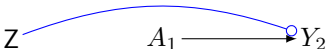
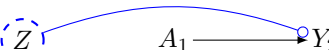






Type

1	Measured Z modifies effect: variation in the effect of $A_1 \rightarrow Y_2$ across levels of Z , observed within the sample.	
2	Unmeasured Z modifies effect: potential variability in the effect of $A_1 \rightarrow Y_2$ for unmeasured Z ; may be relevant to external validity.	
3	Z is a direct effect-modifier: Z directly alters the strength or direction of the effect of $A_1 \rightarrow Y_2$.	
4	G is an indirect effect-modifier by proxy: when not conditioning on Z , G is an indirect effect modifier of $A_1 \rightarrow Y_2$.	
5	Conditioning on B makes G a surrogate effect-modifier: when not conditioning on Z , conditioning on collider B opens a path from G to Y through Z , making G and B indirect effect-modifiers of $A_1 \rightarrow Y_2$.	
6	Only Z is a direct effect-modifier: conditioning on Z renders its descendants independent of Y , leaving only Z as the effect-modifier of $A_1 \rightarrow Y_2$.	

A denotes the treatment;

Y denotes the outcome;

U denotes an unmeasured confounder;

Z denotes a direct-effect modifier;

$\{G, B\}$ denote indirect effect modifiers of $A \rightarrow Y$;

\rightarrow asserts causality;

\boxed{X} indicates conditioning on variable X ;

\boxed{X} indicates variables conditioned upon is an effect modifier (direct or indirect) of $A \rightarrow Y$;

\textcircled{Z} indicates effect-modifier Z is not conditioned upon;

Observation 1: the classification of an indirect-effect modifier depends on the structure of causation and model specification.

Observation 2: Whether we condition on Z or not, differences in the distribution of effect-modifiers within the sample population compared to the target population, specifically where these effect-modifiers interact with the causal pathway from $A \rightarrow Y$, may introduce target validity bias. Because target-validity bias is indifferent to conditioning on Z , we may represent effect

modification without reference to whether Z is included in the model: 