Linear Regression Series Part 4: Mediators and Moderators

Zin Htway, Ph.D., MBA, CT (ASCP, IAC)
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Linear Regression Series Part 4: Mediators and Moderators

Zin Htway, Ph.D., MBA, CT (ASCP, IAC)
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Moderator:
A moderator variable changes the strength of an effect or relationship between two variables. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship as the value of the moderator changes.
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A moderator variable changes the strength of an effect or relationship between two variables. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship as the value of the moderator changes.

Non-Moderator effect

Moderator effect
Mediators:
Mediator variables specify how or why a particular effect or relationship occurs. Mediators describe the psychological process that occurs to create the relationship, and as such are always dynamic properties of individuals (e.g., emotions, beliefs, behaviors).
Andrew F. Hayes, Ph.D.
PROCESS for SPSS (plug-in for SPSS)

Moderation analysis:
SPSS > Analyze > Regression > PROCESS
Moderation analysis:
DV = Outcome Variable (Y)
IV1 = Independent Variable (X)
IV2 = M Variable(s) [Moderator Variable]
Model Number = 1 [Simple Moderation]
Moderation analysis: Output
Moderator (p < .05)

Model = 1
Y = DV
X = IV1
M = IV2

Sample size
401
Moderation analysis: Output Moderator (p < .05)

Outcome: DV

Model Summary

<table>
<thead>
<tr>
<th>R</th>
<th>R-sq</th>
<th>MSE</th>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>.9350</td>
<td>.8743</td>
<td>1.0547</td>
<td>1476.8682</td>
<td>3.0000</td>
<td>397.0000</td>
<td>.0000</td>
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</tbody>
</table>

Model

<table>
<thead>
<tr>
<th></th>
<th>coeff</th>
<th>se</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
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<td>6.2678</td>
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<tr>
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<td>50.8975</td>
<td>.0000</td>
<td>.3309</td>
<td>.3575</td>
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<tr>
<td>IV1</td>
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<td>.0587</td>
<td>-32.4255</td>
<td>.0000</td>
<td>-2.0190</td>
<td>-1.7882</td>
</tr>
<tr>
<td>int_1</td>
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<td>.0037</td>
<td>-16.2801</td>
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<td>-.0535</td>
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</tbody>
</table>

Interactions:

<table>
<thead>
<tr>
<th>int_1</th>
<th>IV1</th>
<th>X</th>
<th>IV2</th>
</tr>
</thead>
</table>
Moderation analysis: Output Moderator (p < .05)

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

<table>
<thead>
<tr>
<th>IV2</th>
<th>Effect</th>
<th>se</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>-12.1736</td>
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<td>-1.2903</td>
<td>-1.0342</td>
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<tr>
<td>.0000</td>
<td>-1.9036</td>
<td>.0587</td>
<td>-32.4255</td>
<td>.0000</td>
<td>-2.0190</td>
<td>-1.7882</td>
</tr>
<tr>
<td>12.1736</td>
<td>-2.6450</td>
<td>.0825</td>
<td>-32.0749</td>
<td>.0000</td>
<td>-2.8071</td>
<td>-2.4829</td>
</tr>
</tbody>
</table>
Moderator:
A moderator variable changes the strength of an effect or relationship between two variables. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship as the value of the moderator changes.

Non-Moderator effect

Moderator effect
Moderation analysis:
DV = Outcome Variable (Y)
IV1 = Independent Variable (X)
IV3 = M Variable(s) [Moderator Variable]
Model Number = 1 [Simple Moderation]
Moderation analysis: Output
Non-moderator (p > .05)

Model = 1
Y = DV
X = IV1
M = IV3

Sample size
401
Moderation analysis: Output
Non-moderator (p > .05)

Outcome: DV

Model Summary

<table>
<thead>
<tr>
<th>R</th>
<th>R-sq</th>
<th>MSE</th>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0828</td>
<td>.0069</td>
<td>8.3308</td>
<td>.9210</td>
<td>3.0000</td>
<td>397.0000</td>
<td>.4306</td>
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</table>

Model

<table>
<thead>
<tr>
<th>coeff</th>
<th>se</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>constant</td>
<td>5.4914</td>
<td>.1449</td>
<td>37.8889</td>
<td>.0000</td>
<td>5.2065</td>
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<td>IV3</td>
<td>-.1134</td>
<td>.0728</td>
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<td>.1201</td>
<td>-.2565</td>
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<tr>
<td>IV1</td>
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<td>.1053</td>
<td>-5.8430</td>
<td>.5593</td>
<td>-.2687</td>
</tr>
<tr>
<td>int_1</td>
<td>.0207</td>
<td>.0546</td>
<td>.3788</td>
<td>.7050</td>
<td>-.0867</td>
</tr>
</tbody>
</table>

