The AVE should be greater than the squared correlation of the compared factors (Hair *et al.*, 2009).

Finally, we assessed divergent and concurrent validity with a nomological approach. For divergent validity, we tested the hypothesis that physical activity is an important variable for physical and psychological health of older adults (Hafner-Holter, Kopp, & Gunther, 2009; Meurer, Benedetti, & Mazo, 2009). To confirm this hypothesis and thus establish the divergent validity, we compared the scores of physically active participants (i.e., those routinely engaged in physical exercise) and sedentary subjects on both scales. For concurrent validity, we would expect the BAS score to be associated with body satisfaction and appearance satisfaction, providing the similarity of the constructs. The APQ score would be associated with perception of competence for ADL, mood and health perception, as indicated by previous

studies (Efklides, Kalaitzidou, & Chankin, 2003; Gattuso, 2001; Levy & Myers, 2004; Steverink, Westerhof, Bode, & Dittmann-Kohli, 2001).

Results

Factor structure of the BAS

The original one-dimensional model of the BAS, which included 13 items, had a poor initial adjustment (RMSEA = .136, GFI = .963, AGFI = .959, NFI = .953, CFI = .971, NNFI = .955, $c^2/df = 12.24$), with item 12 presenting very low factor loading. We eliminated this item, and also eliminated items 9 and 8 on subsequent adjustments due to low factor loadings. We later eliminated items 1 and 11, both with high residuals, one on each new adjustment, in this order. Because all of the remaining items had adequate factorial loadings, $\lambda \geq .50$, we examined the residuals and LISREL modification index. The modification indices of the LISREL system indicated a covariance of errors between items 2 and 3 and items 7 and 6, which we accepted because this finding made both mathematical and theoretical sense – the observed variables were quite similar in content. A satisfactory solution was then found (RMSEA = .076, GFI = 1.00, AGFI = .99, NFI = .99, CFI = 1.00, NNFI = 1.00, $c^2/df = 4.46$) (Figure 1).

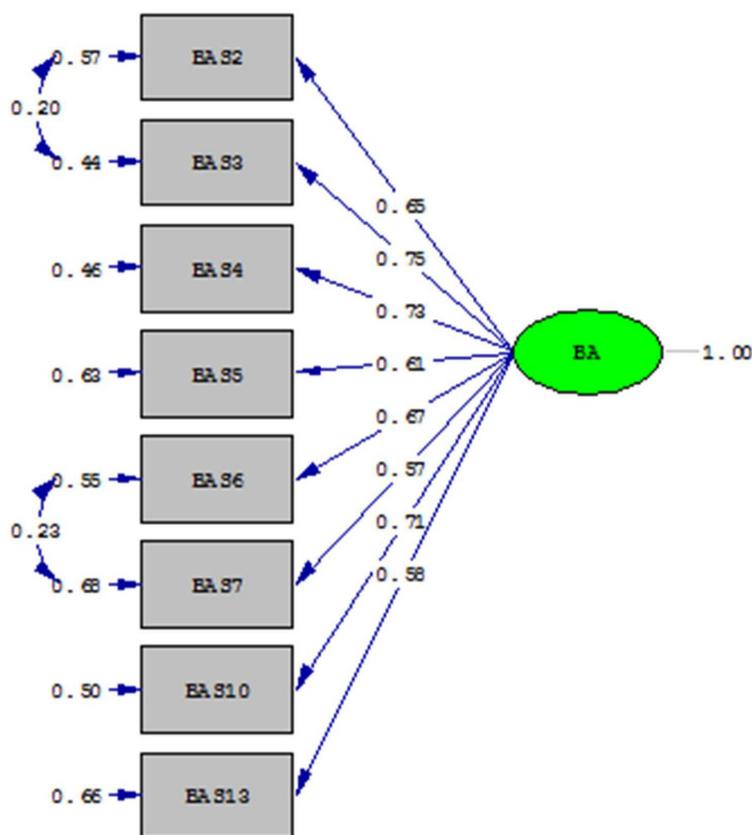


Figure 1. A graphic model of the unidimensional model of the Brazilian version of the BAS for the older adults.

The bidimensional model had a better initial adjustment (RMSEA = .095, GFI = .98, AGFI = .97, NFI = .97, CFI = .97, NNFI = .97, $c^2/df = 6.42$) but was not satisfactory. Following the same rationale adopted for the one-dimensional model, we first eliminated the items with low factorial loadings, which were also items 12 and 9. Then, we analysed the residuals and eliminated items 8, 2 and 13 one at a time in this order. After evaluating the LISREL measurements index, we determined that there was no indication of acceptable error of covariance for this model. Thus, we achieved a satisfactory fit with the previous modifications (RMSEA = .070, GFI = 1.00, AGFI = .99, NFI = 1.00, CFI = 1.00, NNFI = 1.00, $c^2/df = 3.98$) (Figure 2).

