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Polish version of Lars Tornstam's Gerotranscendence Scale Type 2 (GST2-PL)

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Summary

Aim. This study presents the Polish version of the Gerotranscendence Scale Type 2 (GST2 – PL) and describes the scale's psychometric properties (reliability and validity). The scale is mainly intended for research of older people.

Method. A total of 685 (female = 464, male = 221) older adults (60–85 years) participated in the study. The following psychological methods were used: Gerotranscendence Scale Type 2 authored by L. Tornstam, Psychological Well-Being scale by C. Ryff, and the Self-Assessed Wisdom Scale by J.D. Webster.

Results. An exploratory factor analysis of the Polish version of the GST2 revealed the same three-factor structure of gerotranscendence (containing the dimensions of the Cosmic, the Coherence, and the Solitude) as had been reported by Tornstam. The GST2-PL consists of 10 items, including 8 diagnostic ones. The factor structure of the GST2-PL was confirmed using confirmatory factor analysis.

Conclusions. These findings provide support for use of the GST2 in assessing the signs of gerotranscendence not only for older adults in Sweden, Japan, USA, and Taiwan but also for older adults in Poland.

Key words: older people, positive aging, gerotranscendence

Introduction

We are currently witnessing dynamic changes in the demographic structure of many countries around the world [1]. These changes include, but are not limited to, the aging process of the population. As a consequence, we are now experiencing an increase in the share of older people (60 years and more) in the global population [2]. Aging is a serious challenge for many European Union countries [3], including Poland [4]. This fact raises the need for concrete action not only in social and economic policy but also in psychology [5, 6]. The primary goal of these activities is not to "deal with" old age, but to help older people to effectively carry out their developmental tasks [7].

According to one of Lars Tornstam's [8, 9] theories of positive aging, which is currently enjoying growing interest in research, the main developmental task seniors face is to increase their maturity and to attain wisdom through the natural gerotranscendence free from cultural determinants. The developmental process implies a number of changes in the psychosocial functioning of the individual.[1] To assess the course of the gerotranscendence process and identify key gerotranscendent transformations, Tornstam [10-12] constructed two methods of measurement: Gerotranscendence Scale Type 1 (GST1) and Gerotranscendence Scale Type 2 (GST2). The latter of these methods has two versions: a longer one with 25 items and a shorter one that is composed of 10 items. It is mainly the GST2 that has gained the recognition of gerontologists, sociologists and psychologists from outside Scandinavian countries. As a result, several adaptations of this tool have been made: American [13, 14], Mandarin [15, 16] and Japanese [17, 18].

So far this scale has not been translated into Polish. This fact has become the main reason for the work on the Polish adaptation of GST2, which would fulfill the psychometric requirements for psychological tests [19], and thus could be successfully used in studies of Polish seniors. Another motive behind the research project on translation and adaptation of the GST2 scale to Polish conditions was the desire to undertake international and intercultural research in the future. They would allow to verify one of the fundamental assumptions of Tornstam [8], criticized by some researchers [20-22] – according to which gerotranscendence is a process of multifaceted change largely independent of cultural determinants.

Understanding gerotranscendence

The key to understanding Tornstam's theory of positive development in old age seems to be the question of what gerotranscendence is? Tornstam defines gerotranscendence as "(...) a change of meta-perspective from material and rational perception to a more cosmic and transcendent perception, usually resulting in increased life satisfaction" [23, p. 60]. Thus, the essence of the gerotranscendence process is a gradual, albeit radical, change in the perception of oneself and the world by the individual. It is mainly expressed by shifting the focus from concern for mundane matters to concern for universal values [8]. This shift results in a number of transformations that can be observed at three levels: cosmic, personality and social [9].

The most important changes at the cosmic level include: an increase in the sense of being part of the universe and oneness with it; deeper understanding of reality; redefining time; reduction of fear of unknown future and death. The second level of changes manifested in the process of gerotranscendence generally concerns the perception of the self. Observable manifestations of these changes include: readiness

[1] It is worth noting that the literature of Tornstam's thesis on gerotranscendence as a natural process independent of cultural conditions is widely discussed and raises some controversy.

to confront oneself (the story of one's own life); decrease in egocentrism; transcendence (acceptance) of one's own body; increased integration of Ego. The third level of changes experienced in gerotranscendence is associated with an increase in the sense of interconnectedness with others. As a result, a person: revaluates existing family or friendly ties; resigns from unnecessary (in her opinion) social interactions; feels a stronger sense of belonging to the human community and ties with past and future generations; is more open and sensitive to other people, and at the same time more selective in manifesting such openness [24, 25].

To sum up, it can be concluded that, according to Tornstam's concept, an elderly person who is in the process of gerotranscendence is somewhat suspended between effective functioning in life and impending death. Conscious orientation of the individual towards the confrontation with death means that he no longer needs or has the time to pretend or impress with anything surrounding him. Hence, according to Tornstam, a gerotranscendent person is able to focus on fundamental questions about his life. More specifically, questions about its place in the universe, self-perception and relations with the society [9].

Gerotranscendence and other psychological variables

Treating gerotranscendence as a developmental process proper for late adulthood, which manifests itself in the disclosure of a number of changes in the area of psychosocial functioning of the individual helps to distinguish gerotranscendence from related psychological variables, among others, such as: wisdom, resilience and life satisfaction.

