

Transferability of the Assessment of Positive Occupation 15 in elderly people with physical disabilities

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Purpose

The present study aimed to verify the reliability and validity of the Assessment of Positive Occupation 15 (APO-15) in elderly individuals with physical disabilities in health science.

Methods

The study sample comprised 761 elderly individuals with physical disabilities residing in community dwellings, hospitals, and group homes. They completed the APO-15 and Kessler Psychological Distress Scale (K6) evaluations. We analyzed the psychometric properties of the APO-15, polyserial correlation coefficient, and average extracted variance, which included a confirmatory factor analysis (CFA), entropy, Cronbach's α coefficient, Pearson's product-moment correlation coefficient, item response theory (IRT), cut-off point, and latent rank values.

Results

The study outcome supported the APO-15, a 15-item, 4-factor model incorporating positive relationships, achievement, meaning, and engagement. The validity of this model was supported by various results; for example, each item score of polyserial correlation coefficient and entropy of APO-15 was the reference value was confirmed as being higher. The structural validity of APO-15 was assessed by CFA, which indicated a good model fit. Hypothesis testing revealed good values for the convergent and discriminant validity of the APO-15, and Cronbach's α coefficient analysis revealed acceptable internal consistency. These results showed that the 4-factor structure of APO-15, which assumes has been established. Cut-off points for APO-15 of 51-point sensitivity (0.512) and specificity (0.704) yielded good results. The latent rank theory of APO-15 exhibited a good fit in all four rank values. The item reference profile suggested that an effective occupation promotes well-being.

Conclusion

The APO-15 exhibited good psychometric properties with respect to measuring positive occupations in individuals, including elderly individuals, with physical disabilities. This important tool will facilitate participation in occupations that promote daily well-being.

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3

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17

18 Introduction

19 Occupational therapy has been positioned for many years as a health science to
20 promote the well-being of the client (Law, Steinwender & Leclair, 1998). Therefore,
21 Occupational therapy for elderly individuals with physical disabilities has been shown to support
22 the participation of these individuals in occupations that promote well-being (Kjerstad &
23 Tuntland, 2015; Tanaka et al., 2015; Szanton et al., 2011). In recent years, the well-being of
24 elderly individuals has continued to receive increased importance and support worldwide (Lapid
25 et al., 2011; Ward, Barnes & Gahagan, 2012; Oerlemans, Bakker & Veenhoven, 2011; Diener,
26 2011). Previous studies have shown the promotion of well-being to effectively prevent disease
27 and extend lifespans (Diener, 2011; Diener, 1984; David, Boniwell & Conley, 2013; Vazquez et
28 al., 2009; Kim & Kang, 2015; Lis et al., 2008). However, the elderly comprises the most rapidly
29 growing population worldwide, and suicides are expected to increase in this population (Rahimi
30 et al., 2015). Knowledge of occupational therapy in health science might prevent suicide by
31 promoting the well-being of elderly people with disabilities (Zingmark et al., 2014; Nagayama et
32 al., 2016).

33 Occupational therapy is a client-centered health profession concerned with the
34 promotion of health and well-being through occupation (WFOT, 2013). The primary goal of
35 occupational therapy is to enable clients to participate in occupations that promote well-being
36 (WFOT, 2013). Occupation, which is considered central to the human experience, includes work,
37 play, routine tasks, and rest (Wilcock, 2006). At its core, occupational therapy represents a belief
38 regarding the engagement between occupation and well-being, defined as a perceived state of
39 harmony in all aspects of one's life (AOTA, 2014; Law, Steinwender & Leclair, 1998; Wilcock,
40 2006).