The two adjusted models were compared to determine the best models for the Brazilian Portuguese version of the BAS (Table 1). Both models had almost identical RMSEA, CFI, NFI, NNFI, AGFI, and GFI indices, but the bidimensional model had a lower AIC value (109.65; AIC unidimensional model = 116.31) and slightly higher PNFI values (.67; PNFI unidimensional model = .64) and PGFI (.52; PGFI unidimensional model = .49). These parameters indicated that the bidimensional model (model 2) had greater parsimony and better explains the observed data; therefore, we chose model 2 as the best for our data and used this model to continue the further analysis.

Internal reliability of the BAS

Cronbach’s alpha ($\alpha > .60$) and a construct reliability coefficient (CR > .70) were calculated to check the reliability of the scales. Both of the measures indicated appropriate values for the BV factor ($\alpha = .79$; CR = .80) and for the BC factor ($\alpha = .82$; CR = .84) for the present data.

Construct, concurrent and divergent validity of the BAS

All of the factor loadings for convergent validity were above the minimum limit of $\lambda_i = .50$ (.61 – .86). All of the t -values were significant (considering a significance level of 5%) and above 1.96, indicating that the items could measure the latent variable. The AVE values of both factors were above the minimum value of acceptance, $AVE > .50$, being BV factor $AVE = .51$ and BC factor $AVE = .57$, pointing to a satisfactory convergent validity, as well the previous evidences.

Data also supported the discriminant validity of the Brazilian version of the BAS. The AVE values of both factors were higher than the squared correlation of the factors ($r^2 = .25$).

The Mann-Whitney test results provided evidence of divergent validity for the BAS, confirming the expected difference in BV factor ($U = 21487.5, p = .001, r = .15$) and BC factor ($U =$

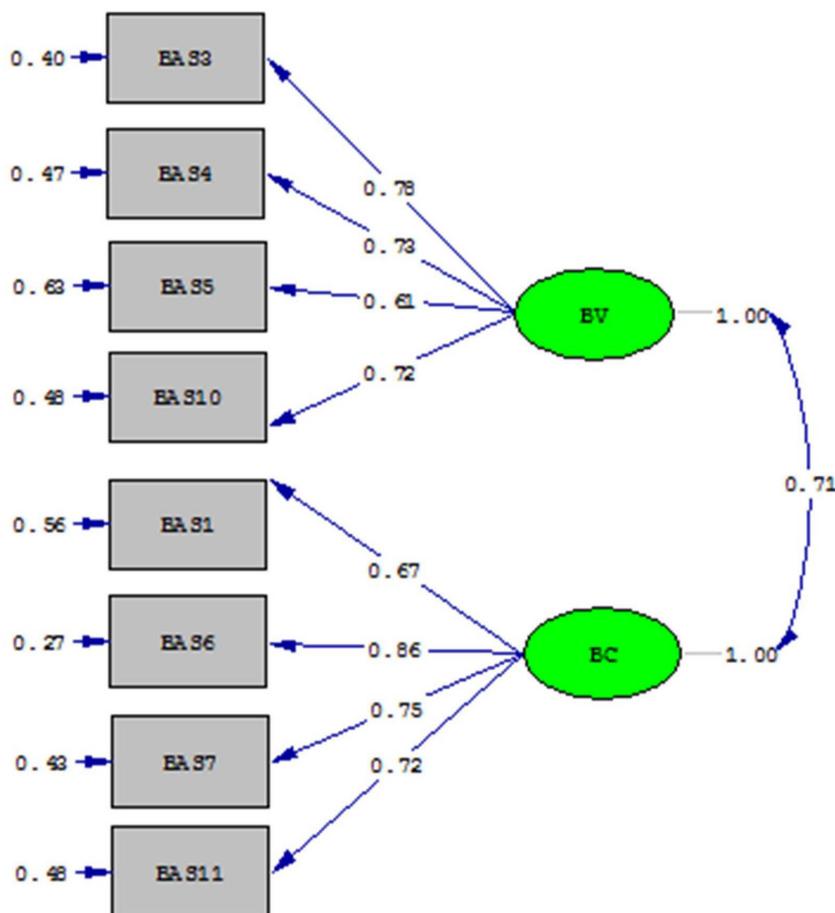


Figure 2. A graphic model of the biidimensional model of the Brazilian version of the BAS for older adults.