Psychological research on wisdom initiated in the '80s of the last century resulted, among others, in a multitude of definitions of this term. There is no consensus among researchers about understanding wisdom. However, they remain in agreement that wisdom is a complex construct within which three basic components can be distinguished: cognitive, socio-emotional and motivational [26]. According to Tornstam, wisdom is the effect – the culmination – of a normatively occurring process of gerotranscendence. Hence, while everyone, although to a varying degree, is subject to gerotranscendence, only those in whom this process proceeded smoothly and without inhibition achieve wisdom [9]. Creating theoretical assumptions for his concept, Tornstam made a significant reference to the personality development model of E. Erikson, according to which achieving wisdom is the highest level of development and gives the strength to face the fear of death in old age. Tornstam, unlike Erikson, claims that the way to deal with one's finitude is not wisdom in itself, but gerotranscendence, whose "component" is, among others, wisdom [8]. In addition, it is difficult to determine the direction of the cause-effect relationship in terms of wisdom and attitude towards death. Considering the fact that many factors can influence the formation of wisdom and gerotranscendence, the current state of empirical research does not make it clear whether wisdom prepares the individual to face death or whether wisdom is the result of death awareness. This question best shows the differences in Erikson's reasoning

and his development process towards integrity and Tornstam and his natural process towards gerotranscendence [27].

The concept of resilience, or mental resilience, appeared in psychology only 30 years ago. It is therefore a relatively young construct that has only been engaging the attention of a larger group of researchers and theorists for several years. The existing arrangements for understanding resilience allow us to conclude that it can be treated as: (1) the property of a person, manifesting itself in personal competences and acceptance of self and life; (2) bravery in coping with stress, strength of character and flexibility in adapting to new conditions; (3) mental property, which is not a permanent, innate quality developed in childhood, but a certain property of the individual that can change depending on different experiences throughout life; (4) the process of relatively positive adaptation despite various adversities [28]. It is also emphasized today that observation of a person's psychological resilience becomes possible when they are exposed to traumatic experiences. In addition, resilience is considered to refer to the dynamic process of positive adaptation in the face of emerging adversity. This process involves the interaction of protective factors and risk factors [29].

Gerotranscendence in the understanding of Tornstam, as well as mental resilience, manifests itself in personal competences and affirmations of oneself and one's own life [9]. The main difference concerns the developmental stage at which we can observe the signs of resilience and gerotranscendence. In the case of the first variable, its identification is possible already during childhood, adolescence and early adulthood [30]. In the case of gerotranscendence, the beginnings of this development process are dated to the end of early adulthood, while its peak of growth is in the period of late adulthood [8]. In addition, personal resilience is revealed when traumatic events occur. Meanwhile, in the opinion of Tornstam, gerotranscendence is a natural development process that does not require highly stressful life experiences to activate. The disclosure and accumulation of traumatic events can even inhibit the process of gerotranscendent changes [8, 9]. Finally, resilience mainly concerns the process of positive adaptation to emerging difficulties, while gerotranscendence, next to the adaptive element, includes a broad aspect of proactive development.

The issue of life satisfaction has rich studies in psychological literature [31]. The numerous studies carried out so far clearly argue that factors such as physical health, material situation and interpersonal relationships contribute to the assessment of the quality of one's own life. According to Ardelt [32, 33], this assessment largely depends on the uniqueness of the personal stories of the elderly. The author claims that the accumulation of experiences of a whole life is much more important for achieving satisfaction with the lives of seniors than any other factor. As part of the gerotranscendence process, life experience is thoroughly revised, which translates into an increase in life satisfaction. According to Tornstam, the occurrence and increase of gerotranscendence requires both a change in the perspective of the individual in relation to what is

important in his life, and a redefinition of what life satisfaction really is. In this sense, gerotranscendence is not a synonym of a happy life, but a factor enabling the increase in the quality of life in the senior period [32, 33].

Method

The process of translating GST2 from English into Polish

The work on the adaptation of the GST2 scale to Polish conditions began in 2015, after obtaining the consent of the author. The translation and adaptation of the Polish version of GST2 was based on the rules of translation of psychological tests [34]. The first step in this process was the translation by three professional translators (including one psychologist) of English theorems of the scale into Polish. Then, after thoroughly analyzing the provided versions of the translated scale, one initial Polish version of the tool was agreed upon. It was handed over to a fourth translator (an Englishwoman of Polish descent who is highly proficient in both languages) to re-translate into English. Both versions, Polish and English, were compared and linguistic corrections were made. Finally, with the assistance of an English philologist who is also a psychologist, the final Polish version of the scale was prepared, ensuring psychological correspondence of the English and Polish terms.

Pilot studies

Before the implementation of the actual research program concerning the Polish adaptation of GST2, a pilot study was conducted. The purpose of this study was to verify the correctness of the research procedure. The investigation included 30 participants (15 women and 15 men) aged 60 to 85 years, being in a marital relationship. The research was individual. While carrying out the pilot study, special attention was paid to the following issues: (1) observation of respondents' reactions and behavior (emotional states of the respondent) while completing the questionnaires included in the prepared set of methods; (2) noting all comments and feedback from the respondents on the content of the questions prepared and the whole situation of the survey; (3) checking how the research tool works (Is the instruction to the set of methods and individual questionnaires comprehensible to the respondent? Has the respondent understood the questionnaire? Has he understood the alternatives in the scale?) [35].