41 To promote well-being in people with physical disabilities, occupational therapy
42 must be able to assess occupational abilities. To this end, relevant tools such as the Canadian
43 Occupational Performance Measure (COPM), Occupational Self-Assessment (OSA),
44 Classification and Assessment of Occupational Dysfunction (CAOD), and Model of Human
45 Occupation Screening Tool (MOHOST) focus on the relationship between occupation and well-
46 being (CAOT, 1997; Carswell et al., 2004; Kobayashi et al., 2010; Teraoka & Kyougoku, 2015;
47 Parkinson et al., 2008). However, these assessments do not measure the effect of an ability to
48 participate in occupational therapy on well-being.

49 Therefore, we developed a measurement tool called the Assessment of Positive

50 Occupation 15 (APO-15) (Noguchi & Kyougoku, 2016a; Noguchi & Kyougoku, 2016b). The
51 assessment properties of this tool were studied in 408 individuals with mental disabilities
52 according to statistical evidence provided through aspects such as an exploratory factor analysis
53 (EFA), confirmatory factor analysis (CFA), and item response theory (IRT). Overall, the
54 assessment properties of APO-15 were very good, and this tool exhibited a high level of
55 sensitivity for the identification of clients who experience constraints regarding participation in
56 occupations that promote well-being. In other words, we believe that the APO-15 can reveal the
57 ability of people with mental disabilities to participate in occupations that would promote their
58 well-being.

59 Despite our success, APO-15 was not evaluated in populations other than individuals
60 with mental disabilities. However, occupational therapy is also used to promote well-being
61 through meaningful occupation in elderly people with physical disabilities. Therefore, the
62 present study aimed to verify the reliability and validity of the APO-15 in a population of elderly
63 individuals with physical disabilities.

64

65 **Methods**

66 **Ethics statement**

67 The research protocol was approved by the Ethics Committee of Kibi International
68 University (No. 15-37). All participants provided both written and verbal informed consent prior
69 to voluntary participation. All participants had the right to withdraw from the research at any
70 time, without providing a reason. This study was conducted according to the principles of the
71 Declaration of Helsinki.

72 **Participants**

73 Data were obtained from elderly individuals with DSM-5-based diagnoses of
74 physical disabilities who lived in community dwellings, hospitals, and group homes. For each
75 subject, we recorded the age, gender, diagnosis, and a sense of happiness. The latter parameter
76 was measured using a five-point Likert scale ranging from 1, very happy to 5, not at all happy.

77 **Measures**

78 **1. APO-15**

79 The APO-15, which comprises 15 items, evaluates the ability of occupation to
80 promote well-being according to 4 factors: positive relationship (5 items), meaning (3 items),
81 achievement (4 items), and engagement (3 items). “Positive relationship” is defined as rich
82 human relationships that provide happiness and satisfaction. “Meaning” is defined as the ability
83 to find significance in particular activities and life. “Achievement” is defined as an attempt to
84 achieve a goal in life. “Engagement” is defined as the experience of flow and the process leading
85 to that state. Each item was evaluated using a 4-point Likert scale (1 = disagree, 4 = agree)
86 (Noguchi & Kyougoku, 2016a; Noguchi & Kyougoku, 2016b).

87 **2. Kessler Psychological Distress Scale (K6)**

88 We used the short-form, 6-item Kessler Psychological Distress scale (K6) as a
89 measure of non-specific psychological distress. This scale exhibits strong psychometric
90 properties and can discriminate psychiatric cases from non-cases. K6 involves a single factor
91 model and includes previous studies of psychological distress (6 items). The K6 comprises 6
92 items scored on a 5-point Likert scale from 1, none of the time to 5, all of the time (Cornelius et
93 al., 2013), with total scores ranging from 6 to 30. The reference period of the K6 is 30 days. We
94 used the official Japanese translation of the K6 and a cut-off point of 9 (0 = total score <9, 1 =
95 total score ≤9).

