

# MedTextR Output

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## MedTextR R Statistical Summaries

### Descriptives

person	xvar	yvar	hous_conts	entit_conts
Min. : 1.00	Min. :0.000	Min. : 0.00	Min. : 0.000	Min. : 0.000
1st Qu.: 54.00	1st Qu.:0.000	1st Qu.: 0.00	1st Qu.: 0.000	1st Qu.: 0.000
Median : 99.00	Median :0.000	Median :17.14	Median : 2.680	Median : 1.320
Mean : 94.77	Mean :0.422	Mean :15.55	Mean : 3.462	Mean : 2.323
3rd Qu.:135.00	3rd Qu.:1.000	3rd Qu.:30.00	3rd Qu.: 5.320	3rd Qu.: 4.000
Max. :179.00	Max. :1.000	Max. :30.00	Max. :20.000	Max. :10.680

sr_hc	mvar	ec9	m2	x2
Min. :0.000	Min. : 0.00	Min. : 0.000	Min. : 0.0	Min. :0.000
1st Qu.:0.000	1st Qu.: 0.00	1st Qu.: 0.000	1st Qu.: 0.0	1st Qu.:0.000
Median :1.637	Median : 8.00	Median : 4.000	Median : 64.0	Median :0.000
Mean :1.475	Mean :10.39	Mean : 6.972	Mean : 239.5	Mean :0.422
3rd Qu.:2.307	3rd Qu.:16.00	3rd Qu.:12.000	3rd Qu.: 256.0	3rd Qu.:1.000
Max. :4.472	Max. :60.00	Max. :32.000	Max. :3600.0	Max. :1.000

xm
Min. : 0.000
1st Qu.: 0.000
Median : 0.000
Mean : 5.725
3rd Qu.: 8.000
Max. :44.000

Step 1 Result

yvar ~ xvar

Call:

lm(formula = dog, data = RaDa)

Residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-19.342 -12.784 1.356 10.658 17.216

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	12.784	1.607	7.955	1.99e-12	***
xvar	6.558	2.474	2.651	0.00924	**

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 12.76 on 107 degrees of freedom  
 Multiple R-squared: 0.06163, Adjusted R-squared: 0.05286  
 F-statistic: 7.028 on 1 and 107 DF, p-value: 0.009245

	2.5 %	97.5 %
(Intercept)	9.598294	15.96996
xvar	1.653970	11.46212

Step 2 Results

mvar ~ xvar

Call:

lm(formula = dog, data = RaDa)

Residuals:

Min	1Q	Median	3Q	Max
-13.565	-8.063	-3.565	3.937	51.937

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	8.063	1.417	5.689	1.12e-07	***
xvar	5.502	2.182	2.522	0.0132	*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 11.25 on 107 degrees of freedom  
 Multiple R-squared: 0.05609, Adjusted R-squared: 0.04727  
 F-statistic: 6.358 on 1 and 107 DF, p-value: 0.01316

	2.5 %	97.5 %
(Intercept)	5.253638	10.873346
xvar	1.176407	9.827044

Steps 3 and 4 Results

```
yvar ~ xvar + mvar
```

Call:

```
lm(formula = dog, data = RaDa)
```

Residuals:

Min	1Q	Median	3Q	Max
-18.612	-9.024	0.781	9.687	20.977

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	9.0235	1.6796	5.372	4.64e-07	***
xvar	3.9922	2.3318	1.712	0.0898	.
mvar	0.4664	0.1004	4.646	9.76e-06	***

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 11.68 on 106 degrees of freedom

Multiple R-squared: 0.2204, Adjusted R-squared: 0.2057

F-statistic: 14.98 on 2 and 106 DF, p-value: 1.859e-06

	2.5 %	97.5 %
(Intercept)	5.6935620	12.3535092
xvar	-0.6308431	8.6152296
mvar	0.2673646	0.6653805

Bootstrap Results

	Estimate	CI.Lower_BCa	CI.Upper_BCa
Indirect.Effect	2.565854	0.668775	5.16529

Nonlinear effect of M on Y Results

```
yvar ~ xvar + mvar + m2
```

Call:

```
lm(formula = dog, data = RaDa)
```

Coefficients:

(Intercept)	xvar	mvar	m2
7.3230	3.1671	0.9357	-0.0118

Interaction of X and M Results

```
yvar ~ xvar + mvar + xm
```

Call:  
lm(formula = dog, data = RaDa)

Coefficients:  
(Intercept)           xvar                    mvar                    xm  
          9.5608           2.4789            0.3997            0.1386

### Step 1 Robust Results

Call: rlm(formula = yvar ~ xvar, data = RaDa)

Residuals:  
      Min        1Q    Median        3Q        Max  
-19.342 -12.784    1.356   10.658   17.216

Coefficients:  
                  Value    Std. Error t value  
(Intercept) 12.7841   1.6071    7.9549  
xvar            6.5580   2.4738    2.6510

Residual standard error: 18.95 on 107 degrees of freedom

### Step 2 Robust Results

Call: rlm(formula = mvar ~ xvar, data = RaDa)

Residuals:  
      Min        1Q    Median        3Q        Max  
-12.082  -6.839  -2.082    5.161   53.161

Coefficients:  
                  Value    Std. Error t value  
(Intercept) 6.8391   1.1642    5.8744  
xvar           5.2427   1.7921    2.9254

Residual standard error: 10.14 on 107 degrees of freedom

### Steps 3 and 4 Robust Results

Call: rlm(formula = yvar ~ xvar + mvar, data = RaDa)

Residuals:  
      Min        1Q    Median        3Q        Max  
-18.6092 -8.9576    0.8393    9.7524   21.0424

## Coefficients:

	Value	Std. Error	t value
(Intercept)	8.9576	1.7042	5.2561
xvar	4.0324	2.3660	1.7043
mvar	0.4683	0.1018	4.5977

Residual standard error: 14.46 on 106 degrees of freedom

## Text and Graphical Output

WARNINGS: 1. There is one outlier (studentized residual greater than 3.5) for the variable Housing Contacts. Examine the output to see what observations are considered to be outliers. 2. There is evidence that the effect of Housing Contacts on Stable Housing is nonlinear and either a data transformation or a nonlinear term might be advisable.

### MEDIATIONAL MODEL

The causal variable or X is Treatment, a manipulated variable, and is a dichotomy with 42.2% Controls and 57.8% Treateds, the outcome variable or Y variable is Stable Housing, and the mediator or M is Housing Contacts. The causal mediational model is as follows: The variable Treatment is presumed to cause Housing Contacts, which in turn is presumed to cause Stable Housing. If there were complete mediation, then the causal effect of Treatment on Stable Housing controlling for Housing Contacts would be zero.

For the estimates below to be valid, it must be assumed that there is no measurement error in Housing Contacts. Additionally, it must be assumed that there are no unmeasured common causes of Housing Contacts and Stable Housing. It must be assumed that Stable Housing does not cause Housing Contacts. Finally, it must be assumed that Treatment and Housing Contacts do not interact to cause Stable Housing.

### RESULTS

#### Descriptive Statistics

There are a total of 109 observations with no missing data. The means and standard deviations are presented in Table 1. The unexplained variance in Housing Contacts is equal to 126.571 (sd = 11.250) controlling for Treatment, with a multiple correlation for the regression equation of 0.237. The unexplained variance in Stable Housing is equal to 136.455 (sd = 11.681) controlling for Treatment and Housing Contacts, with a multiple correlation for the regression equation of 0.469.

#### Power

In this section, theoretical power analyses are computed using the study's sample size of 109 with an alpha of .05. Baron and Kenny (1986)

terminology is used. (The power of the test for Steps 1, 2, and 4 does not take into account that Treatment is a dichotomy.) The power of the Step 1 test is .15, assuming that direct effect (path c') is zero and that all other paths have a moderate effect size ( $r = .3$ ). The power of the Step 1 test is .89, assuming that direct effect (path c') is moderate ( $r = .3$ ) and that the other paths are zero. The power of the Step 2 test or a is .89, assuming that effect size is moderate ( $r = .3$ ). The power of the Step 3 (path b) and Step 4 (path c') tests is .88, assuming that the tested path has a moderate effect size ( $r = .3$ ) and the other path is zero, and the correlation between Treatment and Housing Contacts is .237 (the actual correlation between those variables). A conservative estimate of power of the test of the indirect effect is .56 assuming that a and b have moderate effect sizes and that the direct effect is zero. Again, all of these power calculations are hypothetical based on the assumption of moderate effect sizes.

