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Perceived Autonomy in Old Age scale: Factor structure and psychometric properties of the Polish adaptation

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Summary

Aim. Sense of autonomy – the possibility to choose and decide – is one of the markers of positive and active aging. The goal of this study was to examine the Polish adaptation of the Perceived Autonomy in Old Age (PAA) scale and to determine its internal structure and psychometric properties: reliability, as well as construct and discriminant validity.

Methods. 277 seniors (female=187; male=90), without cognitive function disorders aged 60 to 100 (*M*=77.4; SD=9.2) took part in the study. Apart from the PAA, the ADL and IADL scales (self-reliance assessment) were used, as well as the Emotional State Questionnaire (a measure for positive and negative emotions) and the WHOQoL-Brief (a measure for health-related quality of life).

Results. As a result of an exploratory and confirmation factor analysis a one-factor tool with five items was built. Reliability coefficients of the scale measured with the internal consistency method and test-retest were ≥0.80. Positive correlations were found with indicators in the ADL, IADL, as well as in the somatic and psychological domain of life quality, and positive emotions. Negative correlations were found for negative emotions.

Conclusions. The obtained results indicated very high reliability and accuracy for the Polish adaptation of the SPA. The tool can be used as a predictor and/or indicator of successful aging and life quality of seniors.

Key words: autonomy, elderly, factor analysis

Introduction

According to the dictionary definition, autonomy signifies self-reliance and independence in deciding about oneself [1]. In psychology this construct is associated with a good life and happiness as defined in the eudaemonist approach[1]: it is one of

[1] Human well-being is defined within two principle approches: hedonist (a good life is a life of joy and satisfaction) and eudaemonist (a good life is a life of value which consists in developing virtues and achieving goals) [2].

the characteristics of self-actualizing individuals according to Maslow or a dimension of well-being according to Carol Ryff [2]. Autonomy occupies a special place in the theory of self-determination according to Ryan and Deci [3]. The sense of autonomy defined as "the experience of choice" is considered to be a fundamental and basic human need [3]. The authors distinguish autonomy and independence: the first one refers to volitional action (sense of choice) and the second one to action as an individual without reliance on others. Ryan and Deci emphasize that the satisfaction of the need for autonomy is necessary for development and therefore crucial to the full functioning and psychological health of an individual [3]. The sense of autonomy, understood in this way, is positively connected to satisfaction with life, positive emotions, and psychological well-being [4, 5]. It also boosts the medical adherence (taking medication) [6].

The late adulthood period can threaten perceived autonomy. Although it's a time with potential opportunities for significant happiness and satisfaction, and the majority of people age successfully and are satisfied with life [7], physical disability in elderly people may be connected to a sense of dependence on others and a lack of opportunities to make decisions. The deterioration of somatic health and coexistence of several chronic diseases (multimorbidity) and, as a result, more frequent use of medical care, longer hospital stays and more frequent complications from treatment are all usually connected to a decline in quality of life and sense of happiness [8-10]. Disability can limit the possibility of making choices, for example in the case of neurodegenerative diseases, it can also impact the perception of an individual's own autonomy, for example for a person in supervised care, persons under the care of "overprotective" families and in families who undermine autonomy by doing everything. According to Ryan and Deci, aging is autonomous when seniors have the possibility to choose actions, that is they are allowed to decide what their lives will be like in terms of daily activities and life prospects even if these actions require help from secondary parties [3]. Therefore the aspect of perceived autonomy (possibility of choosing action) seems to be more significant than the possibility of its realization (independence).

Perceived autonomy, therefore, seems to be one of the main variables which determines the quality of life, satisfaction and overall well-being of seniors, especially those suffering from numerous chronic diseases. As a result, this variable can be considered one of the indicators and/or predictors of positive aging [11]. The results of studies indicate that in a group of seniors, perceived autonomy is negatively connected with symptoms of depression [12] and is a better predictor of well-being than heteronomy (the opposite of autonomy) or dependence [13]. In the longitudinal perspective autonomy facilitates volitional behaviours and helps to improve the emotional condition of seniors [14]. Unsurprisingly, according to the WHO, maintaining autonomy in seniors is an imperative task not only in individual dimension, but also in social dimension [15].