96 **Statistical Analysis**

97 SPSS statistical software (Chicago, IL, USA; <http://www.spss.com>) was used for the
98 analyses of descriptive statistics, internal consistency reliability, and concurrent validity. HAD
99 (<http://norimune.net/had>) was used for normality testing. Exametrika
100 (<http://antlers.rd.dnc.ac.jp/~shojima/exmk/index.htm>) was used to determine the validity of the
101 items and the latent rank theory (LRT). Mplus 7.3 (<http://www.statmodel.com>) was used for the
102 CFA, hypothesis testing (convergence and discriminant validity), and IRT analysis.

103 **1) Sample characteristics**

104 Demographic data were summarized using descriptive statistics. The Shapiro–Wilk
105 test was used to determine normality ($p < 0.05$).

106 **2) Item validity**

107 We assessed item validity using polyserial correlation coefficients with critical
108 values. An entropy >0.2 was considered a good standard. In addition, polyserial correlation
109 coefficient >0.5 was considered a good standard.

110 **3) Structural validity**

111 The factor structure of the APO-15 was determined via CFA, using a weighted least
112 squares estimation with mean and variance (WLSMV), along with missing data. The WLSMV is
113 suitable for the analysis of categorical data. Three indicators were used to confirm the model
114 structure of the APO-15 based on the CFA evaluation. The first indicator was the root mean
115 square error of approximation (RMSEA); here, critical values of 0.08–0.10 indicate a mediocre
116 fit, and values <0.08 indicate a good fit. The second and third indicators were the comparative fit
117 index (CFI) and Tucker–Lewis index (TLI), with critical values >0.95 (Kline, 2011; MacCallum,
118 Browne & Sugawara, 1996).

119 **4) Hypothesis testing (convergent and discriminant validity)**

120 For hypothesis testing, we evaluated the discriminant and convergent validities using
121 a multi-trait scaling analysis. Discriminant validity was evaluated using the square of the
122 correlation of the average variance extracted (AVE), based on the factor structure of APO-15 by
123 CFA. An AVE >0.5 was considered a good standard. One criterion of discriminant validity was a
124 comparison of the values and AVEs of factor correlations that yielded high AVEs.

125 **5) Internal consistency reliability**

126 Internal consistency reliability was evaluated using Cronbach's α coefficient. A
127 reference value of >0.7 indicated good internal consistency.

128 **6) Concurrent validity**

129 Concurrent validity was determined using Spearman's nonparametric correlation to
130 measure the association between each item of APO-15, a sensation of happiness, and K6.

131 **7) Item response**

132 A graded item response test (IRT) was conducted using a robust maximum likelihood
133 (MLR) estimation. The IRT estimated item slope parameters, difficulty parameters, and total
134 information curve (TIC) in APO-15. Critical values of 0.5 and 2.5 were obtained for item
135 discrimination, and absolute values of -4.0 and 4.0 were obtained for item difficulty. The IRT
136 was employed to estimate Akaike's information criterion (AIC) and the Bayesian information
137 criterion (BIC).

138 **8) Interpretability**

139 An estimation of the cut-off point and latent rank values were used to examine the
140 interpretability of the APO15. The cut-off point for the APO-15 was assessed by calculating
141 receiver operating characteristic (ROC) curves, using K6 as a gold standard. The ROC curve is
142 represented as a graph of sensitivity and specificity, and an area under the ROC curve of >0.70
143 was selected as a critical value with which to identify a good prediction.

144 The LRT is a nonparametric test theory involving a mechanism based on a self-
145 organizing map (SOM) or generative topographic map (GTM). In this study, we used an
146 analytical model of the SOM. The LRT has been used to propose stage capability evaluations
147 (Shimizu & Daibo, 2014). Usually, psychological testing scores are expressed in 1-point
148 intervals. However, operational scales are not sufficiently reliable to identify a difference of 1 or
149 2 points. The LRT can be used to assess a client's ability on an ordinal scale and therefore cannot
150 derive slight differences in test results. However, we were unconcerned about an uncertainty of 1
151 point.

