Supplementary Text

A Longitudinal Mediation Analysis of the Effect of Negative-Self Schemas on Positive Symptoms via Negative Affect

Edo S. Jaya, Leonie Ascone, and Tania M. Lincoln

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# S. Text. 1 Socio-economic Status across Countries

The participants´ socio-economic status was assessed with a multidimensional question developed by Lampert and Kroll (2009) consisting of education, household income and job position. Socio-economic status data of the participants from Germany, Indonesia, and the United States (U.S.) is described here in greater detail. A similar description of the baseline sample *(n*= 2350) has been published elsewhere (Jaya & Lincoln, 2016), in which we describe the socio-economic status of the participants in the longitudinal data *(n =* 962). Objective socio-economic indicator data was not collected because objective indicators are difficult to compare or be combined between countries, particularly due to currency exchange rates. For example, the lowest income category in Germany (Under 1,250€) would roughly equal to Indonesian Rupiah 18,650,921 based on the exchange rate in December 2015, which then translates into the highest income category in Indonesia (Over Rp11.000.000). Such objective socio-economic indicators would render German participants with the lowest income category equal to Indonesian participants with the highest income category.

 Additionally, we presented census data from each respective country to indicate the representativeness of the sample. However, we would like to emphasize that the census data presented can only serve as a rough guide because the census categories are not always exactly the same as our survey’s socio-economic status categories. More details regarding the census data used, the differences regarding status categories and the general trend of the sample being more educated and having lower income are discussed in the following respective sections.

## Germany

### Education. The educational attainment of the participants are compared with the Germany 2013 census data from the German Federal Statistic office (Statistisches Bundesamt, 2015). However, several education categories cannot be matched perfectly with the categories used by the census data. For example, the survey’s lowest education category (“No school diploma, no vocational training certificate (Berufsabschluss), or currently in vocational training (in Lehre or in Berufsausbildung)”) is regarded as equal to the German census’s education category of “no vocational qualification attained”. Here, the trend is that the participants from our sample are more highly educated than Germany’s general population can be seen by the underrepresentation of the lowest educational attainment category (10.3% in our sample vs 26.4% in Germany) and the overrepresentation of the highest educational attainment category (16.7% in our sample vs 8.3% in Germany).

Table 1. Educational attainment of participants from Germany

|  |  |  |
| --- | --- | --- |
| Education | Participants *(n =* 312) | Germany 2013 (%) |
|  | Frequency | Percentage (%) |  |
| No school diploma, no vocational training certificate [Berufsabschluss], or currently in vocational training [Lehre, Berufsausbildung] | 32 | 10.3% | 26.4% |
| No school diploma and teacher [Lehre] or completed vocational training [Abgeschlossene Berufsfachschule, Handelsschule, Fachschule] | 30 | 9.6% | 18.4% |
| Completed high school [Realschule] and teacher [Lehre] or completed vocational training [Abgeschlossene Berufsfachschule, Handelsschule, Fachschule] or university/college student [Studenten] | 58 | 18.6% | 31.6% |
| Completed high school [Polytechnische Oberschule [POS] 10. Klasse,Fachhochschulreife, Abschluss Fachoberschule] and teacher [Lehre] or completed vocational training [Abgeschlossene Berufsfachschule, Handelsschule or Fachschule] or university/college student [Studenten] | 38 | 12.2% | 2.3% |
| Completed high school [Abitur] and no vocational training certificate [Berufsabschluss], or currently in vocational training [Lehre, Berufsausbildung], or university/college student [Studenten] | 76 | 24.4% | 5.9% |
| Completed high school [Abitur] and applied university degree [Abgeschlossenes Studium Fachhochschule, Ingenieurschule] | 26 | 8.3% | 5.3% |
| Completed high school [Abitur] and university degree [Abgeschlossenes Studium Universität/Hochschule] | 52 | 16.7% | 8.3% |

### Income. The average monthly income of the participants is compared with the average monthly income of German population 2008 from the German Federal Statistic office (Statistisches Bundesamt, 2012). Note, however, that the percentages are only an approximation. For example, the survey’s answer categories of 3,000-3,999€ and 4,000-4,999€ are regarded as equivalent to the category of 3,600 – 5,000€ in the German census data. Here, the trend that the participants from our sample have a lower income than Germany’s general population becomes clear by the underrepresentation of the highest income category (3.2% in our sample vs 13% in Germany) and the overrepresentation of the lowest income category (31.1% in our sample vs 20% in Germany).