As a result of the conducted study: (1) no significant difficulties were found in the understanding of the instruction to the questionnaire nor the statements contained in the scales; (2) it was decided to create two versions of the test sets separately for women and men (the unified version was dropped because, in the opinion of the respondents, it made it more difficult to answer the questions); (3) at the request of the respondents (after the GST2 author's consent), the scale GST2 was modified – the four-point scale

was shifted to the six-point scale (1 – I strongly disagree; 2 – I do not agree; 3 – I rather disagree; 4 – I rather agree; 5 – I agree; 6 – I strongly agree).

Present study

Proper research on the adaptation of the GST2 scale was carried out in 2016-2017 in various Polish cities, including Gdansk, Katowice, Lublin, Lodz, Opole, Poznan, Radom, Rzeszow, Sieradz, Wroclaw and several other smaller towns. Participation in the research was anonymous and voluntary. A set of tools was prepared for the study, which included: (1) a general instruction explaining the purpose of the study and the manner in which questionnaires were to be completed; (2) Personal Questionnaire; (3) the psychological measurement tools, including the Polish version of GST2 – as planned in the research. Each studied person received an envelope bearing the number of the whole set of tools. The respondents were also informed about how to return the filled test sheets. The applied research procedure received a positive opinion from the Commission on Ethics of Scientific Research of the Institute of Psychology of the John Paul II Catholic University of Lublin.

Participants

The study involved 1049 elderly persons (60+) who agreed to participate in the project. Out of these, 716 respondents returned in full or in part filled in questionnaires. After a thorough review, 31 questionnaires were excluded, in which the examined persons did not specify gender or age, or data deficiencies were identified in more than 1/3 of the item pool of the questionnaire in at least one of the scales included in the study. As a result, 685 people (464 women and 221 men) aged 60 to 85 years (M = 67.87; SD = 6.31). were included in the study. The mean age in the group of women was M = 67.41 (SD = 6.13) and in the men group was M = 68.83 (SD = 6.58). All subjects: (1) were married and had at least one adult child; (2) lived independently – with the spouse but without adult children and their families; (3) lived in their own dwellings and were self-reliant.

The socio-demographic characteristics of the examined sample are presented in Table 1. Among the respondents the most numerous were inhabitants of villages (38.7%) and of large cities (27.3%). The number of people living in small towns and medium-sized cities reached 34.3% of the sample size. The respondents differed in their level of education: secondary (36.1%) and higher (27.3%) respectively, while the smallest group was formed by persons with primary (13.3%) and vocational (23.3%) education. In terms of the current or past workplace, the majority of the respondents had a worker or production position (36.2%) and an administrative or office employment (21.3%). The lowest number of persons were employed in a teaching position (12.6%) or in the managerial staff (12.8%). The vast majority of respondents (73.4%) remain retired, while over a quarter of them are still working professionally. More

than 55% of the study participants rated their health as good or very good. By far fewer (16.7%) respondents perceive their health as bad or very bad. More than 27% of respondents could not clearly assess their health status. It is worth noting that the selection of respondents for the sample was not random. It ran according to the snowball method. Therefore, extreme caution should be exercised in treating the analyzed sample as representative for Polish seniors.

Table 1. **Sample characteristics**

Socio-demographics		*N* (Proportion)
Sex		
	Women	464 (67.7%)
	Men	221 (32.3%)
Place of residence		
	Village	265 (38.7%)
	Small town (up to 50 thousand)	139 (20.3%)
	Medium city (50 to 100 thousand)	96 (14.0%)
	Large city (over 100 thousand)	185 (27.0%)
Education		
	Primary	91 (13.3%)
	Primary vocational	160 (23.4%)
	Secondary	247 (36.1%)
	Higher	187 (27.3%)
Are you retired?		
	Yes	169 (24.7%)
	No	516 (75.3%)
Are you still working professionally?		
	Yes	182 (26.6%)
	No	503 (73.4%)
Occupied position		
	Workers / Production	248 (36.2%)
	Clerical / Administrative	146 (21.3%)
	Teaching	86 (12.6%)
	Managerial / Directorial	88 (12.8%)
	Other	117 (17.1%)
Subjective health assessment		
	Very bad	12 (1.8%)

table continued on the next page

	Bad	102 (14.9%)
	Hard to say	189 (27.6%)
	Good	349 (50.9%)
	Very good	33 (4.8%)

Measures

Gerotranscendence

The Polish version of the Gerotranscendence Scale Type 2 – GST2 by L. Tornstam [8, 11, 12] was used to characterize gerotranscendent changes in the studied group. This tool is composed of 10 statements that make up three main dimensions: the Cosmic Dimension (5 items); the Coherence Dimension (2 items); and the Solitude Dimension (3 items). The Cosmic dimension allows to describe the manifestations of gerotranscendence expressed primarily in the redefinition of time and space, in increasing the sense of connectivity with past and future generations, opening up to the spiritual dimension of life, and accepting death and transience. The Coherence dimension refers to how a person perceives himself and his attitude towards himself. In turn, the dimension of Solitude allows to describe how one experiences social relationships and the resulting social roles. The purpose of the participants is to respond to individual statements by choosing one of the six answers: (1) "I strongly disagree", (2) "I disagree", (3) "I rather disagree", (4) "I rather agree", (5) "I agree", (6) "I strongly agree".