152 Stage evaluations are advantageous because they can be used to qualitatively
153 describe a subject's current state. We compared 6-type estimation in LRT: the distribution shape
154 of the data, and confirmation of the suitability of this scale in combination with monotonically
155 increasing constraints. Latent rank values were determined using 4-point Likert scale-based
156 APO-15 scores. Two-fit indices—Akaike's Information Criterion (AIC) and Bayesian
157 Information Criterion (BIC)—were used to assess the model.

158

159 **Results**

160 **1) Sample Characteristics**

161 As shown in Table 1, a total of 761 participants were evaluated (mean age, $75.36 \pm$
162 12.09 years), including 349 (45.9%) males and 408 (53.6%) females. Characteristics of the
163 participants are presented in Table 1. All data were distributed normally (Shapiro–Wilk test).

164 **2) Item validity**

165 Table 2 presents the Shapiro–Wilk test results, polyserial correlation coefficients, and
166 entropy values for each item of the APO-15. All items exhibited normal distribution. Entropy
167 values ranged from 1.253 to 1.855, and polyserial correlation coefficients ranged from 0.561 to
168 0.787.

169 **3) Structural validity**

170 Table 3 presents the CFA results. The CFA of APO-15 estimated a good model fit
171 (RMSEA = 0.089; CFI = 0.949; TLI = 0.944).

172 **4) Hypothesis testing (convergent and discriminant validity)**

173 Table 4 presents the results of hypothesis testing. The correlation coefficients of
174 factor 3 and factor 1 were slightly lower than the reference value. Overall, however, the APO-15
175 exhibited good convergent and discriminant validity.

176 **5) Internal consistency reliability**

177 Table 3 also presents results related to internal consistency. The internal
178 consistencies of the APO-15 and all subscales were good or acceptable, with scores of 0.759–
179 0.911.

180 **6) Concurrent validity**

181 Table 5 presents the results of a concurrent validity analysis. Concurrent validity was
182 confirmed via correlations among the APO-15, sense of happiness, and K6. Each factor score of
183 the APO-15 exhibited a negative correlation with participant happiness ($r = -0.378$ to -0.532 , p
184 <0.01). Moreover, the APO-15 exhibited a negative correlation with the single factor score of K6
185 ($r = -0.201$ to -0.310 , $p <0.01$).

186 7) Item response

187 Table 6 and Fig. 1 present the results of item slope parameters (α) and item difficulty
188 parameters (β). Overall, the APO-15 items exhibited satisfactory item responses, with item
189 slopes ranging from 0.668 to 1.232. The range of APO-15 item difficulty parameters indicated a
190 satisfactory ability of the items to yield appropriate discrimination and difficulty indices. Notably,
191 the APO-15 demonstrated a high level of accuracy with regard to the identification of subjects
192 who experienced constrained participation in occupations intended to promote well-being.

193 8) Interpretability

194 Fig. 2 presents the cut-off point of APO-15, which was defined as a 51-point
195 sensitivity (0.512) and specificity (0.704). The area under the ROC curve was 0.631. Table 7
196 presents the LRT of APO-15, an estimation of the monotonic increasing constraint (do; none)
197 and uniform distribution estimation that indicated a good fit (AIC = 1043.648, BIC = -3336.080).
198 Table 8 presents the item reference profile (IRP) of APO-15. The latent rank values of APO-15
199 could be presented in four steps with regard to the degree of participation in occupations that
200 promote well-being. (Rank 1 = significant participation constraints; Rank 2 = moderate
201 participation constraints; Rank 3 = moderate participation ability; Rank 4 = good participation
202 ability).

203

204 Discussion

205 Psychometric properties of APO-15

206 In this study, we validated the APO-15 as a tool for the evaluation of elderly
207 individuals with physical disabilities who lived in community dwellings, hospitals, and group
208 homes. Overall, we found that APO-15 exhibited a good model fit. Specifically, each polyserial
209 correlation coefficient and entropy score for the items of APO-15 were confirmed to be lower
210 than the reference values (Table 2). In addition, a CFA structural validity assessment of APO-15
211 it indicated a good model fit (Table 3), hypothesis testing indicated good convergent and
212 discriminant validity (Table 4), and Cronbach's α coefficient indicated acceptable internal
213 consistency (Table 3). Taken together, these results showed that the 4 factor structure of APO-15

214 which assumes has been established. However, the AVE value of factor 3 (meaning), which
215 yielded a somewhat low value, might require re-examination in the future.

