PWB Psychometric Analysis

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There are three version of Ryff’s Psychological Wellbeing (PWB) Scale. All of them measure the following constructs: Self-acceptance, Positive Relations with others, Autonomy, Environmental Mastery, Purpose in Life and Personal Growth. The longest version has 84 items in all (14 for each construct), the medium length one has 54 items (nine items per construct) and the short version has 18 items (three per construct). In this study we used the medium length survey that measures for Purpose in Life (Ryff, C., & Keyes, C. (1995). The structure of psychological well-being revisited. Journal of Personality and Social Psychology, 69, 719–727.) because it contained enough of the aspects of purpose as it relates the construct of interest.

**Items:**

1. I live one day at a time and don't really think about the future. (rs)
2. I tend to focus on the present, because the future always brings me problems. (rs)
3. My daily activities often seem trivial and unimportant to me. (rs)
4. I don't have a good sense of what it is that I am trying to accomplish in my life. (rs)
5. I used to set goals for myself, but that now seems a waste of time. (rs)
6. I enjoy making plans for the future and working to make them a reality.
7. I am an active person in carrying out the plans I set for myself.
8. Some people wander aimlessly through life, but I am not one of them.
9. I sometimes feel as if I’ve done all there is to do in life. (rs)

**Analysis**

Because the author maintains that this scale tests one construct, purpose in life, we initially tested for Cronbach's alpha of internal consistency which was in the good range at .78. We then conducted an Exploratory Structural Equation Modelling (ESOM) using Target Rotation specifying a one factor model. This analysis resulted in a very poor fit to data.  for the model was 27 with a  = 552.18, p = <.000; CFI =.73, TLI = . 645, RMSEA = 0.155 [90% CI = 0.143, 0.166]. Items seven and eight all loaded very poorly on the factor (see table 7).

Table 7. One Factor Model EFA (TR) PWB

|  |  |  |
| --- | --- | --- |
|  | Item | std.nox |
| 1 | PWB 1 | 0.61 |
| 2 | PWB 2 | 0.52 |
| 3 | PWB 3 | 0.76 |
| 4 | PWB 4 | 0.59 |
| 5 | PWB 5 | -0.77 |
| 6 | PWB 6 | 0.50 |
| 7 | PWB 7 | 0.21 |
| 8 | PWB 8 | 0.21 |
| 9 | PWB 9 | 0.46 |
|  |  |  |

Given these results that showed that the PWB purpose scale did not represent one factor we conducted a Parallel Analysis using Maximum Likelihood which suggested that there were four factors in the measure. Eigenvalues analysis suggested that there were only two factors. The first factor had and eigenvalue of 2.7 wits SD of 1.8 and explained 37% of the variance, the second factor had an eigenvalue of .7 and SD of 1.2 and explained 17% of the variance. Given the inclusivity of these results an Exploratory Factor Analysis (EFA) was conducted.

We first conducted an EFA that extracted two factors. This analysis resulted in a poor fit to data.  for the model was 19 with a  = 266.7022, p = <.000; CFI =.92, TLI = .85, RMSEA = 0.10 [90% CI = 0.09 0.11]. Items seven, eight now load well onto the second factor, but items two, four, six and nine have moderate loadings on factor one and item six is crossloading (see table 2).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | ML1 | ML2 | h2 | u2 | com |
| PWB 1 | **0.67** | -0.15 | 0.44 | 0.56 | 1.10 |
| PWB 2 | **0.51** | 0.06 | 0.27 | 0.73 | 1.03 |
| PWB 3 | **0.77** | -0.02 | 0.59 | 0.41 | 1.00 |
| PWB 4 | **0.51** | 0.26 | 0.38 | 0.62 | 1.49 |
| PWB 5 | **-0.78** | 0.00 | 0.60 | 0.40 | 1.00 |
| PWB 6 | **0.43** | 0.30 | 0.32 | 0.68 | 1.79 |
| PWB 7 | -0.03 | **0.87** | 0.75 | 0.25 | 1.00 |
| PWB 8 | 0.04 | **0.59** | 0.36 | 0.64 | 1.01 |
| PWB 9 | **0.46** | 0.02 | 0.21 | 0.79 | 1.00 |
| SS loadings | 2.6 | 1.32 |  |  |  |
| ML1 | 1.00 | 0.19 |  |  |  |
| ML2 | 0.19 | 1.00 |  |  |  |

Table 2. Two Factor Loadings for Exploratory Factor Analysis with Oblimin Rotation of PWB-P