Psychological well-being

The Psychological Well-Being (PWB) Scale, developed by C. Ryff, was used to assess the psychological well-being of the examined persons and to verify the theoretical validity of the Polish adaptation of GST2. This tool is based on the concept of eudemonism. It contains 42 items that constitute six subscales: (1) Autonomy (I am not afraid to express my opinions, even when they are contrary to the opinions of most people), (2) Environmental Mastery (I usually feel that I'm in control of the situation I'm in), (3) Personal Growth (I think I developed my capabilities very much as a person), (4) Positive Relationships with Others (Most people see me as a loving and affectionate person), (5) Purpose in Life (I have a direction and a purpose in life), and (6) Self-acceptance (In general, I feel confident and satisfied). Theorems are evaluated on a seven-level Likert scale. In the presented research, the Polish adaptation by D. Krok [36] was used. The coefficients of reliability of α-Cronbach for each scale were from 0.72 to 0.86. In the presented research they are in the range of 0.74 – 0.91. The accuracy of the tool was verified by correlation with the Satisfaction

with Life Scale (SWLS): the correlation coefficients for the scales ranged from 0.31 to 0.74, and with Beck Depression Inventory (BDI): correlation coefficients ranged from –0.35 to –0.64.

Wisdom

The Polish version of the Self-Assessed Wisdom Scale (SAWS) by J.D. Webster [37] was used to measure wisdom. The scale is made up of 40 items that create five subscales: (1) Experience (I have overcome many painful events in my life), (2) Emotional Regulation (I easily and quickly adjust my emotions to a given situation), (3) Reminiscence-Reflectiveness (I often think about the relationship between my past and the present), (4) Humor (When I'm struggling with some important life change, I try to find something funny in it), (5) Openness (I often look for something new to try – new challenges). The purpose of the participants is to address each of the statements by selecting one of the six responses from "Strongly disagree" (1), to "Strongly agree" (6). In the presented studies the α-Cronbach reliability coefficient for the whole SAWS-PL scale is $\alpha = 0.93$, and for individual subscales ranges from $\alpha = 0.66$ (Openness) to $\alpha = 0.85$ (Reminiscence-Reflectiveness).

Death Attitude Profile

The Death Attitude Profile – Revised (DAP-R) by P.T.P. Wong, G.T. Reker and G. Gesser in the Polish adaptation (DAP-R-PL) was used to verify GST2 theoretical validity [38]. This questionnaire is a multi-dimensional tool for measuring attitudes towards death. It consists of 32 items in five dimensions: (1) Fear of Death (The prospect of my death makes me uneasy); (2) Death Avoidance (I avoid the thought of death at all costs); (3) Neutral Acceptance (Death is a natural aspect of life); (4) Escape Acceptance (Death will end all my problems) and (5) Approach Acceptance (I believe that I will be in heaven after I die). The answers are given on a seven-point Likert scale, where 1 means "Strongly disagree" and 7 "Strongly agree". The DAP-R-PL questionnaire is characterized by good psychometric qualities. The α-Cronbach coefficients for individual dimensions are in the range of $\alpha = 0.63$ (Neutral Acceptance of Death) to $\alpha = 0.89$ (Approach Acceptance of Death). In the presented studies, however, they have a value in the range of 0.64 – 0.88. Boundary values apply to the same dimensions of attitude towards death.

Demographic variables

In order to obtain the demographic characteristics of the examined persons, a specially developed for the presented research needs Personal Questionnaire was used. It contains eight questions about demographic variables such as age, sex, place of residence, education, occupation, and health status. In the age question, the task

was to enter the number of years. In the case of the sex question, the participants were asked to mark one of the two options – "Man", "Woman". In the question regarding the place of residence, the respondents were asked to choose one of four categories: "Village", "Small town (up to 50 thousand inhabitants)", "Medium city (50 thousand to 100 thousand inhabitants)", "Large city (over 100 thousand persons)". In the question related to education, respondents were asked to choose one of the following answers: "Basic", "Basic vocational", "Secondary" and "Higher". With regard to questions about the fact of taking up a job, retired people were asked to choose one of two categories – "Yes" or "No". In the question of current or past work positions, the participants were asked to indicate one of five options: "Workers/Production employee", "Officials/Administrators", "Teachers", "Managers /Directors", "Other". Thequestionnaire included questions about the subjective assessment of the health of the examined person. In this case the respondents were asked to indicate one of the five answers: "Very bad", "Bad", "Hard to say", "Good", "Very good".

Data Analysis

In order to determine the psychometric parameters of the Polish version of GST2, statistical calculations were carried out in two stages. In the first stage of analysis, exploratory factor analysis (EFA) was used to determine the factorial structure of the adapted scale. At the second stage of statistical activity, confirmatory factor analysis (CFA) was used for empirical verification of the factorial structure. However, in order to meet the requirements of cross-validation, a random division of the examined sample ($N = 685$) into two subgroups was made. In one group ($n = 204$), EFA was performed (the ratio of items to subjects in the group was 1:20), and in the other ($n = 481$) CFA was performed. The gender, age and place of residence were similar in the analyzed groups.