216 Notably, negative correlations were observed among APO-15, happiness, and K6. In
217 particular, APO-15 and sense of happiness exhibited a negative moderate correlation (Table 5).
218 This result supports the use of the APO-15 to measuring the ability to participate in occupations
219 that promote well-being. Furthermore, the results of this study indicate that the degree of
220 participation in meaningful occupation will promote well-being. In other words, the degree of
221 participation in a meaningful occupation intended to promote well-being is thought to alleviate
222 psychological distress (Kim JS & Kang S., 2015; Lis K et al., 2008; Rahimi R et al., 2015).

223 The IRT was used to assess the individual item characteristics of the APO-15 (Table
224 6), and revealed modest item slope parameters ranging from 0.668 to 1.385. The difficulty
225 parameter scores ranged very widely from -2.256 to 0.636 . This result indicates that the TIC of
226 APO-15 was sufficient (Fig. 1) and, taken together, these results clearly support a good item
227 response to the APO-15. Further, the APO-15 item design was based on a 4-point Likert scale.
228 As mentioned above, there is now sufficient evidence of the high validity and reliability of the
229 APO-15 and from this viewpoint, the current Likert scale design is correct.

230 The cut-off point of APO-15 became a 51-point sensitivity (0.512) and specificity
231 (0.704), which yielded good results (Fig. 2). The LRT of APO-15 exhibited a good fit in the 4
232 rank values (Table 7). The IRP indicated the effects of occupation on the promotion of the well-
233 being (Table 8); in other words, a client with an APO-15 score <51 points will be considered
234 unable to participate in the selected occupation intended to promote well-being. In addition to
235 that, we can determine the Rank 1 or Rank 2 through the LRT the state of the client. Therefore,
236 the APO-15 will provide therapists with necessary information regarding a client's ability to
237 participate in an occupation intended to promote well-being.

238 **Clinical application of APO-15**

239 The APO-15 can be used in clinical occupational therapy practice, as this tool
240 focuses on the ability of a subject to participate in therapeutic occupations and will thus be able
241 to provide information about the subject's health status during therapy. Specifically, the APO-15
242 will allow determinations of a subject's status through an application of the cut-off value (51
243 point) and LRT results. In addition, the findings might allow the provision of an effective
244 occupation that would promote well-being in accordance with each rank associated with the

245 subject. In conclusion, this assessment facilitated the distinction between positive and negative
246 occupations for elderly individuals with physical disabilities and may therefore serve to promote
247 the outcomes of occupational therapy.

248

249 **Limitations**

250 This study design has several limitations. First, to reduce the burden on participants,
251 we did not evaluate test–retest reliability. Second, the survey was conducted at only 31 facilities
252 (outreach-type rehabilitation facilities and hospitals, group homes). Despite these limitations, the
253 APO-15 is a valid and reliable tool for estimating the ability of a subject to participate in
254 occupations that would promote well-being.

255

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259

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331

332 **Table 1. Characteristics of the participants (n = 761).**

Characteristics		Mean (SD)	%
Age		75.36 (±12.09)	
Gender	Male		349 (45.9%)
	Female		408 (53.6%)
Living environment	Community		660 (86.7%)
	Hospital		90 (11.8%)
	Unknown		11 (1.5%)
Diagnosis	Orthopedic disease		318 (41.8%)
	Cerebrovascular disease		241 (31.7%)
	Lifestyle-related disease		82 (10.8%)
	Medical disease		67 (8.8%)
	Mental disorder		19 (2.5%)
	Autoimmune disease		15 (2%)
	Dementia		8 (1.1%)
	Developmental Coordination Disorder		5 (0.7%)
	Traumatic brain injury		3 (0.4%)
	Unknown		3 (0.4%)
Sensation of happiness	Very good		107 (14.1%)
	Good		259 (34%)
	Average		242 (31.8%)
	Fair		105 (13.8%)
	Poor		39 (5.1%)
	Unknown		9 (1.2%)

Note: SD = Standard Deviation.

