

RMPW Software Program Manual

Software Development

The RMPW program is regularly updated. The latest beta version can be downloaded from

<http://hlmsoft.net/ghong/>

RMPW

Click [here](#) to get RMPW.

For a sample RMPW data set, Click [here](#)

Please report technical problems with the software by sending email to Richard Congdon (richard@hlmsoft.net) and copying Guanglei Hong (ghong@uchicago.edu)

Data Set for Demonstration

Save “RMPW_Stata12.dta” on your computer

Save rmpw.exe

Run rmpw.exe

In the “Data Selection and Preparation” window,

Click the radio button for “Stata” under “Input Data Type”

Browse the data file on your computer “RMPW_Stata12.dta”

Variable Types

selected from the National Evaluation of Welfare to Work Strategies
(NEWWS) public use data, Riverside, California

idnumber	ID	
dep12sm2	outcome	(depression score)
treat	treatment	(treatment indicator)
emp	mediator	(ever employed)
pq51	precov	(depressed past week)
pq53	precov	(lonely past week)
nohsdip	precov	(no HS diploma/GED)
emp_prior	precov	(prior employment)
race	precov	(race/ethnicity)

Note: “precov” stands for pretreatment covariate

Variable Scales

idnumber	Continuous	
dep12sm2	Continuous	
treat	(0, 1)	
emp	(0, 1)	
pq51	Continuous	
pq53	Continuous	
nohsdip	(0, 1)	
emp_prior	Describe scale: 0, 1, 2	} Value labels imported, Click “OK” in each case or change to “continuous”
race	Describe scale: 0, 1, 2	

Click “Save” or “Save as” to save your specifications

Click “Next”

Imputation and Descriptives

Imputation control

Number of data sets to impute 5

Maximum number of imputation iterations 100

Click “Impute” if imputation is required

Imputation currently being used for calculation 1 (i.e., the 1st imputed file)

- ▶ Complete data are required for the treatment indicator and the mediator
- ▶ A missing category for the missing observations created in a discrete variable
- ▶ The missing values in each continuous variable imputed through maximum likelihood estimation under the missing at random assumption
- ▶ Subsequently, analyze one imputed data file a time

Imputation and Descriptives

Descriptive Table:

Displays the descriptives for the original unimputed data file and for each of the five imputed data files

Mediator by Treatment Table:

Displays a cross-tabulation of the mediator values by the treatment values

Covariates × (treat × mediator) table:

Computes the maximum value of the standardized bias and conducts an F test for a continuous covariate and a χ^2 test for a discrete covariate

Tolerance Table:

Displays the tolerance value for each covariate indicating its level of collinearity with other covariates; flags low tolerance variables—i.e., $1 - R^2 < 0.005$ (e.g., two or more missing indicators might be redundant.)

Click “Next”

Select Covariates for the Propensity Score Models

Within each treatment group, select covariates for a logistic regression analysis for predicting the mediator.

Three options:

1. Select all covariates in the column of “Important variables”
2. Backward stepwise selection of outcome predictors (default)
3. Backward stepwise selection of mediator predictors

Double click a variable to move it to the column of “Other covariates” for backward stepwise selection.

Double click a variable to move it to the column of “Unused covariates” for exclusion from the propensity score model

Select Covariates for the Propensity Score Models

Click “Do regression”

Initial Screening Results:

Displays how the selected covariates predict the outcome conditioning on the mediator in each treatment group—for identifying outcome predictors

Propensity Score Results:

Displays how the selected covariates predict the mediator in each treatment group—for identifying mediator predictors

Click “Next”

Common Support

Choose a range of propensity score values

The histograms compare each logit propensity score— $\eta(0)$ associated with the control condition and $\eta(1)$ associated with the experimental condition across the four mediator-by-treatment combinations

Three options:

1. The entire range—i.e., “Full”
2. The range within the “Common support”
3. The range within the “Common support with calipers”
(A caliper is 20% of a standard deviation of each logit score.)

