This supplement to the chapter on quantitative research design includes two tables that summarize features of selected experimental (Table S9.1) and quasi-experimental (Table S9.2) designs. Many of the designs in this table were mentioned in the textbook, but some were not (e.g., the factorial design in which two independent variables are simultaneously manipulated [varied] by the researcher).

The table includes the notation used in the classic monograph by Cook and Campbell, and students who are visual learners may find this presentation particularly illuminating. The table also describes situations in which each design is most likely to be attractive and lists their major drawbacks.

### TABLE S9.1 Selected Experimental (Randomized) Designs

<table>
<thead>
<tr>
<th>Type of Design</th>
<th>Schematic Diagram</th>
<th>Situations that are Best Suited</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic posttest-only experimental design</td>
<td>R X O₁, R X₆ O₁, R O₁ or R X₆ O₁</td>
<td>- When the outcome is not relevant until after the intervention is complete (e.g., length of stay in hospital)</td>
<td>- Does not permit an evaluation of whether the two groups were comparable at the outset on the outcome of interest</td>
</tr>
<tr>
<td>Basic pretest-posttest experimental design</td>
<td>R O₁ X O₂, R O₁ X₂</td>
<td>- When the focus of the intervention is on changing behaviors, attitudes, etc.</td>
<td>- Sometimes the pretest itself can affect the outcomes of interest.</td>
</tr>
<tr>
<td>Multiple treatment design</td>
<td>R O₁ X₆ O₁, R O₁ X₆ O₂</td>
<td>- Can be used to disentangle effects of different components of a complex intervention (“black box” issue) or to test competing interventions</td>
<td>- Requires larger sample than basic designs</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Type of Design</th>
<th>Schematic Diagram</th>
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</tr>
</thead>
</table>
| Wait-list (delay of treatment) design | $R \ O_1 \ X \ O_2 \ X \ O_3$  
$R \ O_1 \ O_2 \ X \ O_3$ | • Attractive when there is patient preference for the innovative treatment  
• Can strengthen inferences by virtue of replication aspect for the second group | • Controls may be inclined to drop out of study before they get deferred treatment.  
• Not suitable if key outcomes are measured long after treatment (e.g., mortality) or if there is an interest in assessing long-term effects (wait-list period is then too long)  
• History threat a possibility |
| Crossover design—subjects serve as their own controls | $R \ O_1 \ X_A \ O_4 \ X_B \ O_3$  
$R \ O_1 \ X_B \ O_4 \ X_A \ O_3$ | • Appropriate only if there is no possibility of carryover effects from one period to the next (effects should have rapid onset, short half-life)  
• Useful when recruitment is difficult because smaller sample is needed; excellent for controlling confounding variables | • Often cannot be assumed that there are no carryover effects  
• If the first treatment received “fixes” a problem for participants, they may not remain in the study for the second one. |
| Factorial design                     | $R \ O_1 \ X_{A1B1} \ O_2$  
$R \ O_1 \ X_{A1B2} \ O_2$  
$R \ O_1 \ X_{A2B1} \ O_2$  
$R \ O_1 \ X_{A2B2} \ O_2$ | • Efficient for testing two interventions simultaneously  
• Most useful when strong synergistic/additive effects or no interaction effects are expected | • Power needed to detect interactions could require larger sample size than when testing each intervention separately. |

KEY: $R$, randomization; $X$, intervention ($X_A$, one treatment; $X_B$, alternative treatment, dose, etc.); $O$, observation or measurement of the outcome.
### TABLE S9.2 Selected Quasi-Experimental Designs

<table>
<thead>
<tr>
<th>Type of Design</th>
<th>Schematic Diagram</th>
<th>Situations that are Best Suited</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-group pretest–posttest design</td>
<td>$O_1 \times O_2$</td>
<td>* Only a reasonable choice when intervention impact is expected to be dramatic and other potential causes have little credibility</td>
<td>* Typically provides very weak info for causal inference; vulnerable to many internal validity threats (maturation, history, etc.)</td>
</tr>
<tr>
<td>Nonequivalent control group, posttest-only design</td>
<td>$X O_2$</td>
<td>* Only a reasonable choice when there is some a priori knowledge about comparability of groups with regard to key outcomes</td>
<td>* Extremely vulnerable to selection threat; possibility of other threats as well, especially history</td>
</tr>
<tr>
<td>Nonequivalent control group, pretest–posttest design</td>
<td>$O_1 \times O_2$</td>
<td>* Attractive when an entire unit must get the intervention and a similar unit not getting the intervention is available</td>
<td>* Selection threat remains a nearly intractable problem, but less so than when there is no pretest; history threat also exists.</td>
</tr>
<tr>
<td>Time-series design</td>
<td>$O_1 \quad O_2 \quad O_3 \quad O_4 \quad X \quad O_5 \quad O_6 \quad O_7 \quad O_8$</td>
<td>* Good option when there are abundant data on key outcome in existing records</td>
<td>* Complex statistical analysis that is most appropriate with very large number of data points (100+)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Addresses maturation threat and change from secular trends and random fluctuation</td>
<td>* History threat remains, and (sometimes) selection threat if the population changes over time.</td>
</tr>
</tbody>
</table>

**KEY:** X, intervention; O, observation or measurement of the outcome.