333

334

335 **Table 2. Items analyzed in the APO-15.**

15 items of APO		Mean	SD	SW	Entropy	PCC
Item1	I'm motivated to fulfill the hope	2.899	0.861	0.853	1.253	0.561
Item2	I have a thing that you want to achieve there is a purpose	2.968	0.926	0.845	1.500	0.701
Item3	I am now, are making efforts in order to achieve the goal	3.044	0.883	0.834	1.574	0.723
Item4	While I often talk with the people around, it is able to do things in accordance with the force	2.989	0.848	0.840	1.657	0.697
Item5	Than immediate profit, it is able to act towards the goal	2.959	0.831	0.850	1.646	0.649
Item6	I can feel are supported from the surrounding people	3.545	0.660	0.675	1.617	0.745
Item7	I can tackle it concentrate in favorite activities	3.212	0.857	0.798	1.751	0.759
Item8	I have the utmost living my life	3.347	0.758	0.766	1.664	0.683
Item9	I live on the basis of my beliefs	3.153	0.789	0.813	1.724	0.718
Item10	When I have a people who are in trouble, I want to give help immediately	3.175	0.825	0.810	1.782	0.742
Item11	I would feel that was fulfilling and help each other and people around	3.249	0.788	0.791	1.816	0.702
Item12	I'm working to be able to concentrate	2.977	0.889	0.847	1.724	0.787
Item13	I can concentrate on my hobby	2.951	0.971	0.844	1.855	0.682
Item14	I always can be considered a good side of things	2.901	0.841	0.858	1.747	0.711
Item15	I have chosen the way of life of my own proactively	3.029	0.801	0.836	1.764	0.768

Note: SD = Standard Deviation, SW = Shapiro–Wilk test, PCC = Polyserial Correlation Coefficient.

336

337 **Table 3. Structural validity and reliability of the internal consistency of APO.**

APO-15 items, $\alpha = 0.911$	Estimate	S.E.	Est./S.E.	Two-tailed P-value
Latent variables				
Factor1 Positive relationship $\alpha = 0.777$				
Item4	0.749	0.013	58.455	0.000
Item6	0.731	0.013	58.455	0.000
Item10	0.701	0.012	58.455	0.000
Item11	0.789	0.014	58.455	0.000
Item14	0.702	0.012	58.455	0.000
Factor2 Achievement $\alpha = 0.835$				
Item1	0.774	0.010	79.071	0.000
Item2	0.807	0.010	79.071	0.000
Item3	0.826	0.010	79.071	0.000
Item5	0.822	0.010	79.071	0.000
Factor3 Meaning $\alpha = 0.759$				
Item8	0.753	0.011	65.823	0.000
Item9	0.829	0.013	65.823	0.000
Item15	0.800	0.012	65.823	0.000
Factor4 Engagement $\alpha = 0.780$				
Item7	0.812	0.012	67.188	0.000
Item12	0.845	0.013	67.188	0.000
Item13	0.738	0.011	67.188	0.000
Factor correlation				
Factor2				
Factor1	0.800	0.021	37.962	0.000
Factor3				
Factor1	0.857	0.018	47.110	0.000
Factor2	0.791	0.019	41.032	0.000
Factor4				
Factor1	0.720	0.024	29.421	0.000
Factor2	0.753	0.022	34.921	0.000
Factor3	0.716	0.024	29.271	0.000
Model fit information				
RMSEA	0.089 [90% CI = 0.077–0.096]			
CFI	0.949			
TLI	0.944			

Note: CI = Confidence interval, Factor1 = Achievement, Factor2 = Meaning, Factor3 = Positive relationship, Factor4 = Engagement, α = Cronbach's alpha coefficient.

