1. Single Funding-Affiliation
   1. Public Funding, Public Affiliation, General Outcome
   2. Private Funding, Private Affiliation, General Outcome
   3. University Funding, University Affiliation, General Outcome
2. Affiliation
   1. Public Affiliation, Private Affiliation, University Affiliation, General Outcome
3. Funding
   1. Public Funding, Private Funding, University Funding, General Outcome
4. All
   1. Public Funding, Public Affiliation, Private Funding, Private Affiliation, University Funding, University Affiliation, General Outcome

**Directed Acyclic Graph Results**

The DAG result establishes contemporaneous causal relationships between some key characteristics of the studies included in the meta-analysis, which will be useful in establishing or fitting a model for subsequent econometric analysis. The DAG analysis begins by determining the causal relationship between the author's affiliation (public, private, or university) and the source of funding for the research.

Chart, line chart, scatter chart

Description automatically generated

Figure Funding Sources and Authors' Affiliation

The result of the DAG with the various authors' affiliation and funding sources considered for the meta-analysis, shown in Figure 1, indicates a positive causal relationship between private funding & private organizations, public funding & public organizations, and university funding & university affiliation. While cross-funding between funding sources and affiliations, particularly in the case of public funding to all other organizations, was expected, the DAG-identified relationship demonstrates the statistically significant causal relationships. All the causal relationships in this analysis were caused by funding sources. This means the various funding sources are likely to go to the organization types they cause.

The study then examined the effect that these relationships had on the outcomes of the studies that were conducted. This meant that the various funding sources, the organization type they support, and the results of studies on the impact of glyphosate and their relationship were examined. The DAG between Private Funding, Private Affiliation, and Outcome demonstrated that private funding positively affects private affiliation, which has a negative effect on the overall outcome. This can be interpreted as the link between private organizations and non-harmful glyphosate research findings was funding from private entities. From the DAG it can be concluded that privately funded research conducted by private entities resulted in findings that concluded that glyphosate had no harmful impact.

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| **Private Funding, Private Affiliation and Outcome** | **Public Funding, Public Affiliation and General Outcome** |
| Chart, line chart  Description automatically generated | Chart, line chart  Description automatically generated |

In the face of general outcome, public organizations caused public funding which in turn caused the outcome of glyphosate research findings positively. Since public institutions were almost only funded by public funds by virtue of state budgetary allocation, public funding was caused (in this case provided) by the organization to investigate the impact of glyphosate. Hence the outcome of research studies by public institutions were linked by the funding provided by the state. From the DAG it can be inferred that publicly funded research conducted by public entities resulted in findings that concluded that glyphosate had harmful impact.

As part of their mission, universities and for that matter the ones identified in the meta-analysis are committed to research as a central part of their existence. It is common for university research to be funded by private, public and university funding. Due to this, we interacted university affiliation, outcome of research and the three sources of funding separately to observe the nature of the interaction. From the DAG results obtained, outcome of the study, university funding caused university affiliation. University funding only goes into university research conducted within the university which is illustrated from this finding. From the DAG, general outcomes which reported adverse effect of GBH were likely to come from university affiliated research.

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| **University Funding, University Affiliation and Outcome** | **Public Funding, University Affiliation and Outcome** |
|  | Chart, line chart  Description automatically generated |

From the interaction of public funding with university affiliation and general outcome, general outcome was caused by university affiliation and public funding. This was a positive relationship which meant publicly funded university research was likely to lead to research that concluded that GBH had adverse effect on non-target organisms and the environment. When private funding was added to this model, the results were consistent with the publicly funded university research findings. This meant that private funding, did not cause the outcome of university research outcome in the face of public funding. Results from private funding only, university affiliation and general outcome did not display a connection of private funding with any of the other two variables. This highlights that private funding does not cause university funded research, hence the autonomy of the universities.

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| **Private Funding, University Affiliation and Outcome** | **Public Funding, Private Funding, University Affiliation and Outcome** |
| Chart, line chart  Description automatically generated |  |

In the next stage of analysis will focus on the relationship of a mix of funding sources and authors’ affiliation. This will go further to include the outcome of research conducted from this mix. The interaction between public funding, private funding and author affiliation with private affiliation established not causal relationship between public funding and private funding or private affiliation. The causal relationship identified in this mix was between private affiliation and private funding. This is consistent with earlier findings that private organizations attracted private funding. The addition of general outcome to this combination resulted in a two separate causal relationship, general outcome-public funding and private affiliation and private funding. This result reaffirms earlier findings that publicly funded research was likely to lead to research that concluded that GBH had adverse effect on non-target organisms and the environment.

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| **Public Funding, Private Funding and Private Affiliation** | **Public Funding, Private Funding, Private Affiliation and General Outcome** |
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The interaction between public funding, private funding and private author affiliation established a causal relationship between public funding and public affiliation but private funding did not show any significant relationship in this combination. The causal relationship identified in this mix was consistent with earlier findings that public funding mainly funded public organizations. The addition of general outcome to this combination resulted in general outcome and public affiliation causing public funding. This result reaffirms earlier findings public organizations were funded by public or state funds which is determined by budgetary allocation. publicly funded university research was likely to lead to research that concluded that GBH had adverse effect on non-target organisms and the environment.

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| **Public Funding, Private Funding and Public Affiliation** | **Public Funding, Private Funding, Public Affiliation and General Outcome** |
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The interaction between private funding, university funding, and university author affiliation established a causal relationship between all three variables private funding and university affiliation both affecting university funding. Private funding was negatively associated with university funding. Which meant university funding and private funding do not go together for university affiliated studies, private funding in this case were sole funding. The addition of general outcome to this combination resulted in two separate causal structures, private funding causing university funding and university affiliation having a causal relationship with outcome. The negative relationship between private funding and university funding was maintained in this combination. However, university affiliation was no longer connected to university funding but instead general outcome where general outcome was likely to be adverse in university research.

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| **Private Funding, University Funding and University Affiliation** | **Private Funding, University Funding, University Affiliation and General Outcome** |
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