Table 1. Comparison of the BAS models.

Models	χ^2/df	RMSEA	NFI	NNFI	CFI	GFI	AGFI	AIC	PNFI	PGFI	(+) R	(-)R
Unidimensional model	4.46	.076	.99	1	1	1	.99	116.31	.64	.49	2.50	-1.71
Bidimensional model	3.98	.07	1	1	1	1	.99	109.65	.67	.52	2.65	-2.31

Note: RMSEA = Root Mean Square Error of Approximation; NFI = Normed Fit index; NNFI = Nonnormed Fit index; CFI = Comparative fit index; GFI = Goodness-of-fit; AGFI = Adjusted Goodness-of-fit; χ^2/df = Chi – weighted square; AIC = Akaike information criterion (model); PNFI = Parsimony Normed Fit Index; PGFI = Parsimony Goodness-of-Fit Index; (+) Higher positive residual; (-) Higher negative residual.
Reference values: Chi – Weighted Square = below 5; RMSEA = below .08; NFI, NNFI, CFI, GFI and AGFI = above .90

17784, $p < .001$, $r = .27$) between those participants who regularly engage in physical activity (i.e., physically active persons) and sedentary participants.

Finally, the Spearman Brown correlation test provided evidence of concurrent validity. The BAS factors were positively associated with satisfaction with the body (BV $r_s = .32$, $p < .001$ and BC $r_s = .28$, $p < .001$). The same pattern was observed with satisfaction with appearance and BV and BC factors, with $r_s = .20$, $p < .001$ and $r_s = .21$, $p < .001$, respectively.

APQ factor structure

Only the original model of the APQ was tested. The first estimate presented satisfactory parameters (RMSEA = .076, GFI = .94, AGFI = .93, NFI = .90, CFI = .92, NNFI = 0.91, $\chi^2/gf = 4.06$); however, there were a considerable number of high residuals and items and several items with low factor loadings. To obtain a better fit, we eliminated items 14, 22, 17 (low factor loading and high residuals), 5, 3, 29, 27, 20 and 9 (high residuals) one at a time in this order. With these alterations, the APQ model showed a better adjustment (RMSEA = .058, GFI = .97, AGFI = .96, NFI = .94, CFI = .97, NNFI = .96, $\chi^2/df = 3.06$), thus confirming the original model (Figure 3).

Internal reliability of the APQ

In order to verify the scale's internal reliability, Cronbach's alpha and the construct reliability coefficient were calculated for each factor: TA ($\alpha = .69$; CR = .69), TC ($\alpha = .78$; CR = .79), E ($\alpha = .71$; CR = .71), CTLP ($\alpha = .80$; CR = .81), CTLN ($\alpha = .70$; CR = .71), CP ($\alpha = .74$; CR = .76), and CN ($\alpha = .72$; CR = .73). With the exception of TA, all of the factors were above the minimum value of .70, with TA measuring very close to this value.

Construct, concurrent and divergent validity of the APQ

Regarding convergent validity, all of the factor loading values were high (.51 – .82), and the t -values were above 1.96. However, lower AVE values were found for the TA

(AVE = .43), E (AVE = .46), CN (AVE = .48), CTLN (AVE = .46), and TC (AVE = .48) factors. The values for CP (AVE = .55) and CTLP (AVE = .53) were above the recommended cut-off point.

In addition, we evaluated the discriminant validity of the APQ, comparing the AVE values and the squared inter construct correlations (Table 2). Almost all of the AVE values were higher than the squared inter construct correlation, with the exception of TC – E, where the values were tied.

To generate evidence of concurrent validity, the correlations between APQ score factors and the scores of perceived ADL competence, mood and perception of health status were determined. TA ($r_{s=}$ -.15, -.11, and -.08 for ADL competence, mood, and perception of health status, respectively), TC ($r_{s=}$ -.32, -.25, and -.28 for ADL competence, mood, and perception of health status, respectively) and E ($r_{s=}$ -.21, -.21, -.26 for ADL competence, mood, and perception of health status, respectively) had negative correlations. CP showed a positive correlation with perceived ADL competence, mood and perception of health status ($r_{s=}$.11, .08, and .12 for perceived ADL competence, mood and perception of health status, respectively), as did CTLP ($r_{s=}$.14, .1, and .12 for perceived ADL competence, mood and perception of health status, respectively), CTLN ($r_{s=}$.17, .16, and .20 for perceived ADL competence, mood and perception of health status, respectively) and CN ($r_{s=}$.26, .13, and 0.26 for perceived ADL competence, mood and perception of health status, respectively). All of these associations were significant.