Common Support

Mediator by treatment tables:

Displays a cross-tabulation of the mediator values by the treatment values in the initial sample (and in the sample within the common support or within the common support with calipers if either is chosen)

Total treatment effect:

Computes the intent-to-treat effect on the outcome in the initial sample (and in the sample within the common support or within the common support with calipers if either is chosen)

Common support descriptives:

Displays the descriptive statistics of all the variables in the initial sample (and in the sample within the common support or within the common support with calipers if either is chosen); also displays the descriptives for the IPTW and the logit scores

Balance Check with IPTW

Balance Check with IPTW:

Under IPTW adjustment, computes the maximum value of the standardized bias and conducts an F test for a continuous covariate and a χ^2 test for a discrete covariate

Summarize the number and the proportion of covariates that displays a standardized difference greater than 0.2 or a statistically significant difference between the treatment-by-mediator categories.

Estimation of Mediator Effect with IPTW

Estimation of Mediator Effect:

Under IPTW adjustment, estimates the main effect of the treatment, the main effect of the mediator, and the treatment-by-mediator interaction effect on the outcome

Parametric RMPW

Direct and Indirect Effects

Double click a covariate to include in the outcome model for covariance adjustment, if necessary

Click **“Estimate”** to see the estimation results

Two sets of decomposition:

The first set of decomposition

Total treatment effect

= Natural direct effect + Natural indirect effect

= Natural direct effect

+ Pure indirect effect + Natural treatment-by-mediator interaction effect

$$Y = \gamma^{(0)} + \gamma^{(DE.0)}A + \gamma^{(IE.1)}D1 + \gamma^{(IE.0)}D0 + e$$

Parametric RMPW

The second set of decomposition

Total treatment effect

= Pure indirect effect + Total direct effect

= Pure indirect effect + Pure direct effect + Natural treatment-by-mediator interaction effect

$$Y = \gamma^{(0)} + \gamma^{(\text{IE}.0)}D0 + \gamma^{(\text{DE}.1)}A \times D0 + \gamma^{(\text{DE}.0)}A \times D1 + e$$

To read more, click “[Help me choose](#)”

Combined Imputation Results

At this stage, the program will display two tables

- ▶ Estimation results from the current imputed data file
- ▶ Combined estimation results from all five imputed data files

Non-parametric RMPW

Stratification

Select the number of strata along the propensity score for the mediator under the control condition ($\phi(0)$ strata) and that for the mediator under the experimental condition ($\phi(1)$ strata). The default is 4×4 .

Show Strata

Displays the cross-tabulation of all the strata by quartiles of the estimated propensity scores, treatments, and mediator values.

Balance Check with MMWS

Balance Check with MMWS:

Under MMWS adjustment, computes the maximum value of the standardized bias and conducts an F test for a continuous covariate and a χ^2 test for a discrete covariate

Summarize the number and the proportion of covariates that displays a standardized difference greater than 0.2 or a statistically significant difference between the treatment-by-mediator categories.

Estimation of Mediator Effect with MMWS

Estimation of Mediator Effect:

Under MMWS adjustment, estimates the main effect of the treatment, the main effect of the mediator, and the treatment-by-mediator interaction effect on the outcome

Non-parametric RMPW

Direct and Indirect Effects

Double click a covariate to include in the outcome model for covariance adjustment, if necessary

Choose between two sets of decomposition

Click “**Direct/Indirect Effects**” to see the estimation results

Two-Step Estimation

Step 1

Estimation of the propensity scores used to compute RMPW

Step 2

Weighted estimation of the causal effects

The RMPW software implements an M-estimation procedure generating asymptotic standard errors that correctly reflects the estimation uncertainty in both steps (Bein et al, 2015).

Online Learning

The author taught a professional development and training course “New Weighting Methods for Causal Mediation Analysis” during the 2015 American Educational Research Association (AERA) Annual Meeting. The course can be viewed on-demand through the AERA-Virtual Research Learning Center (VRLC). All course materials and handouts can be downloaded from the VRLC website.

www.aera.net/vrlc