

Moderated Mediation example (Single mediator) write-up

(note that I don't have exact APA here)

I usually put something like this in a Data Analysis paragraph in the Method section

The hypothesised moderated mediation model (see Figure 1) was tested in a single model using a bootstrapping approach to assess the significance of the indirect effects at differing levels of the moderator (Hayes, 2013). Positive mood induction condition was the predictor variable, with positive thoughts as the mediator. The outcome variable was attitude and need for cognition was the proposed moderator. Moderated mediation analyses test the conditional indirect effect of a moderating variable (i.e., need for cognition) on the relationship between a predictor (i.e., positive mood condition vs neutral mood condition) and an outcome variable (i.e., attitude) via potential mediators (i.e., positive thoughts). The "PROCESS" macro, model 7, v2.16 (Hayes, 2013) in SPSS ver 23 with bias-corrected 95% confidence intervals ($n = 10000$) was used to test the significance of the indirect (i.e., mediated) effects moderated by need for cognition, i.e., conditional indirect effects. This model explicitly tests the moderating effect on the predictor to mediator path (i.e., path a). An index of moderated mediation was used to test the significance of the moderated mediation, i.e., the difference of the indirect effects across levels of need for cognition (Hayes, 2015). Significant effects are supported by the absence of zero within the confidence intervals.

Then in the Results Section:

(sometimes you may repeat information - to remind the reader)

Tests of conditional indirect effects.

The hypothesised moderated mediation model was tested using the PROCESS macro model number 7, which tests a model whereby need for cognition moderates the effect of path a (Figure 1; Hayes, 2013). Need for cognition was found to moderate the effect of mood condition and attitude (Unstandardised interaction $B = 1.25$, $Bse = .51$, $t = 2.45$, $p = .02$). Greater positive thoughts was associated with better attitude, $B = 1.16$, $Bse = .19$, $t = 6.24$, $p < .001$. The overall moderated mediation model was supported with the index of moderated mediation = 1.45 (95% CI = $.39$; 2.93). As zero is not within the CI this indicates a significant moderating effect of need for cognition on mood condition on the indirect effect via positive thoughts (Hayes, 2015). The conditional indirect effect was strongest in those high in need for cognition (1 SD above the mean of NFC; effect = 7.06 , $SE = 1.65$, 95% CI = 4.18 ; 10.66) and weakest in those low in need for cognition (1 SD below the mean, effect = 2.97 , $SE = 1.33$, 95% CI = $.80$; 6.23).

If you wanted you could also report the differences between the indirect effects and the effect of any covariates)

For a published example with a dichotomous predictor and continuous moderated (and the inclusion of covariates) see Maxwell, A.M., Loxton, N.J., & Hennehan, J.M. (2017). Exposure to food cues moderates the indirect effect reward sensitivity and external eating via implicit eating expectancies. *Appetite*, 111, 135-141

Link: <https://doi.org/10.1016/j.appet.2016.12.037>

For other examples see: <https://dayone.me/1ccXzga>

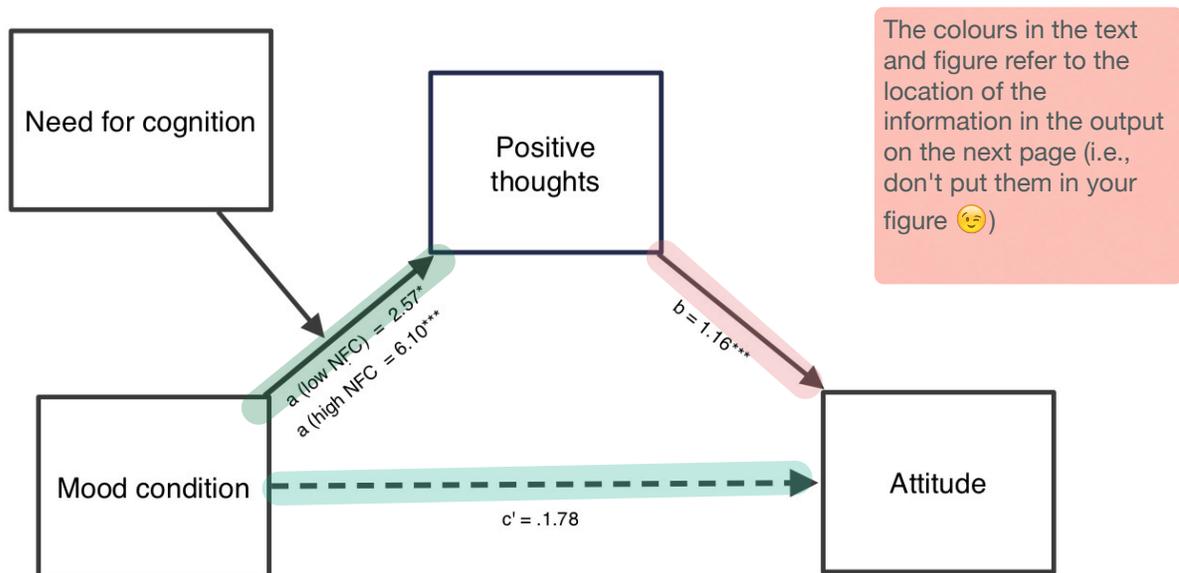


Figure 1. Conditional indirect effects of mood condition and attitude via positive thoughts, at high (+1 SD) and low (-1 SD) Need for cognition. The coefficients in parentheses are unstandardised.

