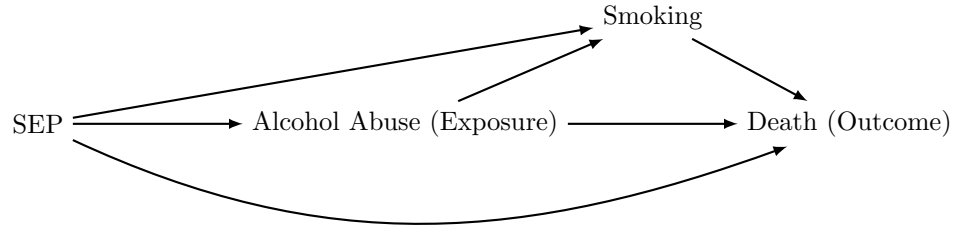# 1 Figure 1

Figure 1: An example of a DAG with exposure to alcohol abuse, Outcome death, confounder socioeconomic position, and mediator smoking.

Code for figure:

```
\begin{tikzpicture}
    \node (1) {};
    \node [right =of 1] (2) {Alcohol Abuse (Exposure)};
    \node [right =of 2] (3) {};
    \node [right =of 3] (4) {Death (Outcome)};
    \node [left =of 1] (5) {SEP};
    \node [above =of 3] (6) {Smoking};

    \draw[Arrow] (2.east)--(4.west);
    \draw[Arrow] (2) to (6);
    \draw[Arrow] (6) to (4);
    \draw[Arrow] (5) to [out=-25, in=-160] (4);
    \draw[Arrow] (5) to (6);
    \draw[Arrow] (5.east)--(2.west);
\end{tikzpicture}
```
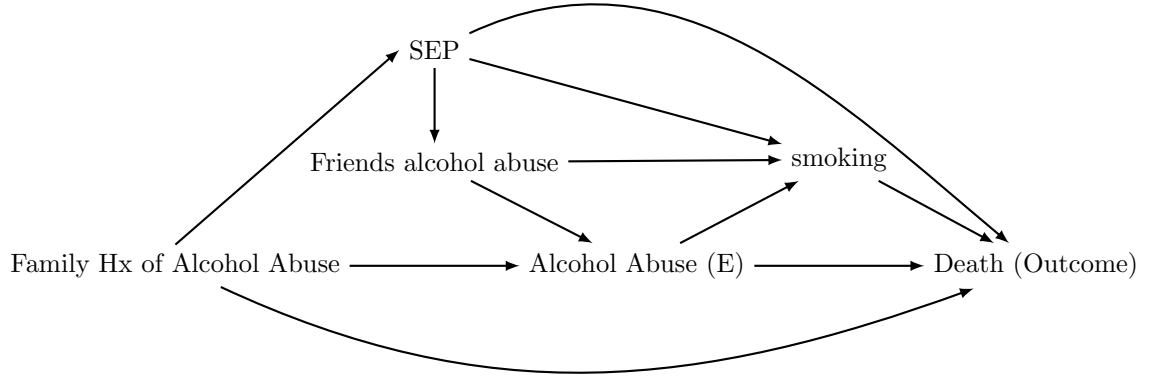
2 Figure 2

Figure 2: Family history of alcohol abuse, socioeconomic position, and friends' alcohol abuse are confounders; smoking is a mediator, alcohol abuse is the exposure of interest, and mortality is the outcome of interest.