The Mann-Whitney test demonstrated differences between physically active and sedentary participants in TA ($U = 22824$, $p = .01$, $r = .11$), CTLP ($U = 20124$, $p \leq .001$, $r = .20$), CN ($U = 20789$, $p \leq .001$, $r = .18$), CTLN ($U = 21184$, $p \leq .001$, $r = .16$), E ($U = 21428.5$, $p = .001$, $r = .16$), and TC ($U = 20368.5$, $p \leq .001$, $r = .19$), but not CP ($U = 23628.5$, $p = .05$, $r = .08$).

Finally, for the I factor, the physically active and sedentary participants showed significant differences in painful joints ($U = 22920$, $p = .01$), back problems/ slipped disc ($U = 22344$, $p = .003$), loss of mobility ($U = 22077$, $p = .001$), loss of balance ($U = 21205.5$, $p < .001$), loss of strength ($U = 22435$, $p = .003$), bone or joint conditions ($U = 21909$, $p = .001$), vision and eyesight changes ($U = 23436.5$, $p = .03$) and depression ($U = 23125.5$, $p = .001$). In all the cases, the sedentary participants had more of these health conditions and attributed the condition(s) to aging.

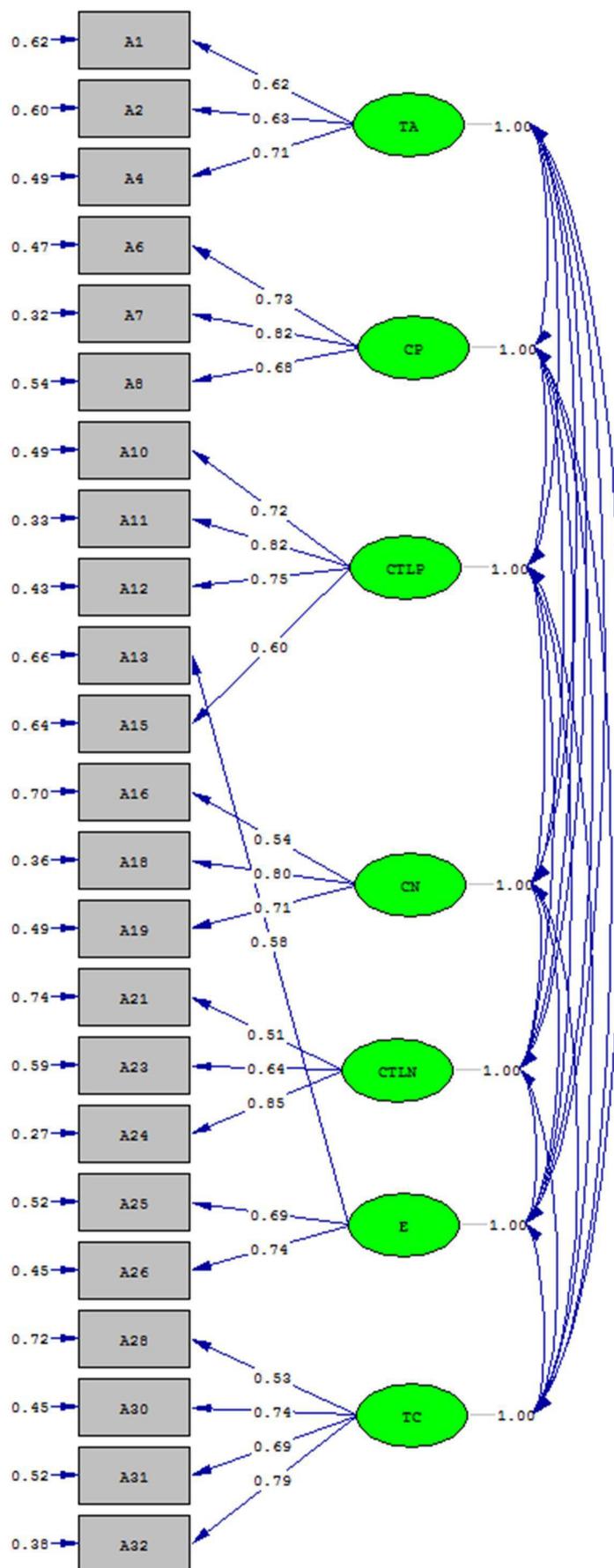


Figure 3. A graphic model of the Brazilian version of the APQ.

