Measuring Perceived Control: Exploratory Factor Analysis of a Perceived Control Scale Among United States Job Seekers

James Boyle

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This study targeted 125 adult job seekers residing in the United States to evaluate the factor structure and reliability of a perceived control scale used by the German Institute of Economic Research in the German Socioeconomic Panel Study. An exploratory factor analysis revealed a two-factor structure with factors reflecting internal control and external control. No items cross loaded at a .4 loading threshold. Of the eight items used in the perceived control scale, only one, item 4, failed to load on either factor. The seven remaining items displayed poor average inter-item correlation, $r = .17$ and a low Cronbach’s alpha, $\alpha = .59$. Internal and external factors had comparatively higher alphas, $\alpha = .74$ and $\alpha = .72$ respectively. The exploratory factor analysis suggests that seven of the eight items load on two factors and when used independently are moderately reliable measures of internal control and external control.

Keywords: exploratory factor analysis, perceived control scale, external control, internal control, reliability

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Keywords: exploratory factor analysis, perceived control scale, external control, internal control, reliability
single, bipolar dimension in which control emerges internally from the self or externally from sources such as chance, fate, institutions, or powerful others (see Infurna, Gerstorf, & Zarit, 2011; Lachman 1985; Pearlin & Schooler, 1978; Togari & Yonekura, 2015).

Contrary to domain-specific control, i.e., constructs that influence outcomes within specific domains, perceived control over life is a broad construct that influences outcomes across life’s domains (Specht, Egloff, & Schmukle, 2013). A perceived personal control scale used by the German Institute for Economic Research in the German Socioeconomic Panel Study ([SOEP], 1994) measures the extent to which an individual believes they have control over their life. It is one of a number of inventories and scales used in the SOEP, an ongoing longitudinal survey that began in 1984 for the purpose of gathering information from German households (Wagner, Frick, & Schupp, 2007). The SOEP used the scale is in waves 1994 to 1996. It is similar to measures of personal control such as the Midlife in the United States Survey (MIDUS; Lachman & Weaver, 1998) and the Mastery Scale (MS; Pearlin & Schooler 1976). The scale contains eight broadly worded items to capture a person’s general sense of control, e.g., “Most plans I make are successful” and “Things always happen differently, one can’t rely on anything.” The scale is a Likert-type scale with four levels of responses, 1 = applies completely, 2 = applies more or less, 3 = does not really apply, and 4 = does not apply. The appendix of this paper contains the German version and the corresponding English translation.

Previous research used data from the SOEP survey to report modest internal consistency (Infurna, Gerstorf, Ram, Schupp, & Wagner, 2011: Cronbach’s alpha = .71 for all eight items; Gerstorf et al., 2014: Cronbach’s alpha = .68 for items 1, 3, and 6). No studies were found that reported on the scale with data from sources other than the 1994-1996 SOEP survey. The aim of this study was to use more recent data collected from residents of the United States to explore the measure’s factor structure and reliability.

Method

The internal review board of Capella University approved this study. The data was drawn from a study that examined job seeker’s attitudes and control beliefs (Boyle, 2020). Participants were provided by Qualtrics, a commercial online survey platform and panel aggregator. The sample consisted of 54% female and 46% male with ages between 21 to 48 years old. The mean age was 28 years old. The sample size, N = 125, met the 10:1 ratio of respondents to variables as suggested for EFA (Costello & Osborne, 2005; Yong & Pearce, 2013). Participants responded anonymously to an online survey. See appendix for the German version of the perceived control items and the corresponding English translation.

To assess the suitability of the data for EFA preliminary analysis checked for multicollinearity, sampling adequacy, and patterned relationships. Factor retention was determined with parallel analysis (Velicer & Jackson, 1990) using IBM SPSS Statistics, Version 23, and syntax written by O’Conner (2000). Factors were retained when real-data eigenvalues were greater than random-data eigenvalues. The extraction method and rotation was principal factor analysis with oblique (direct oblimin) rotation. Minimum loading threshold used for variables was .40 as suggested by Stevens (1992). The analysis included calculations of internal consistency.