339 **Table 4. Hypothesis testing of APO-15.**

APO	AVE	SCC			
		Factor1	Factor2	Factor3	Factor4
Factor1	0.540	1.000			
Factor2	0.651	0.640	1.000		
Factor3	0.631	0.734	0.625	1.000	
Factor4	0.639	0.518	0.567	0.512	1.000

Note: AVE = Average Variance Extracted, SCC = squared correlation coefficient, Factor1 = Positive relationship, Factor2 = Achievement, Factor3 = Meaning, Factor4 = Engagement.

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341

342 **Table 5. Concurrent validity of the APO-15.**

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APO Factor	K6	
	Happiness	Psychological distress
Factor1	-.519**	-.250**
Factor2	-.378**	-.229**
Factor3	-.469**	-.310**
Factor4	-.408**	-.201**
Factor Score Total	-.532**	-.288**

Note: Factor1 = Positive relationship, Factor2 = Achievement, Factor3 = Meaning, Factor4 = Engagement.

344

345 **Table 6. Responses to the APO-15 items.**

Items of APO	α	β_1	β_2	β_3
Factor1				
Item4	1.050	-1.508	-0.684	0.509
Item6	0.668	-2.256	-1.484	0.295
Item10	0.903	-1.710	-0.831	0.250
Item11	1.050	-1.847	-1.006	0.151
Item14	1.044	-1.607	-0.499	0.636
Factor2				
Item1	1.050	-1.464	-0.558	0.634
Item2	0.944	-1.367	-0.568	0.411
Item3	1.192	-1.515	-0.692	0.373
Item5	1.385	-1.688	-0.588	0.560
Factor3				
Item8	1.107	-2.084	-1.057	0.001
Item9	1.232	-1.834	-0.882	0.327
Item15	1.042	-1.713	-0.742	0.512
Factor4				
Item7	0.935	-1.671	-0.865	0.114
Item12	1.134	-1.476	-0.592	0.455
Item13	0.782	-1.275	-0.516	0.351
Information criteria				
AIC	22193.754			
BIC	22471.832			

Note: α = Item slope parameters, β = Difficulty parameters, AIC = Akaike's Information Criterion, BIC = Bayesian information criterion, Factor1 = Positive relationship, Factor2 = Achievement, Factor3 = Meaning, Factor4 = Engagement.

346

347 **Table 7. APO-15 model selection.**

Analysis model of the SOM (Latent rank values = 4)	AIC	BIC
1. Monotonic increasing constraint (do), Distribution estimation (none)	1078.509	-3301.219
2. Monotonic increasing constraint (none), Distribution estimation (none)	1078.509	-3301.219
3. Monotonic increasing constraint (do), Normal distribution estimation (do)	2488.614	-1891.114
4. Monotonic increasing constraint (none), Normal distribution estimation (do)	2533.987	-1845.741
5. Monotonic increasing constraint (do), Uniform distribution estimation (do)	1043.648	-3336.080
6. Monotonic increasing constraint (none), Uniform distribution estimation (do)	1043.648	-3336.080

Note: SOM = The self-organizing map, AIC = Akaike's Information Criterion, BIC = Bayesian information criterion.