The tool used to measure the perceived autonomy of seniors is the German Wahrgenommene Autonomie im Alter (WAA Scale) [16]. Its advantage is specificity and length- only six items in the original version and four in the English language version – assessed on a four point scale (1–definitely not true; 4–definitely true). Perceived autonomy is operationalized as the subjective assessment of independence and freedom of choice [17]. Analyses indicated that the tool is characterised by good psychometric

properties: Cronbach's $\alpha = 0.91$ (in the pilot study) and 0.82 (in two stages of the longitudinal study). The scale significantly correlated with the results of the Overprotection Scale ($r = 0.11$), Satisfaction With Life Scale ($r = 0.07$), limitations in the Instrumental Activities of Daily Living IADL scale ($r = -0.14$) and the results of the tool measuring life quality, the EuroQoL EQ5D scale ($r = 0.20$; 0.25) [17].

Aim of the study

The aim of the studies was to carry out a Polish adaptation of the Perceived Autonomy in Old Age Scale, as well as to determine its internal structure and psychometric properties: reliability and construct and discriminant validity. The discriminant validity of the tool was tested using scales measuring self-reliance in seniors in reference to basic and complex activities of daily living. Construct validity was assessed according to Ryan and Deci's conception [3] through showing relationships between perceived autonomy and indicators of well-being (i.e. positive and negative emotions as well as health-related quality of life).

Material and Method

Participants and Procedure

277 seniors (67.5% women) aged 60–100 ($M = 77.4$; $SD = 9.2$), residents of nursing homes and participants of daily Senior's Clubs were included in the study. The criterion of selection was age (≥ 60) and lack of cognitive function disorders (no dementia or Mild Cognitive Impairment diagnosis, as well as good cognitive functioning of subjects confirmed by the facility staff). The majority of people in the examined group were single (unmarried, widowed or divorced; 83%), with secondary or lower education (71%), not receiving medical care in the last six months (63%), identifying their material status as average (62%). The location of the study did not result in any differences in terms of socio-demographic variables, except for age: the residents of nursing homes ($M = 79.1$; $SD = 9.1$) were significantly older than seniors attending daily centres ($M = 74.2$; $SD = 8.6$; $t = -4.44$; $df = 275$; $p < 0.001$). Accordingly, age was taken into consideration as a covariant for further analyses.

The research procedure included three stages. In the first stage a linguistic adaptation of the WAA scale was developed using back-translation. After the final phrasing of the items was established and the approval of the ethics committee was obtained (opinion no. 22/2012) two measurements were carried out with one month between them using the Polish adaptation of the WAA scale and tools testing its validity in a group of seniors. Participation in the study was voluntary and the respondents were informed about the longitudinal procedures of the study and the possibility of withdrawing at any stage. Missing data in the second stage was random (Little's MCAR test: $\chi^2 = 82.46$; $df = 72$; $p = 0.187$).

Tools

Apart from the Polish adaptation of the Perceived Autonomy Scale in Old Age (PAA) the study made use of the ADL [18] and the IADL scale [19] which measure self-reliance in terms of relevant basic activities (e.g., taking a bath, getting dressed and using the toilet) and complex activities of daily living (e.g., using the telephone, shopping and preparing meals), respectively. Higher indicators for both scales correspond to higher self-reliance. Selected items from the Emotional State Questionnaire[2] [20] were used to measure positive (PA) and negative (NA) emotions. The tool consists of a list of adjectives describing current emotional state (e.g., contentment or despondency) assessed on a seven point scale. Higher results were connected with more intense emotions for the given characteristic. Health-related quality of life was measured using a shortened version of the WHOQoL Questionnaire (WHOQoL-Brief) [21, 22]. Two domains of life quality were selected for comparison: somatic and psychological (total 13 items were assessed on a five point scale). The higher the result, the higher quality of life was in a given domain. The tools used in the study obtained very good reliability indicators (> 0.70 except for NA in the second measurement, see Table 3).