This indicated that there maybe three factors and therefore we conducted an EFA this time extracting three factors which resulted in a much better, albeit not excellent, fit.  for the model was 12 with a  = 94.93, p = <.000; CFI =.97, TLI = .92, RMSEA = 0.73 [90% CI = 0.06, 0.087]. The loadings were still not stellar with items four and nine not loading well on any of the factors and there was cross loading on many of the other items (see table 3). A Target Rotation showed virtually identical results. Thus is seems that a three factor model is the best fit for the data. The only problematic item was number 4 (I don't have a good sense of what it is that I am trying to accomplish in my life.) which was cross loading on all three items.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | ML1 | ML2 | ML3 | h2 | u2 | com |
| PWB 1 | **0.54** | -0.17 | 0.23 | 0.44 | 0.56 | 1.58 |
| PWB 2 | 0.13 | 0.12 | **0.58** | 0.44 | 0.56 | 1.18 |
| PWB 3 | **0.70** | -0.07 | 0.15 | 0.59 | 0.41 | 1.11 |
| PWB 4 | 0.27 | 0.29 | **0.38** | 0.42 | 0.58 | 2.72 |
| PWB 5 | **-0.72** | 0.05 | -0.15 | 0.61 | 0.39 | 1.09 |
| PWB 6 | **0.69** | 0.23 | -0.28 | 0.52 | 0.48 | 1.57 |
| PWB 7 | -0.04 | **0.84** | 0.05 | 0.70 | 0.30 | 1.01 |
| PWB 8 | 0.03 | **0.61** | 0.02 | 0.38 | 0.62 | 1.01 |
| PWB 9 | 0.13 | 0.07 | **0.48** | 0.32 | 0.68 | 1.19 |
| SS loadings | 2.07 | 1.29 | 1.06 |  |  |  |
| ML1 | 1.00 | 0.25 | 0.44 |  |  |  |
| ML2 | 0.25 | 1.00 | -0.02 |  |  |  |
| ML3 | 0.44 | -0.02 | 1.00 |  |  |  |

Table 3: Three Factor Loadings for Exploratory Factor Analysis with Oblimin Rotation of PWB-P

I therefore tried a target rotation with an oblique rotation and item four loaded better on the third factor and the cross loaded less on the other factors (see tables 4). Then fit was also acceptable and identical to the previous regular model above. Thus, based on the exploratory factor analysis we conclude that there are really three factors and not one like the author suggested.

Table 4: Factor Loadings for Target Rotation, Three Factors

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable | MR1 | MR2 | MR3 | h2 | u2 | com |
| PWB 1 | **0.52** | -0.21 | 0.21 | 0.44 | 0.56 | 1.68 |
| PWB 3 | **0.70** | -0.09 | 0.12 | 0.59 | 0.41 | 1.10 |
| PWB 5 | **-0.71** | 0.08 | -0.12 | 0.61 | 0.39 | 1.08 |
| PWB 6 | **0.77** | 0.24 | **-0.33** | 0.52 | 0.48 | 1.57 |
| PWB 7 | -0.04 | **0.83** | 0.12 | 0.69 | 0.31 | 1.05 |
| PWB 8 | 0.03 | **0.60** | 0.08 | 0.38 | 0.62 | 1.04 |
| PWB 2 | 0.02 | 0.06 | **0.64** | 0.44 | 0.56 | 1.02 |
| PWB 4 | 0.21 | 0.25 | **0.43** | 0.42 | 0.58 | 2.09 |
| PWB 9 | 0.05 | 0.02 | **0.53** | 0.32 | 0.68 | 1.02 |
| SS loadings | 1.99 | 1.23 | 1.18 |  |  |  |
| MR1 | 1.00 | 0.21 | 0.62 |  |  |  |
| MR2 | 0.21 | 1.00 | 0.03 |  |  |  |
| MR3 | 0.62 | 0.03 | 1.00 |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Models | Chisq | P-Value | DF | CFI | TLI | RMSEA | upper | lower | SRMR |
| One Factor | 552.177 | 0.000 | 27.000 | 0.734 | 0.645 | 0.155 | 0.143 | 0.166 | 0.116 |
| Two Factors | 266.702 | 0.000 | 19.000 | 0.921 | 0.850 | 0.101 | 0.090 | 0.111 | 0.051 |
| Three Factors | 94.937 | 0.000 | 12.000 | 0.974 | 0.921 | 0.073 | 0.060 | 0.087 | 0.024 |
| Three Factors TR | 94.956 | 0.000 | 12.000 | 0.974 | 0.921 | 0.073 | 0.060 | 0.087 | 0.024 |

Table 5: Fit measures for all EFA of PWB

What are the Factors?

The problem we know have is that deciphering the different underlying factors here is challenging. The factors are as follows:

Factor 1

1. I live one day at a time and don't really think about the future. (rs)

3. My daily activities often seem trivial and unimportant to me. (rs)

5. I used to set goals for myself, but that now seems a waste of time. (rs)

6. I enjoy making plans for the future and working to make them a reality.

This factor seems to be talking about future mindedness (items 1 and 6), goal setting (item 5) and meaningful activities (items 3).

Factor 2

7. I am an active person in carrying out the plans I set for myself.

8. Some people wander aimlessly through life, but I am not one of them.

This factor seems to be relating to the achievement of future plans (item 7) and meaningful current activities (items 8).