Interactions:
int_1 IV1 X IV3
**Moderation analysis: Output**

**Non-moderator (p > .05)**

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

<table>
<thead>
<tr>
<th>IV3</th>
<th>Effect</th>
<th>se</th>
<th>t</th>
<th>p</th>
<th>LLCI</th>
<th>ULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1.9624</td>
<td>-.1022</td>
<td>.1454</td>
<td>-.7026</td>
<td>.4827</td>
<td>-.3881</td>
<td>.1837</td>
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<tr>
<td>.0000</td>
<td>-.0616</td>
<td>.1053</td>
<td>-.5843</td>
<td>.5593</td>
<td>-.2687</td>
<td>.1456</td>
</tr>
<tr>
<td>1.9624</td>
<td>-.0209</td>
<td>.1551</td>
<td>-.1351</td>
<td>.8926</td>
<td>-.3258</td>
<td>.2839</td>
</tr>
</tbody>
</table>
Moderator:
A moderator variable changes the strength of an effect or relationship between two variables. A moderator may increase the strength of a relationship, decrease the strength of a relationship, or change the direction of a relationship as the value of the moderator changes.

Non-Moderator effect

Moderator effect
Mediation analysis:
DV = Outcome Variable (Y)
IV5 = Independent Variable (X)
IV6 = M Variable(s) [Mediation Variable]
Model Number = 4 [Simple Mediation]
Mediation analysis: Output
Mediator (Significant: BootC.I. ≠ 0)

Model = 4

Y = DV
X = IV5
M = IV6

Sample size
401
Mediation analysis: Output
Mediator (Significant: Boot C.I. ≠ 0)

Indirect effect of X on Y

<table>
<thead>
<tr>
<th>Mediator</th>
<th>Effect</th>
<th>Boot SE</th>
<th>BootLLCI</th>
<th>BootULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV6</td>
<td>.1518</td>
<td>.0157</td>
<td>.1197</td>
<td>.1817</td>
</tr>
</tbody>
</table>
Mediators:
Mediator variables specify how or why a particular effect or relationship occurs. Mediators describe the psychological process that occurs to create the relationship, and as such are always dynamic properties of individuals (e.g., emotions, beliefs, behaviors).
Mediation analysis:
DV = Outcome Variable (Y)
IV5 = Independent Variable (X)
IV3 = M Variable(s) [Mediation Variable]
Model Number = 4 [Simple Mediation]
Mediation analysis: Output
Mediator (Non-significant: BootC.I. = 0)

Model = 4
Y = DV
X = IV5
M = IV3

Sample size
401
Mediation analysis: Output
Mediator (Non-significant: BootC.I. = 0)

Indirect effect of X on Y

<table>
<thead>
<tr>
<th>Effect</th>
<th>Boot SE</th>
<th>BootLLCI</th>
<th>BootULCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV3</td>
<td>0.0003</td>
<td>-0.0023</td>
<td>0.0042</td>
</tr>
</tbody>
</table>
Mediators:
Mediator variables specify how or why a particular effect or relationship occurs. Mediators describe the psychological process that occurs to create the relationship, and as such are always dynamic properties of individuals (e.g., emotions, beliefs, behaviors).
To investigate [RQ] a [simple] moderator analysis was performed using PROCESS. The outcome variable for analysis was [DV]. The predictor variable for the analysis was [IVP]. The moderator variable evaluated for the analysis was [IVM]. The interaction between [IVP] and [IVM] was found to be statistically significant \[B = XXXX, 95\% \text{ C.I.} (yy, zz), p < .05\]. The conditional effect of [IVP] on [DV] showed corresponding results. At low moderation [IVP] = AAAA, the [conditional effect = dddddd, 95\% \text{ C.I.} (yy, zz), p < .05]. At middle moderation [IVP] = .0000, the [conditional effect = eeee, 95\% \text{ C.I.} (yy, zz), p < .05]. At high moderation [IVP] = CCCC, the [conditional effect = ffff, 95\% \text{ C.I.} (yy, zz), p < .05]. These results identify [IVM] as a [negative/positive/non-] moderator of the relationship between [IVP] and [DV].
To investigate [RQ] a simple mediation analysis was performed using PROCESS. The outcome variable for analysis was [DV]. The predictor variable for the analysis was [IVP]. The mediator variable for the analysis was [IVM]. The indirect effect of [IVP] on [DV] was found to be statistically significant [Effect = XXXX, 95% C.I. (yy, zz)].
Questions
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