Table 2. Average variance extracted vs. shared variance on the Brazilian APQ.

Factors	1	2	3	4	5	6	7
1 – <i>Timeline acute</i> (TA)	.43	.23	.33	-.36	.20	-.21	.09
2 – <i>Timeline cyclical</i> (TC)	.05	.48	-.02	-.55	-.18	-.41	.68
3 – <i>Consequences Positive</i> (CP)	.11	.004	.55	.05	.47	.06	-.21
4 – <i>Consequences Negative</i> (CN)	.13	.30	.002	.48	.02	.57	-.47
5 – <i>Control Positive</i> (CTLP)	.04	.03	.23	.004	.53	.25	-.22
6 – <i>Control Negative</i> (CTLN)	.04	.17	.003	.32	.06	.46	-.45
7 – <i>Emotional</i> (E)	.01	.46	.04	.22	.05	.20	.46

Note: The values of Average Variance Extract are on the diagonal, in bold. The values of the shared variance of each pair of factors are below the diagonal. The correlations between each factor are shown above the diagonal.

Discussion

The main aim of the present study was to translate the Body Appreciation Scale (BAS) and Aging Perceptions Questionnaire (APQ) into Brazilian Portuguese and establish the factorial structure and psychometric properties these instruments. Although the two tested models for the BAS achieved good fit indices, a bidimensional structure was considered the best solution because of its parsimony indices, which indicated that this model better explained the observed data. The BAS bidimensional structural model fitted these data satisfactorily, and the analysis of the measurement model also gave satisfactory evidence of construct, concurrent and divergent validity, and internal consistency. In fact, aside from the variance in the factorial structure, the BAS is being validated in different countries and languages (Swami & Chamorro-Premuzic, 2008; Swami *et al.*, 2008; Swami *et al.*, 2011; Swami *et al.*, 2014), indicating that positive body image as theoretically operationalized in this scale is quite stable across cultures, gender, and now age. It is worth mentioning that the present study was the first to evaluate the psychometric evidence of the BAS in a sample of older adults.

Concerning the association among BAS factors, satisfaction with appearance and body satisfaction level, the results found here were similar to other studies that found a strong relationship between satisfaction with appearance and body appreciation (Barreto, Fernandes, & Guihard-Costa, 2011; Whitbourne & Whitbourne, 2001). The difference in body appreciation between sedentary and physically active participants is also worth mentioning. Physical activity is an unquestionable source of experience with the body, and the possibility of experiencing the limits and the possibilities of the body – especially as the living body changes with age – is important for developing body image (Tavares, 2003). This theoretical argument explains this finding, which is important to all physical educator to consider, since they are the professional that took care of this dimension of life.

Aside from the satisfactory fit and the evidence of validity and reliability, five items were eliminated from the Brazilian version of the BAS due to low factor loading and/or high residuals. Items 8, 9, 12 and 13 evaluated aspects of body appearance. Although previous studies (Swami, Hadji-Michael, & Furnham, 2008; Thompson & Smolak, 2001) have documented that physical appearance is a predominant factor in body appreciation

in young people, other studies have indicated that appearance is not as decisive for positive body image during old age (Tiggemann, 1999, 2004; Webster & Tiggemann, 2003). According to Tiggemann (1999), the level of dissatisfaction with the body tends to decrease with aging, probably because individuals adapt their standards of physical attractiveness as they age, i.e., comparing themselves with other people of their own age. This same study showed that women demonstrate dissatisfaction with body parts such as hands, eyes, fingers and legs, as well as body weight, suggesting a change in focus toward functional aspects. Thus, for our sample, these items would explain the construct very poorly. On the other hand, item 2 was probably perceived as having content overlap with items 3 and 10, resulting in the elimination of item 2.

The factorial analysis for the APQ model confirmed the original structure of the scale. However, nine items were eliminated due to low factor loadings and high residuals. The most reasonable explanation for the deletion of these items may be related to the fact that the perception of aging in Brazil is different from the perception of aging in Ireland, and is not only associated with personal thoughts and beliefs, but also with sociocultural questions, e.g., “symbolic manifestations of group subjectivities” (Vaisberg, 1997). We did not find any theoretical evidence supporting a different model, and the only different factor model found were for a brief version of the APQ (Sexton *et al.*, 2014), which is different from our proposition.