Table 2. Average income of participants from Germany

|  |  |  |
| --- | --- | --- |
| Income | Participants *(n =* 312) | Germany 2008 (%) |
|  | Frequency | Percentage (%) |  |
| Under 1,250€ | 97 | 31.1% | 20% |
| 1,250-1,749€ | 55 | 17.6% | 12% |
| 1,750-2,249€ | 48 | 15.4% | 9% |
| 2,250-2,999€ | 56 | 17.9% | 32% |
| 3,000-3,999€ | 37 | 11.9% | 15% |
| 4,000-4,999€ | 9 | 2.9% |
| Over 5,000€ | 10 | 3.2% | 13% |

## Indonesia

### Education. The educational attainment of the participants are compared with the Indonesian 2010 census data from the Indonesian Statistic office (Badan Pusat Statistik, 2010). Here, the trend that the participants from our sample are more highly educated than the general population of Indonesia becomes evident by the underrepresentation of the lowest educational attainment category (3.2% in our sample vs 7.9% in Indonesia) and a major overrepresentation of the highest educational attainment category (49.1% in our sample vs 5.6% in Indonesia).

Table 3. Educational attainment of participants from Indonesia

|  |  |  |
| --- | --- | --- |
| Education | Participants *(n =* 348) | Indonesia 2010 (%) |
|  | Frequency | Percentage (%) |  |
| No school diploma, no vocational training certificate [SM Kejuruan], or currently in vocational training [Pendidikan non-formal setara paket A, B, C] | 11 | 3.2% | 7.9% |
| No school diploma and completed vocational training [menyelesaikan pendidikan non-formal setara paket A, B, C] | 1 | 0.3% | 7.6% |
| Elementary school diploma [SD] and completed vocational training [menyelesaikan pendidikan non-formal setara paket A, B, C] or student [mahasiswa] | 3 | 0.9% | 35.6% |
| Middle school diploma [SMP] and completed vocational training [menyelesaikan pendidikan non-formal setara paket A, B, C] or student [mahasiswa] | 9 | 2.6% | 17.5% |
| Completed high school [SMA] and no vocational training certificate, or currently in vocational training, or university/college student | 105 | 30.2% | 23.0% |
| Completed high school [SMA] and college certificate [Diploma I/II/III] | 48 | 13.8% | 2.9% |
| Completed high school [SMA] and university degree [S1/S2/S3] | 171 | 49.1% | 5.6% |

### Income. The average monthly household expenditure of the participants is compared with the average monthly household expenditure of the Indonesian population in 2011 from the Indonesian statistical office (Badan Pusat Statistik, 2011). Income is difficult to compare across living conditions in Indonesia due to the wide range of economic conditions. To illustrate, the minimum monthly wage in Indonesian provinces range from USD$ 226 in Jakarta to USD$ 80 in Central Java (approximation, see (Wage Indicator, 2015)). Here we do not find evidence of the trend that the participants from our sample are of lower income than the general population of Indonesia. The trend seems to be the reverse.