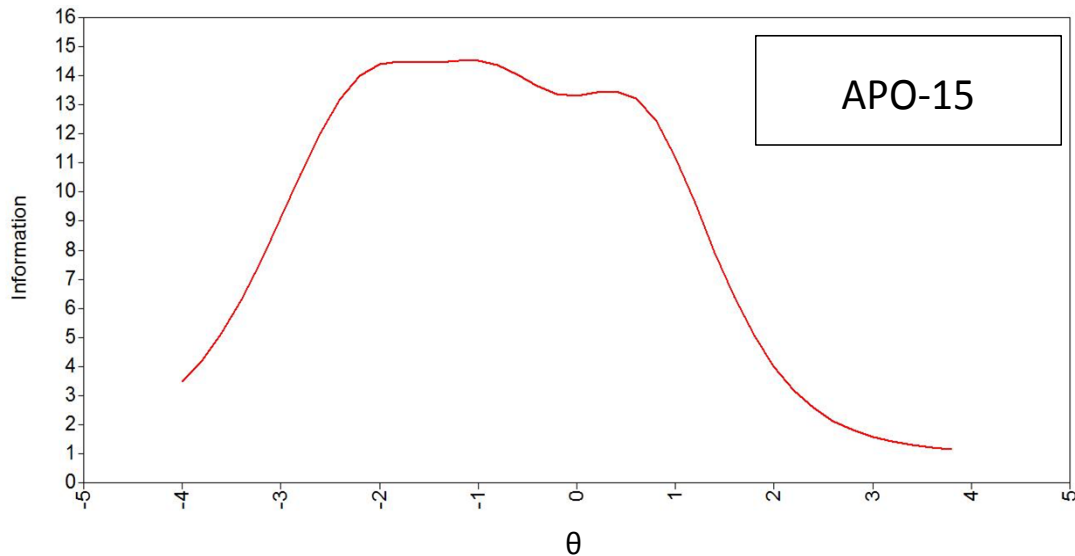
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350 **Table 8. Reference profiles of items of the APO-15.**

15 items of APO		Rank 1	Rank 2	Rank 3	Rank 4
Item1	I'm motivated to fulfill the hope	2.298	2.690	3.135	3.468
Item2	I have a thing that you want to achieve there is a purpose	2.412	2.785	3.192	3.485
Item3	I am now, are making efforts in order to achieve the goal	2.434	2.877	3.273	3.599
Item4	While I often talk with the people around, it is able to do things in accordance with the force	2.470	2.776	3.179	3.515
Item5	Than immediate profit, it is able to act towards the goal	2.362	2.768	3.172	3.527
Item6	I can feel are supported from the surrounding people	3.218	3.468	3.689	3.820
Item7	I can tackle it concentrate in favorite activities	2.707	3.043	3.417	3.683
Item8	I have the utmost living my life	2.821	3.201	3.581	3.801
Item9	I live on the basis of my beliefs	2.612	2.966	3.366	3.662
Item10	When I have a people who are in trouble, I want to give help immediately	2.684	3.038	3.378	3.607
Item11	I would feel that was fulfilling and help each other and people around	2.755	3.085	3.447	3.708
Item12	I'm working to be able to concentrate	2.399	2.760	3.188	3.547
Item13	I can concentrate on my hobby	2.446	2.773	3.133	3.440
Item14	I always can be considered a good side of things	2.325	2.694	3.148	3.433
Item15	I have chosen the way of life of my own proactively	2.546	2.839	3.198	3.518

Note: Shows the occupation should be supported by rank value that client belongs in color. Blue color is indicates that the client is able to participate somewhat in each rank which occupation to promote the well-being. Red color indicates that the client is able to most participants an occupation to promote the well-being. Rank 1 = quite participation constraints, Rank 2 = somewhat participation constraints, Rank 3 = somewhat can participate, Rank 4 = frequently can participation.

352 **Fig. 1. Total information curve (TIC) of the APO-15.**



353

354 Note: θ = Capability value, 0 = Standard capacity

355 Note: Standard capacity more of the clients with positive values are considered capable of
356 participating in occupations that promote well-being. APO-15 exhibits a high level of sensitivity
357 for detecting clients with constrained participation in occupations that promote well-being.

358

359 **Fig. 2. Receiver operating characteristic (ROC) curve analysis of the cut-off point of the**
360 **APO-15.**

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