Statistical Analysis

The first step of the analysis was to determine the factor structure of the Perceived Autonomy Scale. For this purpose an exploratory factor analysis (EFA) was carried out using the principal components method with Varimax rotation (using SPSS 20) on data from the first measurement (T1). The number of factors was determined on the basis of Kaiser-Guttman criterion and a more restrictive scree test [23]. The desired value of the factor loads was set at 0.5.

In order to confirm the obtained scale structure, a confirmatory factor analysis (CFA) was performed using AMOS 20. Prior to the main analyses, given the random character of data loss, multiple imputation of the missing data was carried out using the regression method [24]. This is a currently recommended approach as it provides the most faithful picture of the relationships between tested variables in these cases [25]. The next step was to verify the multivariate normal distribution of the tested model [23]. The value of the critical ratios (CRs) of skewness and kurtosis for individual variables and the entire model showed that the joint data set did not fit a normal distribution model. Thus, further computation was carried out using bootstrapping to correct this finding [26]. The bootstrap sample (created by random drawing with replacement) for the assessment of parameter estimates and fit indices was 2000. CFA was carried out on the basis of the data from measurement two (T2), and then from both measurements jointly, in order to test the time-invariance of the scale structure [27]. Considering current guidelines, the quality of the tested models was assessed us-

[2] Considering the character of the sample group and the need to develop a concise set of tools, the original 14 items of the Emotional State Questionnaire were shortened to 6 items. Items characterised by the best psychometric properties in both subscales were selected [20].

ing χ^2 statistic (good fit at $p > 0.05$); its corrected value χ^2/df (good fit <2;5>); and the following indexes: RMSEA (root mean square error of approximation; good fit < 0.05, or < 0.80); RMR (root mean squared residual; good fit if near 0); GFI (goodness-of-fit index); AGFI (adjusted goodness-of-fit index); and CFI (comparative fit index) [23]. A value of ≥ 0.95 for the last three indices indicates very good fit while ≥ 0.90 satisfactory. The time-invariance test was carried out according to guidelines in four steps (for a detailed description of the procedure see [27]). Comparisons between models in subsequent steps were based on $\Delta\chi^2$ indicators and the more restrictive ΔCFI [28].