Results

Preliminary data analysis indicated EFA was a useful procedure for examining the structural dimension of the PCI. The correlation matrix had at least one correlation greater than .30 for each item (Field, 2018; Tabachnick & Fidell, 2019). There was no evidence of multicollinearity as evidenced by the absence of any correlations exceeding .80 as well as a nonzero determinant (Field, 2018). Entries on the diagonal of the anti-image correlation matrix were greater than .50 providing further support for sufficient correlation between items (Kaiser, 1976). Table 1 shows the results of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett’s Test of Sphericity. The KMO value of .5 and the statistically significant Bartlett’s test are further evidence that the data was factorable (Williams, Onsman, & Brown, 2010). Item communalities shown in Table 2 ranged from .151 (Item 4) to .610 (Item 7). Three of eight items have communalities less than .4 (items 2, 6, and 8). Parallel analysis identified two factors. Table 3 shows the real-
data eigenvalues and random-data eigenvalues. The real-data eigenvalues exceed random-data eigenvalues in the only two of eight cases. The results of a principal factor analysis with an oblique (direct oblimin) rotation are in Table 4. Note the table does not report variables with factor coefficients less than .40. For example, Item 4 failed to load on either factor at the .40 threshold. The remaining items load exclusively on the two factors with coefficients ranging from .549 to .718.

Table 5 shows the internal consistencies, inter-item correlation, and descriptive statistics. SPSS provides an option to observe changes in internal consistency by deleting items. The internal consistency for all eight items as measured by Cronbach’s alpha was \( \alpha = .56 \). Deleting item 4 slightly improved the Cronbach’s alpha from \( \alpha = .56 \) to \( \alpha = .59 \). Cronbach’s alpha for factor1, \( \alpha = .74 \), and factor 2, \( \alpha = .72 \) also reflect calculations after deleting item 4.

**Discussion**

Over the years, the aim of the SOEP’s personal control scale was to assess an individual’s general perception of control over life (Specht, Egloff, Schmukle, 2013). The eight-item scale analyzed in this study was part of the SOEP longitudinal study that collected data from German residents in waves 1994 to 1996. The present study is the first known analysis of the scale using a sample drawn from residents of the United States. As such, EFA is valuable means of examining a scale’s underlying factors and to provide information about item retention and item deletion between different populations (Ziegler & Hagemann, 2015). To these ends, the analysis provided useful information.

Ideally, data is least ambiguous when having high communalities, no cross loadings, and items that load highly on a single factor. Communalities represent the variance in a variable accounted for in the factors. Costello and Osborne (2005) reported communalities of variables in social science often have values of .40 to .70. In this case, the factors explained only 15% of the variance in Item 4. This item did not correlate well with the other items and appears to be measuring something different. It may load independently on a third factor. In any event, Child (2006) recommended removing items with communalities less than .20.

A cross loading occur when items load on two or more factors. Loadings exceeding .5 with at least 3 items per factor are desirable (Tabachnick & Fidell, 2019; Yong & Pearce, 2013). In this case, with a minimum loading threshold of .4, the ETA did not identify any cross loadings. The result was a clear two-factor structure with seven items loading independently on the factors, four on factor 1 (external control: items 2, 5, 7, and 8) and three on the factor 2 (internal factor: items 1, 3, and 6). Loadings ranged from .549 to .781. Although the value of the Cronbach’s alpha for the factors 1, \( \alpha = .74 \), and factor 2, \( \alpha = .72 \), were reasonably reliable, the Cronbach’s alpha for seven-item scale was low, \( \alpha = .59 \). The four items loading on factor 1 assess perceptions of external control (e.g., If I get something I want then it’s mostly due to luck), whereas, the items loading on factor 2 assess perceptions of external control (e.g., My life is determined by my own behavior). The EFA implies the scale measures an individual’s perception of control similar to scales using locus of control as conceptualized by Rotter’s (1966). Note that items ask about personal agency and random means of control such as fate or chance. There are no items asking other means of control such as powerful others, institutions, gods, groups, or means of control in which a separate entity can affect control by proxy.

**Conclusion**

The study used a sample of job seekers residing in the United States to conduct an EFA on the eight-item perceived control scale used in the SOEP’s longitudinal survey of German households. The EFA indicated the scale captures an individual’s perception control over life by measuring the degree to which they believe control originates through personal agency (internal control) or means beyond personal agency such as fate or chance (external control). By grouping items according to internal control and external control each group of items has a reasonably reliable Cronbach’s alpha.

**References**


**Appendix**

German and English versions of the perceived control scale


Perceived control items, English translation

**Directions:**

The following are various attitudes towards life and the future. Please indicate what most applies to you.

**Items:**

1. I determine most of what happens to me in life.
2. Making plans make people unhappy because they seldom work out.
3. My life is determined by my own behavior.
4. I think no one can escape their fate. Everything in life happens as it must happen.
5. If I get something I want then it’s mostly due to luck.
6. Most plans I make are successful.
7. There is little sense in specifically planning ahead because something unexpected always comes up.
8. Things always happen differently, one can’t rely on anything.