In order to estimate the reliability indicators of the extracted dimensions of gerotranscendence (subscales), the Cronbach's α index was estimated. To verify the theoretical validity of the tool, the Pearson *r* correlation coefficient was used. The GST2-PL was correlated with other tests used in the study. Calculations were made using IBM SPSS version 22.0 and AMOS version 22.0.

Results

Exploratory factor analysis (EFA) and reliability of the GST2-PL

In the first stage of the statistical analysis, EFA was performed using the principal components method with the rotation *Oblimin* (delta = 0) and Kaiser normalization. The matrix for the analyzed data assumed a value of 0.141; KMO test = 0.687 with a significant Bartlett sphericity test ($\chi^2 = 389.15$; df = 45; $p < 0.001$). Based on the own value criterion (greater than or equal to 1) and the scree plot, the three-factor

structure of the GST2 scale was confirmed. Subsequently, the EFA was again carried out by forcing the three-factor solution. As a criterion for inclusion of a given position to a given factor, a load greater than the absolute value of 0.40 with a low degree of saturation of the other factor was assumed. The statistical analyses carried out allowed to distinguish three factors that accurately reflect the structure of the English version of the tool [8, 11, 12]. The three components account for a total of 56.98% of variance. Each factor explains respectively 27.33% (Cosmic Dimension), 16.58% (Coherence Dimension), and 13.07% (Solitude Dimension) of variance. The factorial loads for each dimension vary from 0.47 to 0.84. The results of the factor analysis of the Polish version of the GST2 scale are presented in Table 2.

Table 2. **Results of the exploratory factor analysis of the GST2-PL**

Items/Factor loadings	F1	F2	F3	*M (SD)*
Factor 1: The Cosmic Dimension (F1)				
8. *I feel connected with the entire universe*	**0.75**	–0.02	0.00	3.36 (1.48)
5. *I can feel a strong presence of people who are elsewhere*	**0.71**	0.05	–0.14	3.31 (1.48)
6. *I feel that I am a part of everything alive*	**0.68**	–0.14	0.07	4.17 (1.36)
4. *I feel a strong connection with earlier generations*	**0.65**	–0.40	0.11	4.42 (1.32)
3. *Sometimes I feel like I live in the past and present simultaneously*	**0.47**	0.35	–0.07	2.89 (1.38)
Factor 2: The Coherence Dimension (F2)				
2. *The life I have lived has coherence and meaning*	0.34	**0.77**	–0.08	4.45 (1.15)
10. *My life feels chaotic and disrupted**	0.15	**–0.78**	0.13	2.67 (1.35)
Factor 3: The Solitude Dimension (F3)				
7. *I like to be by myself better than being with others*	0.02	0.15	**0.84**	2.97 (1.48)
9. *I like meetings with new people**	0.44	–0.22	**–0.66**	4.34 (1.28)
1. *Being at peace and philosophizing by myself is important for my well-being*	0.38	–0.31	**0.48**	4.20 (1.23)

* – the reverse-coded item

Descriptive statistics and reliability indices for individual subscales of the initial version of GST2-PL were then calculated. The results are presented in Table 3.

Table 3. **Descriptive statistics and psychometric properties of the initial version of GST2-PL**

Variables		Descriptive statistics						
		k	*M*	*SD*	*SKE*	*K*	*Z*	*α*
GST2–PL	Cosmic Dimension (C)	5	3.63	0.94	–0.55	–0.03	0.10***	0.69
	Coherence Dimension (E)	2	4.39	1.05	–0.64	0.23	0.15***	0.58
	Solitude Dimension (S)	3	3.27	0.91	0.31	0.36	0.12***	0.42

Designations: *k* – number of items included in the subscale; *M* – average score within the subscale; *SD* – standard deviation; *SKE* – skewness coefficient; *K* – kurtosis coefficient; *Z* – value of Kolmogorow-Smirnow test; *** $p < 0.001$; α – Cronbach's alpha. Correlations between scales: C↔E: r = 0.06; p < 0.01; C↔S: r = – 0.12; p < 0.001; E↔S: r = – 0.20; p < 0.001

The analyses showed that only one (Cosmic Dimension) of the three subscales of the Polish version of GST2 obtained a satisfactory level of reliability index (α = 0.69). At the limit of acceptability, the Coherence Dimension reliability coefficient was located, with the value of α = 0.58. The subscale which obtained the lowest reliability index was the Solitude Dimension (α = 0.42). In the case of the first two subscales, the results obtained are similar to those obtained by Tornstam [8] in the original study. However, the value of the reliability index of the third subscale was much lower than that in the original study.

In the attempt to – on the one hand improve the psychometric properties of the tool, and on the other hand, as far as possible, to maintain the general theoretical model of gerotranscendence proposed by Tornstam [8], it was decided: (1) not to interfere in the structure of the second factor (Coherence Dimension) of the Polish version of GST2; (2) to analyze the correlation values of the individual items included in the Cosmic Dimension and Solitude Dimension and the contribution of each item to the reliability of these subscales. The results of the calculations are presented in Table 4.