Table 4. Average income of participants from Indonesia

|  |  |  |
| --- | --- | --- |
| Income | Participants *(n =* 348) | Indonesia 2011 (%) |
|  | Frequency | Percentage (%) |  |
| Under Rp1.000.000 | 28 | 8.0% | 87.2% |
| Rp1.000.000-Rp3.000.000 | 138 | 39.7% | 12.8% |
| Rp3.000.000-Rp5.000.000 | 84 | 24.1% |
| Rp5.000.000-Rp7.000.000 | 48 | 13.8% |
| Rp7.000.000-Rp9.000.000 | 17 | 4.9% |
| Rp9.000.000-Rp11.000.000 | 10 | 2.9% |
| Over Rp11.000.000 | 23 | 6.6% |

## United States

### Education. The educational levels of the participants are compared with the U.S. census data from U.S. Census Bureau, Current Population Survey, 2013 Annual Social and Economic Supplement (U.S. Census Bureau, 2013). Here, the trend that the participants from our sample are more highly educated than the general population of the U.S. becomes evident in the underrepresentation of the lowest educational attainment category (1.7% in our sample vs 12.23% in the U.S.) and a slight overrepresentation of the highest educational attainment category (3.6% in our sample vs 2.95% in the U.S.)

Table 5. Educational attainment of participants from the United States

|  |  |  |
| --- | --- | --- |
| Education | Participants *(n =* 302) | U.S. 2013 (%) |
|  | Frequency | Percentage (%) |  |
| Elementary or middle school | 5 | 1.7% | 12.23% |
| High school | 55 | 18.2% | 29.67% |
| Some college, no degree | 93 | 30.8% | 18.31% |
| Associate degree | 24 | 7.9% | 9.59% |
| Bachelor degree | 85 | 28.1% | 19.37% |
| Master degree | 29 | 9.6% | 7.88% |
| Professional or doctoral degree | 11 | 3.6% | 2.95% |

### Income. The average household yearly income of the participants is compared with the household yearly income U.S. census data from U.S. Census Bureau, Annual Social and Economic Supplement 2014 (U.S. Census Bureau, 2014). Here, the trend that the participants from our sample have lower income than the general population of the U.S. is less apparent. Although there is a visible underrepresentation of the highest income category (2.6% in our sample vs 10.38% in the U.S.), there is only a slight overrepresentation of the lowest income category (23.8% in our sample vs 23.52% in the U.S.).

Table 6. Average household yearly income of participants from the United States

|  |  |  |
| --- | --- | --- |
| Income | Participants *(n =* 302) | U.S. 2014 (%) |
|  | Frequency | Percentage (%) |  |
| Under US$24,999  | 72 | 23.8% | 23.52% |
| US$25,000 to US$49,999 | 93 | 30.8% | 23.23% |
| US$50,000 to US$74,999 | 59 | 19.5% | 17.04% |
| US$75,000 to US$99,999 | 42 | 13.9% | 11.54% |
| US$100,000 to US$124,999 | 21 | 7.0% | 8.15% |
| US$125,000 to US$149,999 | 7 | 2.3% | 4.97% |
| Above US$150,000 | 8 | 2.6% | 10.38% |

**S. Text 2 Comparison of Participants who Completed One or Several Follow-Up Assessments with Participants who did not Complete any Follow-Up Assessment**

A series of independent sample t-tests and chi-square tests were conducted to compare participants who completed one or several follow-up assessments (FU) with participants who did not complete any follow-up assessment (noFU) on several variables such as demographic (age, sex, socio-economic status), mental health condition (ever been diagnosed with a mental disorder or not, ever been diagnosed with schizophrenia and other psychoses or not), and baseline variables of interest (negative-self schemas (NSS), negative affect and positive symptoms).

We found significant differences between participants who completed one follow-up assessment or more (FU, *n =* 962) with participants who did not complete any follow-up assessment (noFU, *n =* 1368) on all demographic variables such as age (FU, *M =* 34.41, *SD =* 11.85; noFU, *M =* 31.22, *SD =* 10.86; *t(*1947.99) = -6.65, *p =* 0.001), socio-economic status (FU, *M =* 10.27, *SD =* 3.77; noFU, *M =* 9.91, *SD =* 3.90; *t(*2348) = -2.24, *p =* 0.025) and gender (FU, male = 54.4%; noFU, male = 67.7%; *χ2* (1, 2350) = 42.66, *p =* 0.001), as well as positive symptoms (FU, *M =* 2.23, *SD =* 1.47; noFU, *M =* 2.62, *SD =* 1.76; t(2265.49) = 5.80, *p =* 0.001). Thus, noFU participants were significantly younger, had lower socio-economic status, were more likely to be male and had a higher positive symptoms score in comparison to participants who completed at least one follow-up assessment.