#### The Four Steps

The results of the four Baron and Kenny (1986) steps, which are summarized in Table 2, are as follows. The effect of Treatment on Stable Housing or path c is equal to 6.558 ( $p = .009$ ), with a 95% confidence interval of 1.654 to 11.462 and a medium effect size ( $d = 0.514$ ). The least squares mean for Controls is equal to 12.784 and the mean for Treateds is equal to 19.342. Step 1 has been passed. The effect of Treatment on Housing Contacts or path a is equal to 5.502 ( $p = .013$ ), with a 95% confidence interval of 1.176 to 9.827 and a small effect size ( $d = 0.489$ ). The least squares mean for Controls is equal to 8.063 and the mean for Treateds is equal to 13.565. Step 2 has been passed. The effect of Housing Contacts on Stable Housing controlling for Treatment or path b is equal to 0.466 ( $p < .001$ ), with a 95% confidence interval of 0.267 to 0.665 and a medium effect size ( $r = 0.411$ ). Step 3 has been passed. The effect of Treatment on Stable Housing controlling for Housing Contacts or path c' is equal to 3.992 ( $p = .090$ ), with a 95% confidence interval of -0.631 to 8.615 and a small effect size ( $d = 0.342$ ). The least squares mean for Controls is equal to 12.784 and the mean for Treateds is equal to 16.776. Step 4 has been passed. A mediational diagram for unstandardized estimates is contained in Figure 1 (see C:/MTFig1.png) and for standardized estimates is contained in Figure 2 (see C:/MTFig2.png). (In contemporary analyses, Baron and Kenny (1986) steps are no longer reported, but rather total, direct, and indirect effects are reported and tested.)

The results of the four Baron and Kenny (1986) steps using robust regression are as follows. (Huber weighting is used and observations with small residuals are given more weight than observations with smaller residuals.) The effect of Treatment on Stable Housing or path c is equal to 6.558 ( $p = .008$ ), with a 95% confidence interval of 1.709 to 11.407. Step 1 has been passed. The effect of Treatment on Housing Contacts or path a is equal to 5.243 ( $p = .008$ ), with a 95% confidence interval of 1.730 to 8.755. Step 2 has been passed. The effect of Housing Contacts on Stable Housing controlling for Treatment or path b is equal to 0.468 ( $p < .001$ ), with a 95% confidence interval of 0.269 to 0.668. Step 3 has been passed. The effect of Treatment on Stable Housing controlling for Housing Contacts or path c' is equal to 4.032 ( $p = .088$ ), with a 95% confidence interval of -0.605 to 8.670. Step 4 has been passed. Robust methods yield essentially the same conclusions as ordinary least squares.

#### The Indirect Effect

The indirect effect of Treatment on Stable Housing or ab is equal to 2.566, with a smaller than small effect size ( $d \cdot r = 0.211$ ), and the direct effect is equal to 3.992. The percentage of the total effect or  $c' + ab$  that is mediated is equal to 39.13 percent. The mediator is said to be "distal" (Hoyle & Kenny, 1999) in that standardized path b is greater than standardized path a. Thus, Housing Contacts is "closer" to Stable Housing than to Treatment. The Sobel standard error is equal to 1.158, which makes the Z test of the indirect effect equal to 2.216 ( $p = .027$ ). Because the Sobel test is statistically significant, it is concluded that the indirect effect is significantly different from zero.

The bootstrap estimated indirect effect (bias corrected) is 2.566 ( $p = .012$ ) with a standard error of 1.124 (Preacher & Hayes, 2008). The 95 percent bias-corrected bootstrap confidence interval (5000 trials) is from 0.479 to 4.853, and because zero is not in the confidence interval, it is concluded that the indirect effect is different from zero. (In contemporary analyses, the bootstrapped test, and not the Sobel test, is reported.)