Table 4. **Descriptive statistics and psychometric properties of the final version of GST2-PL**

Variables		Descriptive statistics						
		k	*M*	*SD*	*SKE*	*K*	*Z*	*α*
GST2–PL	Cosmic Dimension (C)	4	3.82	1.04	–0.42	–0.06	0.09***	0.72
	Coherence Dimension (E)	2	4.39	1.05	–0.64	0.23	0.15***	0.58
	Solitude Dimension (S)	2	2.81	1.17	0.49	–0.21	0.12***	0.60

Designations: same as above. Correlations between scales: C↔E: r = 0.10; p < 0.01; C↔S: r = – 0.14; p < 0.001; E↔S: r = – 0.25; p < 0.001

The actions undertaken have revealed that items 3 (Sometimes I feel like I live in the past and present simultaneously) and 1 (Being at peace and philosophizing by myself is important for my well-being) poorly correlated with the others and that after removing them, the reliability index will increase in the case of the Cosmic Dimension from α = 0.69 to α = 0.72, and in relation to the Solitude Dimension from α = 0.42 to

$\alpha = 0.60$. Ultimately, it was decided to leave these positions within the GST2-PL pool of items (taking into account the prospect of international research) while excluding them from further analysis. Following the above-described procedures in the final version of the GST2-PL scale, there remained 10 items, including eight diagnostic ones, which composed the three dimensions of gerotranscendence (coincident with the proposition of the author of the tool).

Confirmatory factor analysis (CFA) of the GST2-PL

In order to verify the accuracy of the EFA-derived structure of GST2-PL on data from a previously randomized second group ($n = 481$), CFA was performed. Estimation of model fit is based on indicators that are recommended in methodological literature based on structural equations [39, 40].

The distribution of individual items included in GST2-PL tested using the Kolmogorow-Smirnow test showed significant deviations from the normal distribution of all eight items ($Z \leq 0.238$; $p < 0.001$). The disclosed deviations can be considered as insignificant, since the value of the slope and the kurtosis for these statements is in the range from – 1 to +1. As a result, however, it was decided to carry out the CFA bootstrap procedure. Parameters were estimated by weighted least squares with corrected mean and variance (WLSMV).

Table 5. **Results of confirmatory factor analysis conducted on GST2-PL (n = 481). Summaries for models**

Models	χ^2	*df*	*p*	CMIN/df	RMSEA	RMSEA LO	RMSEA HI	SRMR	PCLOSE	CFI	TLI
Model 1	154.47	33	0.001	4.68	0.088	0.074	0.102	0.079	0.000	0.67	0.55
Model 2	48.22	17	0.001	2.84	0.062	0.042	0.083	0.055	0.156	0.87	0.78
Model 3	40.68	14	0.001	2.91	0.063	0.041	0.086	0.053	0.154	0.89	0.78
Model 4	26.02	13	0.017	2.00	0.046	0.019	0.071	0.041	0.573	0.95	0.88

CFA was conducted for four (hierarchical) models. The first model (Table 5) is a consistent representation of the GST2 factorial structure as proposed by the author [8]. Fit indicators of this model have reached values suggesting an unacceptable fit to data [39, 40]. The second model reflects the factorial structure of the questionnaire obtained in the research referring to the Polish elderly population (three factors consisting of eight items). Model 2 (Table 5) fit indicators were at a level that indicated its acceptable but only sufficient fit. The third model is a bifactor (or direct hierarchical) model. Bifactor models assume that each item measures two orthogonal factors: a general factor and a specific factor. The fit indicators in this case (Table 5) were at a slightly higher level compared to Model 2, but still indicating its sufficient fit. In addition, comparative analyses in terms of parameters describing both models revealed that they are equally fit to the data (CMIN3 – CMIN2 = 7.54; df = 3; $p = 0.057$).

Therefore, an attempt was made to improve the fit parameters by taking into account the correlation between the measurement errors related to the specific pairs of test items. Correlation of measurement errors for specific pairs of test items may arise either from the immediate vicinity of questionnaire questions or from the fact that the respondents (for some reason) view these claims as similar, which in turn suggests the existence of hidden factors not included in the model [41]. Bearing this in mind, one modification was made to the model based on modification indices, which were able to be generated with the use of the AMOS 22.0 statistical program. As shown in Table 5, the model fit significantly improves upon subsequent error correlations.

In Model 4, the correlation of errors from the measurement of items 10 (My life feels chaotic and disrupted) and 7 (I like to be by myself better than being with others) were taken into account. The modifications revealed that the matching measures have reached values suggesting a very good fit of the model (Table 5).