We did not find significant differences between the comparison groups on mental health conditions, negative schema and negative affect. Specifically, there were no significant differences between FU-participants *(n =* 962) and noFU-participants *(n =* 1368) on the proportion of any lifetime mental health disorder (FU, diagnosed = 31.2%; noFU, diagnosed = 27.4%; *χ2* (1, 2350) = 3.85, *p =* 0.050) and lifetime schizophrenia and other psychoses (FU, diagnosed = 96.7%; noFU, diagnosed = 96.4%; *χ2* (1, 2350) = 0.13, *p =* 0.720). Additionally, there were no significant differences between FU-participants *(n =* 962) and noFU participants *(n =* 1368) on baseline assessment of NSS (FU, *M =* 1.79, *SD =* 0.90; noFU, *M =* 1.85, *SD =* 0.98; *t(*2170.73) = 1.23, *p =* 0.217) and negative affect (FU, *M =* 1.92, *SD =* 0.78; noFU, *M =* 1.90, *SD =* 0.76; *t(*2348) = -0.43, *p =* 0.666). Thus, participants who did not complete any follow-up assessment were not significantly different to participants who completed at least one follow-up assessment in regard to the proportion of mental health diagnoses, NSS and negative affect.

**S. Text 3 Discussion of the Longitudinal Mediation Analysis of the Effect of Negative-Other Schemas on Positive Symptoms via Negative Affect**

## Preconditions for Cross-Lagged Panel Models

First, the saturated models show that negative-other schemas, negative affect, and positive symptoms were significantly correlated with each other within and across time points (see Supplementary Table S. Table 8). Second, the within-construct longitudinal models show that previous measures significantly predicted subsequent measures for all variables of interest (see Supplementary Table S. Table 9) indicating that these constructs are stable over time to a certain extent. In addition, all fit indices of the cross-lagged panel models tested below met at least two out of three goodness of fit criteria (see notes of Supplementary Table S. Table 10 to 13), indicating that all parameter estimates can be interpreted. Thus, the preconditions for testing the hypotheses with cross-lagged panel models are fulfilled.

## Preconditions for Longitudinal Mediation Analysis

First, there was no significant pathway from negative-other schemas to positive symptoms at the following time-points. However, there was a significant reverse pathway from positive symptoms to negative-other schemas (for details see Supplementary Table S. Table 10). Second, there was no significant pathway from negative-other schemas to negative affect at the following time-points. However, again there were two significant reverse pathways from negative affect to negative-other schemas (for details see Supplementary Table S. Table 11). Third, as stated in the article we found that negative affect significantly predicted positive symptoms at the following time-points. There were no significant reverse pathways from positive symptoms to negative affect (for details see Figure 1c and Supplementary Table S. Table 6). Although Baron and Kenny (1986) caution against proceeding with a longitudinal mediation analysis in the absence of a significant total effect, the view that a total effect is absolutely necessary for a mediation analysis has been contested (e.g. (Hayes, 2013) which is why we have computed and report the longitudinal mediation analysis for reasons of completeness .

### Longitudinal mediation

As in the model in Figure 2 of the article, there are three possible indirect pathways from negative-other schemas at T0 via negative affect to positive symptoms at T3, of which none was significant. The unstandardized indirect effect estimate ranges from -0.002 to 0.005 with p-value ranging from 0.172 to 0.483. This result is consistent with the results of the independent cross-lagged panel analysis of negative-other schemas and positive symptoms, in which negative-other schemas had no significant effect on positive symptoms.

**Discussion**

There was no significant effect of negative-other schemas on positive symptoms, and no significant effect of negative-other schemas on negative affect. Consistent with these findings, there was no significant mediation path from negative-other schemas to positive symptoms via negative affect. Interestingly, however, there is evidence of a reverse causation from negative affect and positive symptoms to negative-other schemas.

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