* $p < .05$, *** $p < .001$.

Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York: Guilford Press.

Hayes, A. F. (2015). An Index and Test of Linear Moderated Mediation. *Multivariate Behave Res*, 50, 1-22.

To get the coefficients for the "a" paths above I had to run a separate moderation analysis (Model 1). See below.

In a journal paper you may not have the word length to present this separately but in a thesis you probably want to present the simple effects in a graph as per Stefano's class. E.g., you may want to report the interaction like:

Tests of simple slopes (i.e., conditional effects on path a found a weaker (albeit significant) association between mood condition and positive thoughts for those low in need for cognition ($B = 2.57$, $Bse = 1.0$, $t = 2.57$, $p = .01$) relative to those high in need for cognition ($B = 6.10$, $Bse = 1.0$, $t = 6.07$, $p < .001$). Participants with higher need for cognition and in the positive mood condition had higher positive thoughts than those low in need for cognition.

This information comes from the moderation analysis. You can also use the output from the option in PROCESS "Generate data for plotting" to create a simple slopes graph in Excel as per 6020PSY.

🤔 Where the numbers come from....

Moderated Mediation

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Release 2.16.1 *****

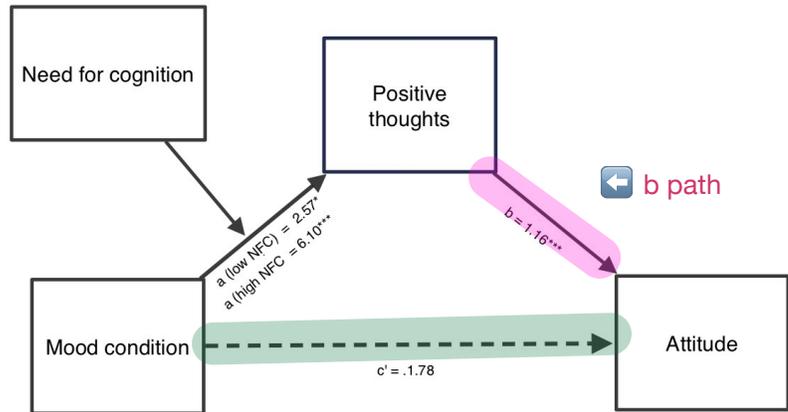
Written by Andrew
Documentation available

Model = 7
Y = ATT
X = MOOD
M = POS
W = NFC

Sample size
100

Outcome: POS

Model Summary
R R-sq 4
.5656 .3200



Model	coeff	se	t	p	LLCI	ULCI
constant	.0404	.6971	.0579	.9540	-1.3435	1.4242
MOOD	4.3357	.6971	6.2193	.0000	2.9519	5.7196
NFC	.7672	.5130	1.4956	.1380	-.2510	1.7854
int_1	1.2565	.5130	2.4496	.0161	.2383	2.2747

Test of the interaction

Product terms key:

int_1	MOOD	X	NFC
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Outcome: ATT

Model Summary
R R-sq MSE F df1 df2 p
.6356 .4039 171.5940 32.8662 2.0000 97.0000 .0000

Model	coeff	se	t	p	LLCI	ULCI
constant	1.9807	1.3099	1.5121	.1338	-.6192	4.5806
POS	1.1571	.1853	6.2450	.0000	.7894	1.5248
MOOD	1.7844	1.5343	1.1631	.2477	-1.2607	4.8295

b path
c' path

***** DIRECT AND INDIRECT EFFECTS *****

Direct effect of X on Y

Effect	SE	t	p	LLCI	ULCI
1.7844	1.5343	1.1631	.2477	-1.2607	4.8295

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Test of the indirect effect at low and high moderator

Mediator	NFC	Effect	Boot SE	BootLLCI	BootULCI
POS	-1.4046	2.9747	1.3296	.8216	6.0690
POS	.0000	5.0168	1.2038	2.9676	7.6647
POS	1.4046	7.0590	1.6405	4.2486	10.6768

Values for quantitative moderators are the mean and plus/minus one SD from mean.
 Values for dichotomous moderators are the two values of the moderator.