The justification for introducing this covariance to the model can be the fact that cultural determinants can inhibit the normative course of the process of gerotranscendence. Perhaps the respondents answering to the above-mentioned questions, on the one hand reported experiencing gerotranscendent changes, and on the other hand expressed that these changes – due to a number of social influences – bring about anxiety or sense of chaos. It is worth mentioning Tornstam's position [8, pp. 43-44], who claims that:

> *"Everyone in Western culture 'knows' that it is activity, productivity, efficiency, individuality, independency, wealth, health, sociability, and a 'realistic' view of the world that counts. […] As a result, we may impede the process towards gerotranscendence by making the individual feel guilty about his/her developmental change away from parts of this. […] Supported by interactionist gerontologists, staff members and relatives of old people may obstruct a natural process towards gerotranscendence."*

Construct validity of the GST2-PL

To investigate the theoretical validity of the Polish version of GST2, Pearson's correlation coefficient *r* (Table 6) was used. The analysis revealed positive correlations between global indicators of GST2-PL and the Cosmic Dimension ($r = 0.85$; $p < 0.001$), Coherence Dimension ($r = 0.39$; $p < 0.001$) and Solitude Dimension ($r = 0.19$; $p < 0.001$). In addition, it is interesting to note that the correlation between the Cosmic Dimension and Coherence Dimension ($r = 0.09$; $p < 0.05$) is positive, whereas for the Cosmic Dimension and Solitude Dimension the correlation coefficient had a negative value ($r = –0.16$; $p < 0.001$). The obtained pattern of results is consistent with the results obtained by other researchers [8, 17, 18]. The analysis of the relationship between the Polish version of GST2 and the other scales used in the present project has demonstrated, inter alia, that the global gerotranscendence index,

as expected, positively correlates with: (1) the overall PWB (r = 0.20; $p < 0.001$) and SAWS (r = 0.38; $p < 0.001$); (2) Neutral (r = 0.12; $p < 0.001$), Approach (r = 0.21; $p < 0.001$) and Escape Acceptance of Death (r = 0.14; $p < 0.001$). These findings indicated that the construct validity of the GST2-PL was also established.

In addition to the analyses described above, correlation coefficients for the overall score and individual GST2-PL subscales as well as demographic variables such as age, gender, place of residence, education and health were also calculated. Age positively correlated with both the global gerotranscendence index (r = 0.12; $p \leq 0.001$) and the Cosmic Dimension (r = 0.08; $p \leq 0.05$) and Solitude Dimension (r = 0.11; $p \leq 0.01$). In the case of the Coherence Dimension, the relationship turned out to be statistically insignificant (r = – 0.01; $p = 0.413$). Gender did not correlate with gerotranscendence at the general level ($\eta = 0.01$; $p = 0.990$) or at the factor level. Place of residence, education and health only correlated with the Coherence Dimension. Spearman's rho correlation coefficients were 0.09, 0.18 and 0.15, respectively, at significance level $p \leq 0.05$.

Table 6. **Correlations between the GST2-PL, the PWB, the SAWS and the DAP-R**

Variables		GST2			
		Cosmic Dimension	Coherence Dimension	Solitude Dimension	Global result
GST2	Cosmic Dimension	—			
	Coherence Dimension	0.07*	—		
	Solitude Dimension	–0.16**	–0.22**	—	
	Global result	0.85**	0.39**	0.19**	—
PWB	Autonomy	0.08*	0.20**	–0.15**	0.09**
	Environmental Mastery	0.08*	0.40**	–0.21**	0.15**
	Personal Growth	0.16**	0.26**	–0.27**	0.14**
	Positive Relationships	0.20**	0.38**	–0.38**	0.17**
	Purpose in Life	0.10**	0.26**	–0.16**	0.12**
	Self–acceptance	0.13**	0.37**	–0.19**	0.19**
	Global result	0.17**	0.43**	–0.31**	0.20**
SAWS	Experience	0.34**	0.07*	–0.18**	0.26**
	Emotional Regulation	0.39**	0.26**	–0.25**	0.35**
	Reminiscence-Reflectiveness	0.46**	0.10**	–0.14**	0.39**
	Humor	0.29**	0.24**	–0.26**	0.25**
	Openness	0.36**	0.14**	–0.20**	0.29**
	Global result	0.46**	0.20**	–0.26**	0.38**

table continued on the next page

DAP-R	Fear of Death	0.05$^{n.s.}$	–0.09**	–0.00$^{n.s.}$	0.01$^{n.s.}$
	Death Avoidance	0.04$^{n.s.}$	–0.07*	–0.04$^{n.s.}$	–0.01$^{n.s.}$
	Neutral Acceptance	0.10**	0.15**	–0.07*	0.12**
	Approach Acceptance	0.21**	0.17**	–0.12**	0.21**
	Escape Acceptance	0.14**	–0.06$^{n.s.}$	0.08*	0.14**

Discussion

The concept of gerotranscendence by L. Tornstam [8] – according to which gerotranscendence is a natural, cultural-free, developmental process, in the normal course leading to maturity and wisdom – is the basis of many contemporary studies on the adaptation to aging, carried out recently especially in Scandinavian countries [8, 9, 42-44]. It is worth noting, however, that Tornstam's theory [8] is gaining more and more recognition among European and non-European researchers [14-18, 45, 46]. As part of this study, the most commonly used Gerotranscendence Scale Type 2 (GST2) has been applied to characterize gerotranscendence [8, 10-12]. There is no such psychological measurement tool in Poland. This fact became an essential motive for translation and adaptation (to Polish conditions) of the scale established by the Swedish researcher.