Code for figure 2:

```
\begin{tikzpicture}
    \node (1) {Family Hx of Alcohol Abuse};
    \node [above =of 1] (11) {};
    \node [above =of 11] (12) {};
    \node [above =of 12] (13) {};
    \node [right =of 1] (2) {};
    \node [above =of 2] (10) {Friends alcohol abuse};
    \node [above =of 10] (8) {SEP};
    \node [right =of 2] (3) {Alcohol Abuse (E)};
    \node [above =of 3] (9) {};
    \node [right =of 8] (7) {};
    \node [right =of 3] (4) {};
    \node [above =of 4] (6) {smoking};
    \node [right =of 4] (5) {Death (Outcome)};
    \draw[Arrow] (3.east)--(5.west);
    \draw[Arrow] (3) to (6);
        \draw[Arrow] (6) to (5);
    \draw[Arrow] (1) to (3);
        \draw[Arrow, thick] (1.north)--(8.west);
        \draw[Arrow] (1) to [out=-25, in=-160] (5);
    \draw[Arrow] (8) to (6);
    \draw[Arrow] (8) to [out=25, in=140] (5);
```

```
    \draw[Arrow] (10) to (6);
    \draw[Arrow] (10) to (3);
    \draw[Arrow] (8) to (10);
\end{tikzpicture}
```
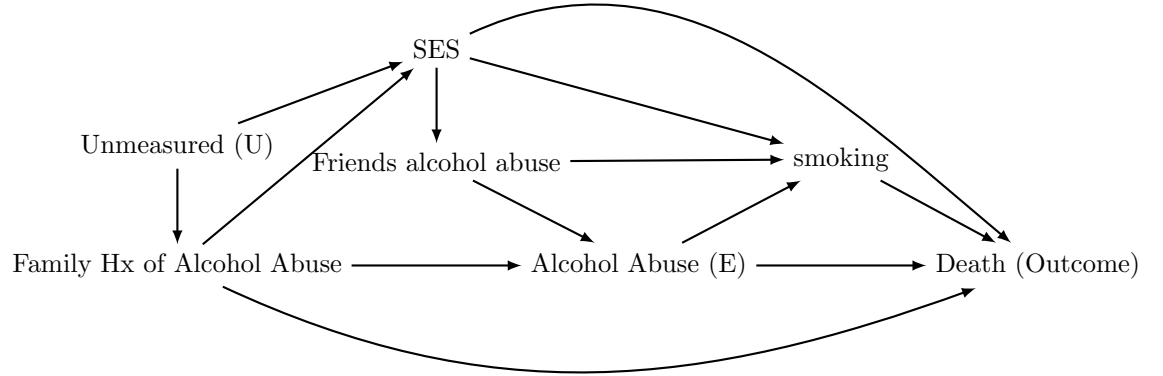
3 Figure 3

Figure 3: The DAG from Figure 2 with an unmeasured confounder. In this case, U is either unknown or unmeasured but is a common cause of a family history of alcohol abuse and smoking.
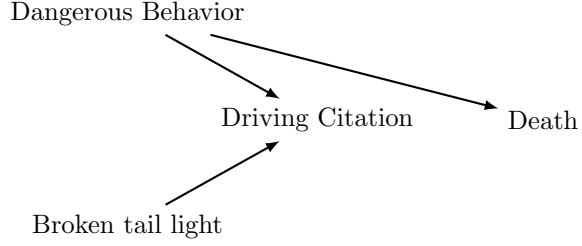
```
\begin{tikzpicture}
\node (1) {Family Hx of Alcohol Abuse};
\node [above =of 1] (11) {};
\node [above =of 11] (12) {};
\node [above =of 12] (13) {};
\node [right =of 1] (2) {};
\node [above =of 2] (10) {Friends alcohol abuse};
\node [above =of 10] (8) {SES};
\node [right =of 2] (3) {Alcohol Abuse (E)};
\node [above =of 3] (9) {};
\node [right =of 8] (7) {};
\node [right =of 3] (4) {};
\node [above =of 4] (6) {smoking};
\node [right =of 4] (5) {Death (Outcome)};
\node [above =of 1] (14) {Unmeasured (U)};
\draw[Arrow] (3.east)--(5.west);
\draw[Arrow] (3) to (6);
    \draw[Arrow] (6) to (5);
\draw[Arrow] (1) to (3);
    \draw[Arrow, thick] (1) to (8);
    \draw[Arrow] (1) to [out=-25, in=-160] (5);
\draw[Arrow] (8) to (6);
\draw[Arrow] (8) to [out=25, in=140] (5);
```

4

```
    \draw[Arrow] (10) to (6);
    \draw[Arrow] (10) to (3);
    \draw[Arrow] (8) to (10);
    \draw[Arrow] (14) to (1);
    \draw[Arrow] (14) to (8);
\end{tikzpicture}
```

4.1 Figure 4a

Dangerous Behavior

Driving Citation　　Death

Broken tail light

4.2 Figure 4b

Dangerous Behavior
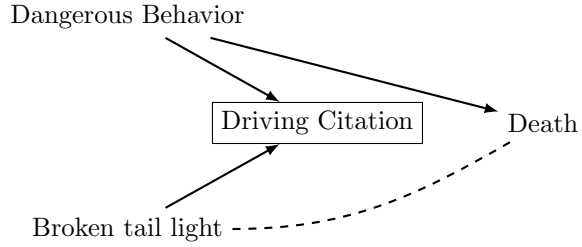
Driving Citation　Death

Broken tail light

Figure 4: A) Driving citation is a collider without adjustment, there is no relationship between a broken tail light and death B) After adjustment for the collider, there is an induced relationship between a broken taillight and death (dashed line), which is not truly causal.