**Response scale:**

Applies completely (1) Applies more or less (2) Does not really apply (3) Does not apply (4)

Perceived control items in German

**Directions:**

Die folgenden Aussagen kennzeichnen verschiedene Einstellungen zum Leben und zur Zukunft. In welchem Maße stimmen Sie persönlich den einzelnen Aussagen zu?
Items:

1. Ich kann ziemlich viel von dem, was in meinem Leben passiert, selbst bestimmen.

2. Planen macht einen Menschen nur unglücklich, da Pläne sich kaum jemals in die Wirklichkeit umsetzen lassen.


5. Wenn ich bekomme, was ich will, so geschieht dies meistens aus Glück.


7. Es hat wenig Sinn, fest umrissene Ziele zu verfolgen, weil doch immer etwas Unerwartetes dazwischenkommt.

8. Es kommt doch immer anders als man denkt, man kann sich auf nichts verlassen.

Response scale:
Stimme voll zu (1) Stimme eher zu (2) Stimme eher nicht zu (3) Stimme überhaupt nicht zu (4)

Table 1.
Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett’s test of sphericity

<table>
<thead>
<tr>
<th></th>
<th>KMO</th>
<th>Bartlett’s test of sphericity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.69</td>
<td>Chi – 223.77, df = 28, p &lt; .001</td>
</tr>
</tbody>
</table>

Table 2
Communalities

<table>
<thead>
<tr>
<th>Items</th>
<th>Initial</th>
<th>Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1(^a)</td>
<td>.404</td>
<td>.543</td>
</tr>
<tr>
<td>Item 2</td>
<td>.309</td>
<td>.392</td>
</tr>
<tr>
<td>Item 3(^a)</td>
<td>.356</td>
<td>.485</td>
</tr>
<tr>
<td>Item 4</td>
<td>.194</td>
<td>.151</td>
</tr>
<tr>
<td>Item 5</td>
<td>.353</td>
<td>.446</td>
</tr>
<tr>
<td>Item 6(^a)</td>
<td>.317</td>
<td>.374</td>
</tr>
<tr>
<td>Item 7</td>
<td>.418</td>
<td>.610</td>
</tr>
<tr>
<td>Item 8</td>
<td>.303</td>
<td>.342</td>
</tr>
</tbody>
</table>

Note. \(^a\)Item was reverse coded.

Table 3
Parallel analysis comparing real-data eigenvalues to the random-data eigenvalues

<table>
<thead>
<tr>
<th>Factor</th>
<th>Real-data eigenvalues</th>
<th>Random data eigenvalues</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.458</td>
<td>1.381</td>
<td>retain</td>
</tr>
<tr>
<td>2</td>
<td>1.979</td>
<td>1.240</td>
<td>retain</td>
</tr>
<tr>
<td>3</td>
<td>0.939</td>
<td>1.127</td>
<td>reject</td>
</tr>
<tr>
<td>4</td>
<td>0.757</td>
<td>1.034</td>
<td>reject</td>
</tr>
<tr>
<td>5</td>
<td>0.584</td>
<td>0.948</td>
<td>reject</td>
</tr>
</tbody>
</table>
Table 4

Pattern Matrix

<table>
<thead>
<tr>
<th>Factor</th>
<th>Real-data eigenvalues</th>
<th>Random data eigenvalues</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.466</td>
<td>0.860</td>
<td>reject</td>
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<tr>
<td>7</td>
<td>0.439</td>
<td>0.761</td>
<td>reject</td>
</tr>
<tr>
<td>8</td>
<td>0.378</td>
<td>0.646</td>
<td>reject</td>
</tr>
</tbody>
</table>

Table 5

Cronbach’s alpha and average inter-item correlation for subscales and total scale

<table>
<thead>
<tr>
<th>subscale</th>
<th>alpha</th>
<th>Number of items</th>
<th>Average inter-item correlation</th>
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</thead>
<tbody>
<tr>
<td>α</td>
<td>.72</td>
<td>4</td>
<td>.42</td>
</tr>
<tr>
<td>Internal</td>
<td>.74</td>
<td>3</td>
<td>.46</td>
</tr>
<tr>
<td>Combined</td>
<td>.60</td>
<td>7</td>
<td>.17</td>
</tr>
</tbody>
</table>

Note. aItem was reverse coded.