In the presented research, the concept of gerotranscendence by Tornstam [8] and the tool based on it used to measure gerotranscendent changes were evaluated. Both EFA and CFA were used for this purpose. As a result of the analyses, the GST2-PL three-layer structure was disclosed. The results obtained are consistent with the results obtained by Tornstam [8, 9] and other authors who have translated and adapted GST2 in their countries of origin [14-18]. This is indicated by the analysis of intercorrelation between the three gerotranscendence factors (see Table 6) and their relation to the general result. The correlations obtained (between the three factors and the global index of gerotranscendence) have been sufficiently high to recognize that the isolated factors are dimensions of the same construct – gerotranscendence. At the same time, the configuration of the correlation values within the revealed gerotranscendence dimensions indicates the interdependence between them. It is worth adding that the role of the social dimension in the process of shaping gerotranscendence should be made the subject of future analyses. This dimension is the least correlated with the general gerotranscendence index. Perhaps the obtained result is a manifestation of the specificity of the Polish senior population. The carried out analyses also confirmed the good psychometric properties of the Polish adaptation of GST2. Both α-Cronbach (as reliability indicators) and model fit scores in CFA (as indicators of factor validity) proved to be sufficiently high for the tool to be successfully used in research. It should be noted, however, that in order to obtain satisfactory reliability ratios, it was necessary to exclude from the diagnostic pool two items: 3. (Sometimes I feel like I live in the past and present simultaneously) and 1. (Being at peace and

philosophizing by myself is important for my well-being). The content analysis of the excluded items suggests that they may have been misunderstood – contrary to the intent of the author of the scale. In the assumptions of his concept, Tornstam [8] goes back to the philosophy of the East (the metaphor of the Zen Buddhist, the cosmic dimension of gerotranscendence), which to a high extent is beyond the Polish tradition, especially of the older generation of Poles. Poland is a country still in the circle of Judeo-Christian culture and still very much attached to the Catholic religion [47]. Hence, item 3 may sound alien to respondents, and item 1 may have raised cognitive dissonance in respondents, bringing as a result, as postulated by Tornstam [8], cultural inhibitory factors for gerotranscendence. On the one hand, respondents could feel the need for gerotranscendent loneliness, and on the other hand, they feared that such behavior would be astonishing or distressing to their immediate surroundings. As a result, the answers turned out to be unreliable. In this context, it is worth considering a research project that would translate (and adapt) GST2 from English into Polish using the terminology of Christian theology.

The presented studies have some limitations, elimination of which can be the subject of future research and analysis. Firstly, it would be worthwhile to make an empirical verification of the three-factor structure of gerotranscendence – as did Tornstam [11, 12] – in different age groups (adolescence, early adulthood, middle adolescence, late adulthood). Secondly, a research project devoted to the dynamics of the gerotranscendence process throughout life would be valuable. Longitudinal studies should be carried out with the use of a psychometrically validated tool, as which the Polish version of GST2 described in this publication can undoubtedly be considered. Thirdly, it is worth considering a research project that would translate (and adapt) GST2 from English into Polish using the terminology of Christian theology. Fourthly, intercultural research would be an interesting undertaking. The publications of such authors as Cozort [14], Wang [15], Ishihara and Osada [17] and Hoshino et al. [18], as well as the results of the research presented in this paper undoubtedly form the basis for such an initiative. Fifth, it would be worthwhile to give an empirical answer to the question whether gerotranscendence revealed during late adulthood has real psychological consequences for the functioning of the elderly in various areas of life.

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APPENDIX

The Polish form of the GST2

Skala GST-2 (L. Tornstam, 2005)
(w polskiej adaptacji P. Brudka)

Poniżej znajduje się szereg stwierdzeń, które dotyczą Pan/i przekonań na temat siebie i własnego życia. Proszę, aby Pan/i przeczytał/a uważnie każde z nich i ocenił/a w jakim stopniu zgadza się ono z Pana/i osobistymi doświadczeniami i uczuciami. W kwestionariuszu nie ma odpowiedzi dobrych ani złych, poprawnych oraz niewłaściwych, bo każdy odczuwa inaczej. Odpowiedzi udziela się poprzez **zakreślenie kółkiem wybranej cyfry** spośród znajdujących się obok twierdzenia. Poszczególne cyfry oznaczają:

1 – zdecydowanie się nie zgadzam
2 – nie zgadzam się
3 – raczej się nie zgadzam
4 – raczej się zgadzam
5 – zgadzam się
6 – zdecydowanie się zgadzam

Dla mojego dobrego samopoczucia ważny jest spokój oraz rozmyślanie nad samym sobą.	1 2 3 4 5 6
Moje życie odznacza się spójnością i sensownością.	1 2 3 4 5 6
Czasem czuję jakbym żyła/żył w przeszłości i teraźniejszości jednocześnie.	1 2 3 4 5 6
Czuję silny związek z wcześniejszymi pokoleniami.	1 2 3 4 5 6
Potrafię czuć silną obecność osób, które są gdzie indziej.	1 2 3 4 5 6
Czuję się częścią wszystkiego co żyje.	1 2 3 4 5 6
Wolę spędzać czas z samym sobą niż z innymi ludźmi.	1 2 3 4 5 6
Czuję związek ze wszechświatem.	1 2 3 4 5 6
Lubię spotykać się z nowymi ludźmi.	1 2 3 4 5 6
Moje życie wydaje się być chaotyczne i skomplikowane.	1 2 3 4 5 6