MANCHESTER 1824
The University of Manchester

Prediction of changes in working memory following changes in air quality

MANCHESTER 1824
The University of Manchester

global action plan

PHILIPS
Philips Foundation

MANCHESTER 1824
The University of Manchester

What we did I: literature search

- We started by summarising the existing literature on the links between air pollution in and around schools and executive functioning in primary school aged children
- Executive functioning has been shown to be an important determinant in educational attainment
  - However, quantifying the exact magnitude of the effect is difficult as very context dependent

MANCHESTER 1824
The University of Manchester

What did we find?

- Nine previous studies had investigated this:
  - From a range of continents and countries
  - Measured pollution in different ways
  - Measured executive functioning in different ways
- Prevailing finding: **increased pollution is associated with decreased executive functioning**

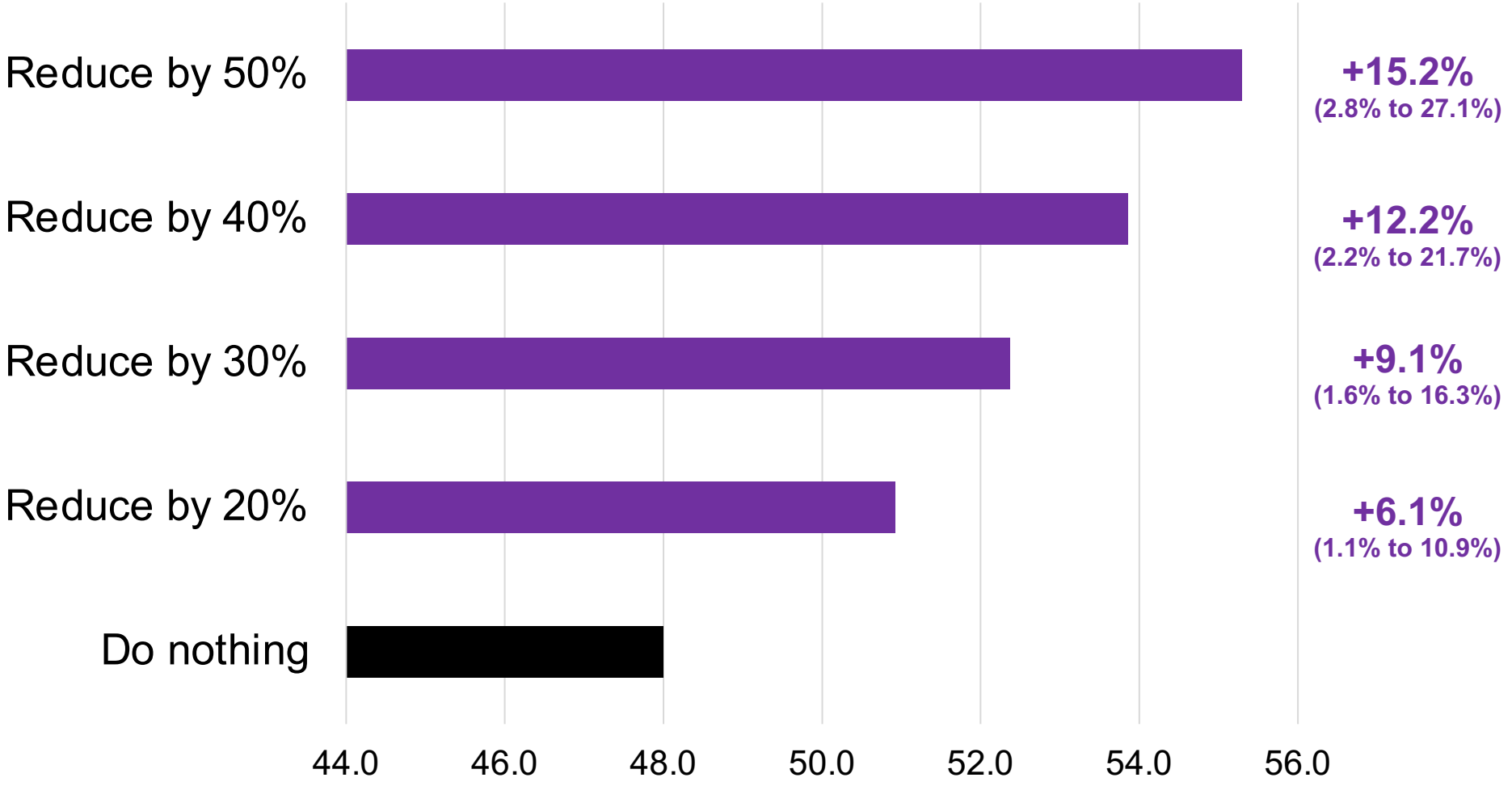
MANCHESTER 1824
The University of Manchester