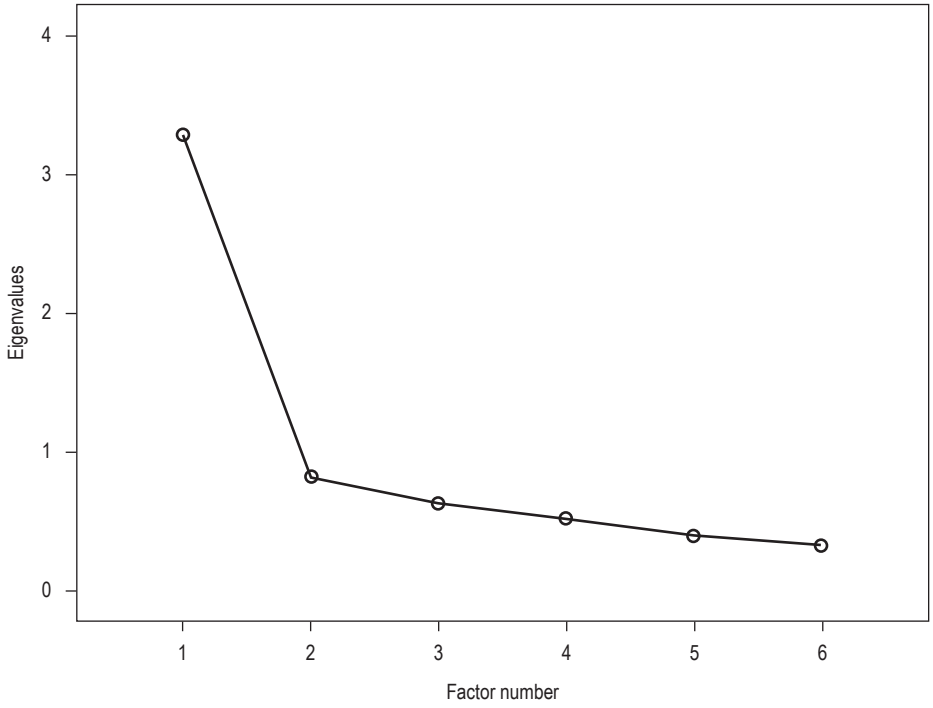

Figure 1. **Scree test – one-factor solution for PAA.**

Subsequently, reliability was tested using Cronbach's alpha internal reliability and the test-retest method as well as scale validity to determine its relationship with indicators of self-reliance and well-being.

Results

Exploratory Factor Analysis of the Perceived Autonomy in Old Age (PAA) scale – Data at T1

Both the Kaiser-Guttman criterion and the scree-test (Figure 1) indicated a single factor solution which corresponded with the theoretical assumptions of the tool. All scale items obtained the desired factor loadings (> 0.5, see Table 1).

Table 1. **The content of PAA and results of explanatory factor analysis (T1).**

No.	Item	Factor loadings	Correlation with scale	Item's mean
1.	I live by my own choices now that I am old.	0.726	0.61	3.23
2.	I make my own decisions and don't need others to protect me.	0.736	0.59	3.38
3.	I organize my life according to my own ideas.	0.695	0.55	3.25
4.	I cope with my daily life without outside help.	0.677	0.54	3.13
5.	Even when I have health related limitations, I don't allow myself to be deprived of the right to decide about myself.	0.782	0.64	3.43
6.	Despite aging, I have control over my thoughts and feelings and don't allow them to be controlled by others.	0.819	0.69	3.52

% of explained variance: 54.87

Confirmatory Factor Analysis of the PAA scale

The adequacy of the single factor scale model with six items was tested using data from T2. Poor quality of the model was obtained: $\chi2 = 22.160$; $df = 7$; $p < 0.01$; $\chi2/df = 3.16$; RMR = 0.02; GFI = 0.97; AGFI = 0.92; CFI = 0.97; RMSEA = 0.09. Due to the fact that factor loadings for the items met their desired values (> 0.7), except for Item 4 ($\beta = 0.53$), it was decided to modify the model by removing the weak item. The new model, with five items, fits very well: $\chi2 = 5.801$; $df = 3$; $p = 0.166$; $\chi2/df = 1.69$; RMR = 0.01; GFI = 0.99; AGFI = 0.96; CFI = 0.99; RMSEA = 0.05. Fractional loading values and percentages of the explained variance met the desired or acceptable values (Item 1: $\beta = 0.6$; $R2 = 0.4$; Item 2: $\beta = 0.8$; $R2 = 0.7$; Item 3: $\beta = 0.7$; $R2 = 0.5$; Item 5: $\beta = 0.7$; $R2 = 0.5$; Item 6: $\beta = 0.7$; $R2 = 0.5$).

Next, the time-invariance of the scale structure was studied. Both the five item and the six item solutions were explored. The analysis included data from the first and the second measurement. Latent variables (PAA at T1 and T2) and regression residuals of corresponding items were correlated. Test results are presented in Table 2. Unfortunately, both solutions failed to obtain time-invariance at the level of the metric model (step 2 of the procedure: significant $\Delta\chi2$ and $\Delta CFI \geq 0.01$), therefore,

no further comparisons were carried out (steps 3 to 4). Both solutions obtained approximate indicators of model quality. Due to the fact that the five item longitudinal model (compare Figure 2) obtained a slightly better fit, further scale analysis was carried out using this solution.