Factor 3

9. I sometimes feel as if I’ve done all there is to do in life. (rs)

2. I tend to focus on the present, because the future always brings me problems. (rs)

4. I don't have a good sense of what it is that I am trying to accomplish in my life. (rs)

This factor seems to be getting at lack of meaningful activities, lack of goal setting and lack of future mindedness. Based on this it seems that all the factors are really trying to get at the same three elements: meaningful activities, goal setting and future mindedness. Thus, I decided to conduct a confirmatory factor analysis to see whether we could fit a second order model to the data.

**CFA**

I first wanted to see whether a three factor model would work well in CFA. I therefore tested the same factor structure that seemed to fit the data in EFA moderately well. The loadings seemed to do well (see table #) however the fit was a lot worse than what we found in the EFA. Firstly item six was cross loading significantly with Factor 2. In addition in the normalized covariance matrix (see table 6) items seven and eight were overly high correlated with item number six. In addition the loadings were now very poor (see table 7).

|  |
| --- |
| PWB1 PWB3 PWB5 PWB6 PWB7 PWB8 PWB2 PWB9 PWB4  PWB1 0.000 |
| PWB3 -0.611 0.000 |
| PWB5 0.247 -0.019 0.000 |
| PWB6 0.548 0.302 -0.684 0.000 |
| PWB7 -4.044 -1.052 0.249 7.400 0.000 |
| PWB8 -2.565 0.124 -0.245 6.695 0.000 0.000 |
| PWB2 3.968 -0.745 0.210 -2.607 -1.695 -1.236 0.000 |
| PWB9 1.036 0.346 -0.804 -3.078 -2.511 -1.302 2.100 0.000 |
| PWB4 -1.393 0.873 0.653 -0.303 2.368 1.627 -0.507 -0.810 0.000 |

Table 6: Covariance Matrix (Normalized)

I then tried to fit a second order model which did not converge initially because there was a significantly negative eigenvalue and the correlation between the higher model factor and the lower level factor was greater than one. I therefore fixed the covariances of Factor 3 to zero this allowed the model to converge. The loadings were good (see table 7), however, goodness of fit measures were again poor (see table 8).

|  |  |  |  |
| --- | --- | --- | --- |
| Models | Items | Factor Names | Loadings |
| Three Factor | PWB 1 | F1 | 0.62 |
|  | PWB 3 | F1 | 0.78 |
|  | PWB 5 | F1 | -0.79 |
|  | PWB 6 | F1 | 0.50 |
|  | PWB 7 | F2 | 0.77 |
|  | PWB 8 | F2 | 0.65 |
|  | PWB 2 | F3 | 0.58 |
|  | PWB 9 | F3 | 0.51 |
|  | PWB 4 | F3 | 0.68 |
| Second Order | PWB 1 | F1 | 0.62 |
|  | PWB 3 | F1 | 0.77 |
|  | PWB 5 | F1 | -0.79 |
|  | PWB 6 | F1 | 0.51 |
|  | PWB 7 | F2 | 0.75 |
|  | PWB 8 | F2 | 0.68 |
|  | PWB 2 | F3 | 0.60 |
|  | PWB 9 | F3 | 0.53 |
|  | PWB 4 | F3 | 0.67 |
|  | F1 | HO | 0.78 |
|  | F2 | HO | 0.35 |
|  | F3 | HO | 1.00 |

Table 7: Factor Loadings for Confirmatory Factor Analysis with Lavaan of Three Factor and Second Order for PWB

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Models | Chisq | DF | P-Value | CFI | TLI | RMSEA | upper | lower | SRMR |
| Three Factor Model | 299.698 | 24.000 | 0.000 | 0.880 | 0.820 | 0.110 | 0.099 | 0.122 | 0.063 |
| Second Order Model | 314.527 | 24.000 | 0.000 | 0.874 | 0.811 | 0.113 | 0.102 | 0.125 | 0.064 |

Table 8: Fit measures for CFA

**Discussion**

The author of the purpose subscale of the PWB created it to be a one factor measure of purpose in life. However, based on the EFA of the data I collected from teenagers there are at least three factors in this nine item scale. In the EFA the three factor model; had decent loading and good fit measures. However, the structure of the new three factor fit was not coherent with the content of the items themselves. We therefore tried a CFA using a second order model. Whilst the convergence was a problem initial when the covariance was constrained I managed to get the model to work. Nonetheless the second order model proved to be a poor fit to the data.

**Conclusion**

Based on the analysis conducted above we have been unable to get this a coherent fit to the data. This may be because of the many negatively worded questions as has been suggested in the literature. In addition the items are worded in a manner that can be confusing at times. This is contrast to the MLQ that has items that are clear and easily understandable. In any event, I was unable to decipher a clear factor structure from the purpose subscale of the PWB that made sense of the items and was a good fit to the data. Thus, I conclude that this scale does not adequately measure the construct­­­ of interest.