***** INDEX OF MODERATED MEDIATION *****

Test of the moderated effect

Mediator	Index	SE(Boot)	BootLLCI	BootULCI
POS	1.4539	.6290	.3961	2.9639

***** ANALYSIS NOTES AND WARNINGS *****

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
 10000

Level of confidence for all confidence intervals in output:
 95.00

----- END MATRIX -----

To get the coefficients for the a path you need to run the moderated component using Model 1

***** PROCESS Procedure for SPSS Release 2.16.1 *****

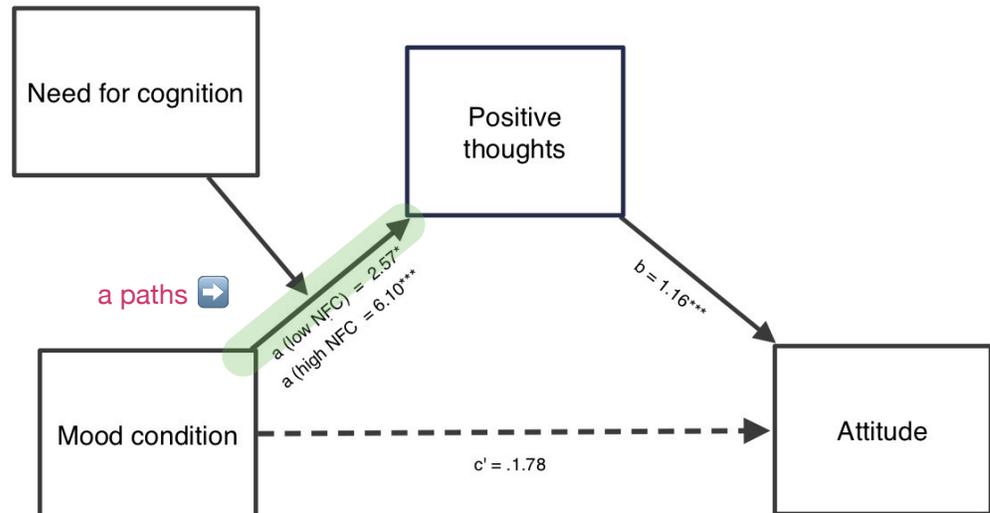
Written by Andrew F. Hayes, Ph.D. www.afhayes.com
 Documentation available in Hayes (2013). www.guilford.com/p/hayes3

Model = 1
 Y = POS
 X = MOOD
 M = NFC

Sample size
 100

 Outcome: POS

Ignore the rest of the output. We only care about the conditional effects (i.e., the simple slopes)



Conditional effect of X on Y at values of the moderator(s):

NFC	Effect	se	t	p	LLCI	ULCI
-1.4046	2.5708	.9998	2.5714	.0117	.5863	4.5554
.0000	4.3357	.6971	6.2193	.0000	2.9519	5.7196
1.4046	6.1006	1.0053	6.0684	.0000	4.1051	8.0962

Values for quantitative moderators are the mean and plus/minus one SD from mean.

Values for dichotomous moderators are the two values of the moderator.

If you want to plot the simple slopes of the a path then use the "Generate data for plotting" under "Options" and follow your 6020PSY notes

Data for visualizing conditional effect of X on Y
Paste text below into a SPSS syntax window and execute to produce plot.

```
DATA LIST FREE/MOOD NFC POS.  
BEGIN DATA.
```

```
    -1.0000    -1.4046    -3.6080  
     1.0000    -1.4046     1.5336  
    -1.0000     .0000    -4.2954  
     1.0000     .0000     4.3761  
    -1.0000     1.4046    -4.9827  
     1.0000     1.4046     7.2186
```

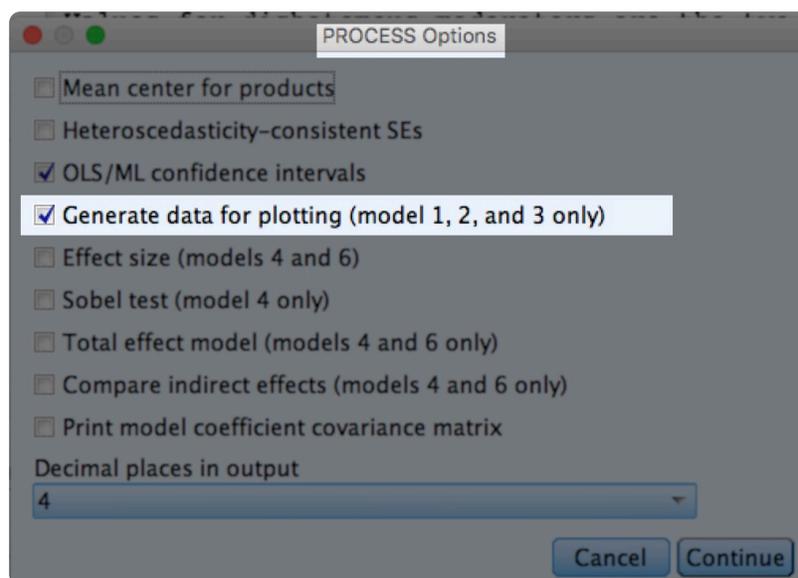
```
END DATA.  
GRAPH/SCATTERPLOT=NFC WITH POS BY MOOD.
```

```
***** ANALYSIS NOTES AND WARNINGS *****
```

```
Level of confidence for all confidence intervals in output:  
95.00
```

```
----- END MATRIX -----
```

restore.



For information on running this analysis see:
<https://app.box.com/s/xi5bgxh3ubzzwz67gd7vjrfy66d3zny5>