Table 2. **Confirmatory factor analysis: time-invariance of PAA**

	5 items					6 items				
	χ^2	df	$\Delta\chi^2$	CFI	ΔCFI	χ^2	df	$\Delta\chi^2$	CFI	ΔCFI
Model A	58.097***	27		0.97		90.482***	43		0.97	
Model B	93.417***	32	35.32***	0.95	0.02	126.788***	49	36.31***	0.95	0.02

Model A – unconstrained model; Model B – model with invariant factor loadings across time (metric model); ***$p < 0.001$
Model A (5 items): $\chi^2/df = 2.152$; RMR = 0.31; GFI = 0.96; AGFI = 0.96; RMSEA = 0.06.
Model A (6 items): χ^2/df=2.104; RMR = 0.37; GFI = 0.94; AGFI = 0.90; RMSEA = 0.06.
Model B (5 items): χ^2/df=2.919; RMR = 0.55; GFI = 0.94; AGFI = 0.89; RMSEA = 0.08.
Model B (6 items): $\chi^2/df = 2.588$; RMR = 0.56; GFI = 0.92; AGFI = 0.89; RMSEA = 0.07.

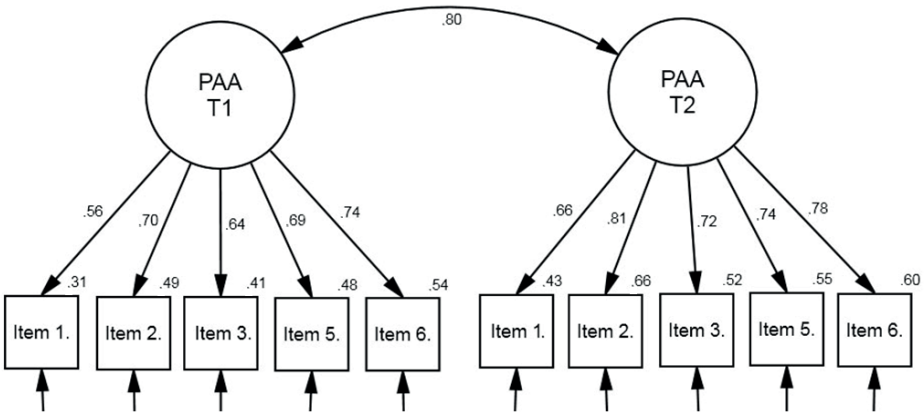

Figure 2. **Confirmatory factor analysis – metric model for 5 items. Testing of the time-invariance**

Reliability Analysis of the PAA scale

The Cronbach's alpha internal consistency coefficients of the scale were 0.82 and 0.83 respectively in the first and second measurement. The reliability indicator computed using test-retest was 0.80.

Construct and Discriminant Validity Analysis of the PAA scale

Weak cross-sectional and longitudinal correlations between perceived autonomy and self-reliance measured with the basic (ADL) and the more complex (IADL) for daily living activity were noted (Table 3). Higher self-reliance was accompanied by a higher perceived autonomy, controlling the age of the participants. Positive associations (weak or moderate) occurred in relation of perceived autonomy with indicators of health-related life quality (somatic and psychological domain) and positive emotions. Higher levels of perceived autonomy were accompanied by higher assessments of life quality and positivity. Negative relations were noted for negative emotions when measured at T1.

Table 3. **Descriptive statistics, reliability and correlations (N = 277).**

	T1						T2					
Variable	ADL	IADL	QoL-S	QoL-P	PA	NA	ADL	IADL	QoL-S	QoL-P	PA	NA
PAA_T1	0.22**	0.30***	0.26***	0.33***	0.23***	-0.24***	0.19**	0.24***	0.22**	0.34***	0.28***	-0.09
PAA_T2	0.10	0.25***	0.23***	0.33***	0.27***	-0.18**	0.14*	0.25***	0.25***	0.40***	0.34***	-0.10
M	5.65	20.89	22.93	21.10	12.74	7.56	5.60	20.69	22.16	20.18	11.42	6.89
SD	0.89	3.88	5.23	4.35	4.81	4.48	0.89	4.02	5.25	4.24	4.69	3.82
α	0.78	0.84	0.74	0.70	0.84	0.70	0.78	0.85	0.78	0.73	0.80	0.64