#### Tests of Nonlinearity and Interaction

The tests of nonlinearity and interaction are as follows: The interactive effect of Treatment and Housing Contacts on Stable Housing is 0.139 and is not statistically significant ( $p = .493$ ). Because Treatment is a dichotomy, its quadratic effects cannot be measured. The quadratic effect of Housing Contacts squared on Stable Housing is -0.012 and is statistically significant ( $p = .034$ ). There are concerns about nonlinear effects and either a data transformation or a nonlinear term might be advisable. The linear interactive effect of Treatment and Housing Contacts is not statistically significant ( $p = .493$ ).

#### Overall Summary

Here is an attempt to summarize the results, but they need to be carefully verified by the investigator. The direct effect from Treatment to Stable Housing equals 3.992 and is not statistically significant ( $p = .090$ ). The predicted mean difference between the Treateds and Controls groups on Stable Housing equals 3.992. The indirect effect from Treatment to Stable Housing equals 2.566 and is statistically significant ( $p = .012$ ). For the indirect effect, the predicted mean difference indirectly via Housing Contacts between the Treateds and Controls groups on Stable Housing equals 2.566. There is evidence of partial mediation of the effect of Treatment on Stable Housing given that the indirect effect is statistically significant but the percentage of the total effect mediated is less than 80 percent.

#### References

- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Hoyle, R. H., & Kenny, D. A. (1999). Sample size, reliability, and tests of statistical mediation. In R. H. Hoyle (Ed.), *Statistical strategies for small sample research* (pp. 195-222). Thousand Oaks, CA: Sage.
- MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. *Annual Review of Psychology*, 58, 593-614.

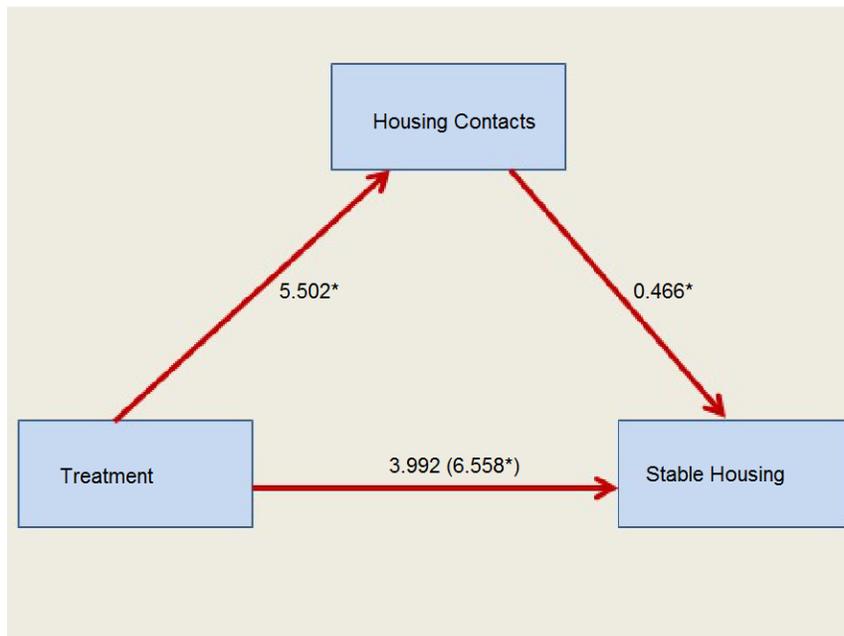
Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879-891.

Table 1

Variable	Mean	Standard Deviation
Treatment	0.422	0.496
Housing Contacts	10.385	11.526
Stable Housing	15.552	13.107

Table 2

Step	Path	Estimate	Lower	95% CI	Upper	Beta	r	p
1	c	6.558	1.654	to	11.462	0.248	.248	.009
2	a	5.502	1.176	to	9.827	0.237	.237	.013
3	b	0.466	0.267	to	8.615	0.410	.411	<.001
4	c'	3.992	-0.631	to	8.615	0.151	.164	.090

**Mediation Diagram: Unstandardized Estimates****Mediation Diagram: Standardized Estimates**