Besides the satisfactory fit of the structural model, the measurement model showed some weakness. Internal consistency was below the preferable values for TA factor ($\alpha = .69$; CR = .69). A lack of internal consistency was also observed in previous studies for factors CP ($\alpha = .64$, Barker *et al.*, 2007; $\alpha = .62$, Ingrand *et al.*, 2012) and CN ($\alpha = .59$; Ingrand *et al.*, 2012). Considering this background, our results are quite acceptable. The main issues identified were the AVE values supporting convergent validity. Good values were only found for the CP and CTLP factors, acceptable values were found for the CTLN and TC factors and low values were found for the TA, E and CN factors. We strongly recommend the reader to consider that this low AVE might be explained by fact that the APQ has an understudied model that has shown this type of problem before (TA AVE = .42; CP AVE = .28; CN AVE = .29; Ingrand *et al.*, 2012). Must also be consider that construct reliability - which is also a measure of convergent validity (Hair *et al.*, 2009),

the factor loadings and *t-values* were satisfactory, giving other evidences of convergent validity.

This study was able to generate satisfactory evidence of concurrent, divergent and discriminant validity. Regarding the last, some correlation were very weak, and must be considered with cautious. Specific to divergent validity, our results confirm differences found by Sørensen, Anderssen, Hjermand, Holme, and Ursin, (1997), which concluded that physical exercise had positive results on self-perception of the body. Because the perception of age-related changes in particular is linked with ADL performance, which demands both physical and cognitive effort from the aging individual, it would seem that the perception of aging seems to be a complex product of such activities (Nagel, Werkle-Bergner, Li, & Lindeberger, 2007). An active, healthy lifestyle affects one's self-perception of health and, consequently, healthy aging (Nagel *et al.*, 2007; Tervo, Nordström, & Nordström, 2011). We also found differences in the frequency of health problems and their relation to aging in the sedentary and active groups. These findings also converge with the findings of previous studies (Angevaren, Aufdemkampe, Verhaar, Aleman, & Vanhees, 2008; Böner *et al.*, 2012) indicating that exercise is important for the perception and maintenance of health.

A number of limitations of the present study should be considered. First, the evidence generated here was based on a non-probabilistic sample. A future study should provide more evidence of psychometric properties for both of these scales, especially the APQ, which has been showing weakness in construct validity.

Second, we must consider that the responses indicated a high level of body appreciation, acceptance of aging and perception of aging in a natural and positive way among the participants. However, the data were mainly collected from community-dwelling older individuals, with only a fraction of the sample coming from nursing homes. According to Ferreira and Simões (2011), the regulations of institutional environments in some cases do not foster a positive relationship between older adults and their bodies due to a lack of autonomy and independence, particularly regarding bodily self-care. Thus, exploring the association between body appreciation and aging perception in institutionalized and non-institutionalized older populations could provide evidence as to whether this environment is a positive or a negative predictor in body appreciation and perception of aging.

A third limitation is the need to investigate the extent of the relationships and associations that body appreciation and perception of aging could have with other relevant topics. Future studies could explore an association between the Brazilian version of these scales and other variables, such as resilience, self-esteem, quality of life, social interaction, mobility, and depressive symptoms, which could increase the understanding of these topics with respect to Brazilian older population. Additional studies could contribute to the structuring of a new model of body appreciation and aging perception. Considering the role that body experiences have on body image development (Schilder, 1978), these same studies may also contribute to the development of intervention strategies to be used by physical therapists/educators for developing and maintaining a positive image for Brazilian older adults.

Fourth, we must recognize that APQ showed some issues re-

garding its convergent and discriminant validity. Despite that fact that the model had a satisfactory adjustment, and thus, confirming its theoretical background, we can not ignore its psychometric fragilities. Future psychometric studies could contribute for the refinement of this scale, and they must be done not only in Brazil, since APQ is showing reliability and validity problems in diverse cultural scenarios (Barker *et al.*, 2007; Ingrand *et al.*, 2012). Finally, and completing our previous statement, we must always remember that psychometric theory states that validity and reliability are not characteristics of the instrument *per se*, but of the data collected with the instrument in a given sample (Campos & Maroco, 2012). In the face of this fact, this study cannot be taken as the final word in Brazil, but only a beginning. Additional studies in diverse samples will help improve the BAS and APQ, and should be completed in the future.

Specifically for the physical education area of knowledge, a contribution of this study was to point out the differences in body acceptance, regardless of flaws or imperfections, between those with an active lifestyle and sedentary individuals. The study also indicated that physical activity might have a positive impact on the perception that older individuals have of aging.