4   Figure 4

Code for figure 4a and 4b:

```
%Figure 4a
    \begin{tikzpicture}
    \node (1) {Broken tail light};
    \node  [right =of 1] (2) {};
    \node [right =of 2] (3)  {};
    \node [above =of 2] (4)
    {Driving Citation};
    \node [right =of 4] (5) {Death};
    \node [above =of 1] (6) {};
    \node [above =of 6] (7) {Dangerous Behavior};

    \draw[Arrow] (7) to (5);
    \draw[Arrow] (7) to (4);
    \draw[Arrow] (1) to (4);
\end{tikzpicture}
```

```
%Figure 4b
\begin{tikzpicture}
    \node (1) {Broken tail light};
    \node [right =of 1] (2) {};
    \node [right =of 2] (3) {};
    \node [rectangle, draw, above =of 2] (4) {Driving Citation};
    \node [right =of 4] (5) {Death};
    \node [above =of 1] (6) {};
    \node [above =of 6] (7) {Dangerous Behavior};

    \draw[Arrow] (7) to (5);
    \draw[Arrow] (7) to (4);
    \draw[Arrow] (1) to (4);
    \draw[dashed, thick] (1) to [out=0, in=-150] (5);
\end{tikzpicture}
```
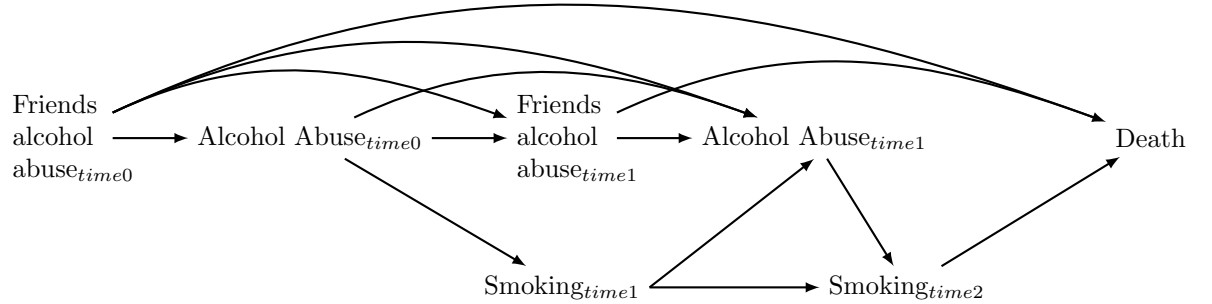
5   Figure 5

Figure 5: Time Variant DAG with the exposure to alcohol abuse was measured
at baseline, and a later follow-up (Alcohol abuse$_{time1}$, and smoking and friends
who abuse alcohol were also measured at baseline and follow-up. The outcome
is unchanged and is 5-year mortality (Death).

Code for figure 5:

```
\begin{tikzpicture}
\node (1) {Friends EtOH Abuse$Z_0$};
\node [right =of 1] (2) {Alchol Abuse$E_0$};
\node [right =of 2] (3) {Friends EtOH Abuse$Z_1$};
\node [right =of 3] (4) {Alchol Abuse$_1$};
\node [right =of 4] (5) {};
```

```
    \node [right =of 5] (8) {D};
    \node [below =of 3] (6) {Smoking$_0$};
    \node [right =of 6] (9) {};
    \node [right =of 9] (7) {$Smoking_1$};
    \draw[Arrow, thick] (1.east) -- (2.west);
    \draw[Arrow, thick] (1) to [out=25, in=160] (3);
    \draw[Arrow, thick] (1) to [out=25, in=160] (4);
    \draw[Arrow, thick] (1) to [out=25, in=160] (8);
    \draw[Arrow, thick] (2.east) -- (3.west);
    \draw[Arrow, thick] (2) to [out=25, in=160] (4);
    \draw[Arrow, thick] (3.east) -- (4.west);
    \draw[Arrow, thick] (3) to [out=25, in=160] (8);
    \draw[Arrow, thick] (2) to (6);
    \draw[Arrow, thick] (6.east) -- (4.south);
    \draw[Arrow, thick] (6.east) -- (7);
    \draw[Arrow, thick] (4) to (7);
    \draw[Arrow, thick] (7) to (8);
\end{tikzpicture}
```