PAA – Perceived Autonomy in Old Age; ADL – Activity of Daily Living; IADL – Instrumental Activity of Daily Living; QoL-S and QoL-P –somatic and psychological domain of health-related quality of life, respectively; PA and NA – level of positive and negative emotions, respectively; T1, T2 – time 1 and 2, respectively; α – Cronbach's alpha internal reliability coefficient; M – mean, SD – standard deviation.

The dynamic of variables through time was also tested (controlling the age of participants). No significant changes over time were noted in terms of any of the analysed variables: perceived autonomy ($M1$ = 16.82; $SD1$ = 3.43; $M2$ = 16.70; $SD2$ = 2.91; $F[1;273] = 0.59$; $p = 0.442$), health-related quality of life (somatic: $F[1;273] = 0.23$; $p = 0.630$; psychological domain: $F[1;273] = 0.34$; $p = 0.560$), emotions (positive: $F[1;273] = 0.39$; $p = 0.844$; negative: $F[1;273] = 0.21$; $p = 0.643$), as well as ADL ($F[1;273] = 0.02$; $p = 0.963$) and IADL ($F[1;273] = 0.44$; $p = 0.833$) indicators.

Discussion and Conclusions

The study on the Polish adaptation of the Perceived Autonomy in Old Age scale was started from determining its structure. The results of the exploratory factor analysis confirmed its one dimensional character. This result is in accordance with the intentions of the tool's creator and its original version [16]. However, the six item scale structure did not pass confirmation analysis. The best and perfect fits were obtained for five items: 1, 2, 3, 5 and 6. The removed Item 4 (I cope with my daily life without outside help) correlated weakly with the entire scale and was characterized by the lowest loading value at T1. According to guidelines the next step in the analysis was

to test the measurement invariance of the obtained scale structure. Unfortunately, it was not confirmed. Yet, the level of invariant factor loadings across time (metric model) failed to meet the acceptable parameters and was significantly less fitted than the unconstrained model. This means that the stability of the PAA structure was not confirmed even at a weak level. The comparison of factor loadings at T1 and T2 indicates that this was due to generally higher factor loadings at T2, especially for items 1, 2 and 3. It turns out that a lack of stability over time is a problem for many if not the majority of tools. The results of a review of over 75 studies showed that measurement invariance is a rare phenomenon: many scales fail to meet it and if they do it is at a weak level [29]. This shows that the respondents understand the tools' statements differently over time. In the case of PAA the significance of the first three items turned out to be especially dynamic.

The psychometric properties of the five item PAA turned out to be very good. The reliability of the scale measured both with Cronbach's alpha internal consistency and with test-retest was ≥ 0.80. The construct and discriminant validity of the scale was also confirmed. The relationship between perceived autonomy with well-being and self-reliance indicators met expectations and was comparable with the original tool [17]. Weak and moderate correlation indicators confirmed the validity but not the redundancy of the new tool. The perceived autonomy scale does not test precisely the same thing as the ADL scale, the IADL scale and the Emotional State Questionnaire, or the WHOQoL-Brief. Perceived autonomy is an independent construct connected to the measures of well-being and quality of life in seniors.

Summing up, the Polish adaptation of the Perceived Autonomy in Old Age (PAA) scale[3] for seniors can be considered a very good tool for the assessment of perceived autonomy: a predictor and/or indicator of well-being and successful aging in seniors. Due to the lack of confirmation of time-invariance of the scale structure and probable changes of meaning for some participants for certain test items over time, as well as comparable parameters of longitudinal models, it is recommended to use both the five and the six item scales.

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[3] The tool together with the instruction and response scale are available from the author.

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