Having BAS and the APQ to be used for research with Brazilian older populations fills a current gap in measurement instruments for evaluating body image of older individuals. The availability of these instruments for social service and health professionals may represent an advance in studies on body image and aging. The validated scales may also be used in physical education and other health fields to gain a better understanding of the aging phenomenon from the perspective of older individuals and to understand the body image dynamics, consequently, could lead to more effective interventions. Because the perception of aging-related changes is linked to everyday activities, which demand effort from the physical and cognitive dimensions of the aging individual, the perception of aging can be seen as a complex product of ADL. Thus, regular physical activity and a healthy lifestyle impact the self-perception of health and, consequently, healthy aging (Nagel *et al.*, 2007; Tervo, Nordström, & Nordström, 2011).

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Appendix A. Body Appreciation Scale

Instruções: Por favor, indique a frequência com que estas questões são verdadeiras para você: Nunca, Raramente, Às vezes, Frequentemente, Sempre.

	Nunca	Raramente	Às vezes	Frequentemente	Sempre
1. Respeito meu corpo, ou seja, cuido dele.	(1)	(2)	(3)	(4)	(5)
2. Eu me sinto bem em relação ao meu corpo	(1)	(2)	(3)	(4)	(5)
3. De uma forma geral, estou satisfeito (a) com meu corpo	(1)	(2)	(3)	(4)	(5)
4. Apesar de suas imperfeições, aceito meu corpo como ele é.	(1)	(2)	(3)	(4)	(5)
5. Sinto que meu corpo tem algumas qualidades boas	(1)	(2)	(3)	(4)	(5)
6. Tomo uma atitude positiva em relação ao meu corpo	(1)	(2)	(3)	(4)	(5)
7. Sou atento (a) às necessidades do meu corpo.	(1)	(2)	(3)	(4)	(5)
8. Minha auto-estima independe da forma ou do peso do meu corpo.	(1)	(2)	(3)	(4)	(5)
9. Perco tempo me preocupando com meu peso ou forma do meu corpo.	(1)	(2)	(3)	(4)	(5)
10. A maioria dos meus sentimentos em relação ao meu corpo são positivos	(1)	(2)	(3)	(4)	(5)
11. Adoto comportamentos saudáveis para cuidar do meu corpo	(1)	(2)	(3)	(4)	(5)
12. Para mulheres: Permito que imagens idealizadas de mulheres magras mostradas na mídia afetem minhas atitudes em relação ao meu corpo.	(1)	(2)	(3)	(4)	(5)
12. Para Homens: Permito que imagens idealizadas de homens musculosos mostradas na mídia afetem minhas atitudes em relação ao meu corpo.	(1)	(2)	(3)	(4)	(5)
13. Apesar de suas imperfeições, eu ainda gosto de meu corpo.	(1)	(2)	(3)	(4)	(5)

Note: Items in bold were excluded from the final model

Appendix B. Aging Perception Questionnaire

Instruções: Estas questões avaliam suas opiniões e experiências sobre o envelhecimento. Já que todos estão envelhecendo, estas questões podem ser respondidas por qualquer pessoa, de qualquer idade. Não há respostas certas ou erradas – somente suas experiências e opiniões sobre o envelhecimento. Mesmo que as afirmativas sejam sobre algo que você não pensa frequentemente em relação a você mesmo, por favor, tente nos dar uma indicação de sua opinião sobre o assunto, respondendo todas as questões.

Parte A: Visão Sobre o envelhecimento. Nós estamos interessados nas suas visões e experiências pessoas sobre o envelhecimento. Por favor, indique sua concordância em relação às afirmações que se seguem (discordo totalmente, discordo, não concordo nem discordo, concordo, concordo totalmente), marcando com um X.

	Discordo totalmente	Discordo	Nem concordo nem discordo	Concordo	Concordo totalmente
1. Tenho consciência de que estou envelhecendo o tempo todo	(1)	(2)	(3)	(4)	(5)
2. Estou sempre ciente da idade que tenho	(1)	(2)	(3)	(4)	(5)
3. Sempre me classifico como velho	(1)	(2)	(3)	(4)	(5)
4. Estou sempre ciente de que estou envelhecendo	(1)	(2)	(3)	(4)	(5)
5. Sinto a minha idade em tudo o que faço	(1)	(2)	(3)	(4)	(5)
6. À medida que envelheço adquiero mais experiência de vida.	(1)	(2)	(3)	(4)	(5)
7. À medida que envelheço, continuo a crescer como pessoa.	(1)	(2)	(3)	(4)	(5)
8. À medida que envelheço, aprecio mais as coisas.	(1)	(2)	(3)	(4)	(5)
9. Fico deprimido (a) quando penso em como o envelhecimento pode afetar as coisas que posso fazer.	(1)	(2)	(3)	(4)	(5)
10. A qualidade da minha vida social nos anos que virão depende de mim	(1)	(2)	(3)	(4)	(5)
11. A qualidade dos meus relacionamentos no futuro depende de mim.	(1)	(2)	(3)	(4)	(5)
12. Continuar vivendo minha vida plenamente depende de mim	(1)	(2)	(3)	(4)	(5)
13. Fico deprimido (a) quando penso sobre o efeito que envelhecer pode ter na minha vida social.	(1)	(2)	(3)	(4)	(5)
14. À medida que envelheço, há muito que posso fazer para manter minha independência.	(1)	(2)	(3)	(4)	(5)
15. Se envelhecer terá pontos positivos, depende de mim.	(1)	(2)	(3)	(4)	(5)
16. Envelhecer limita as coisas que posso fazer	(1)	(2)	(3)	(4)	(5)
17. Envelhecer me faz menos independente	(1)	(2)	(3)	(4)	(5)
18. Envelhecer torna tudo bem mais difícil para mim.	(1)	(2)	(3)	(4)	(5)
19. À medida que envelheço, consigo participar de menos atividades.	(1)	(2)	(3)	(4)	(5)
20. À medida que envelheço não lido tão bem com os problemas que aparecem.	(1)	(2)	(3)	(4)	(5)
21. A diminuição do ritmo com a idade não é algo que eu consiga controlar.	(1)	(2)	(3)	(4)	(5)
22. Minha mobilidade futura, não depende de mim.	(1)	(2)	(3)	(4)	(5)
23. Não tenho controle se vou perder a vitalidade ou o pique, à medida que envelheço.	(1)	(2)	(3)	(4)	(5)
24. Não tenho controle sobre os efeitos que envelhecer tem sobre minha vida social	(1)	(2)	(3)	(4)	(5)
25. Fico deprimido (a) quando penso sobre envelhecer.	(1)	(2)	(3)	(4)	(5)
26. Fico preocupado (a) sobre os efeitos que envelhecer pode ter em meus relacionamentos com as pessoas.	(1)	(2)	(3)	(4)	(5)
27. Tem dias em que minhas experiências de envelhecer ficam melhores ou piores.	(1)	(2)	(3)	(4)	(5)
28. Minha percepção sobre meu envelhecimento vai e vem em fases	(1)	(2)	(3)	(4)	(5)
29. Sinto raiva quando penso que estou envelhecendo.	(1)	(2)	(3)	(4)	(5)
30. Tem dias em que me sinto velho (a).	(1)	(2)	(3)	(4)	(5)
31. Minha percepção de estar envelhecendo muda bastante de um dia para o outro.	(1)	(2)	(3)	(4)	(5)
32. Passo por fases em que me vejo como sendo velho (a).	(1)	(2)	(3)	(4)	(5)

Note: Items in bold were excluded from the final model

Parte B. Experiências relacionadas às mudanças de saúde: A próxima lista descreve algumas mudanças relacionadas à saúde que você talvez tenha vivido. Você pode nos dizer se você tem passado por estas mudanças nos últimos 10 anos e se você acredita que as mudanças vividas estão relacionadas especificamente ao envelhecer ou não.

Você já viveu ou tem vivido esta mudança?			“Sobre as mudanças que você viveu ou tem vivido: você acha que esta mudança está <u>APENAS</u> relacionada com o fato de você estar envelhecendo?”	
1. Problemas com o peso	Sim	Não	Sim	Não
2. Problemas com o sono	Sim	Não	Sim	Não
3. Problemas nas costas ou hérnia de disco	Sim	Não	Sim	Não
4. Dores nas articulações (Juntas)	Sim	Não	Sim	Não
5. Perda de mobilidade	Sim	Não	Sim	Não
6. Perda de equilíbrio	Sim	Não	Sim	Não
7. Perda de força	Sim	Não	Sim	Não
8. Diminuição do ritmo	Sim	Não	Sim	Não
9. Câimbras	Sim	Não	Sim	Não
10. Problemas nos ossos ou articulações (juntas)	Sim	Não	Sim	Não
11. Problemas Cardíacos	Sim	Não	Sim	Não
12. Problemas de ouvidos ou de audição.	Sim	Não	Sim	Não
13. Alterações nos olhos ou na visão.	Sim	Não	Sim	Não
14. Problemas respiratórios	Sim	Não	Sim	Não
15. Problemas nos pés	Sim	Não	Sim	Não
16. Depressão	Sim	Não	Sim	Não
17. Ansiedade	Sim	Não	Sim	Não