What we did II: modelling

- We then used estimates from the existing literature to *predict* what could happen to working memory (a key component executive functioning) following changes in pollution
- We focus on two pollutants:
  - Outdoor air pollution, measured by NO_2
  - Indoor air pollution, measured in $PM_{2.5}$

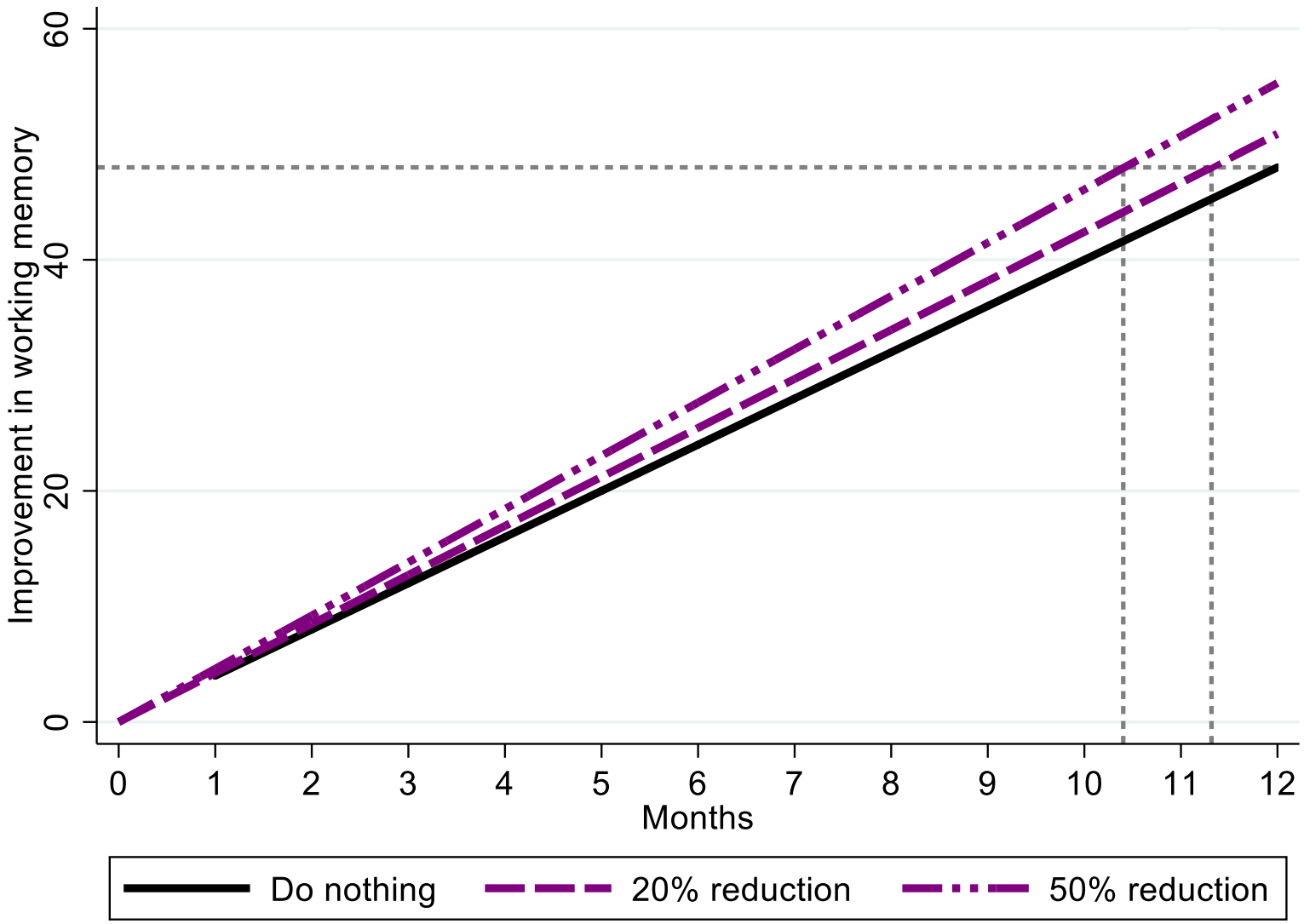
MANCHESTER 1824
The University of Manchester

Outdoor Pollution (NO_2)



MANCHESTER 1824
The University of Manchester

Outdoor Pollution (NO_2)



MANCHESTER 1824
The University of Manchester

Summary of results

- Decreases in air pollution could lead to considerable increases in working memory:
  - A 20% reduction in outdoor NO_2 could improve the growth in working memory by around 6%, around 3 weeks worth of growth per-year
  - A 50% reduction in outdoor NO_2 could improve the growth in working memory by around 15%, around 7 to 9 weeks worth of growth per-year
- Similar results when we consider indoor air pollution ($PM_{2.5}$)

MANCHESTER 1824
The University of Manchester

Key takeaways

- Reductions in air pollution in and around primary schools could improve the working memory of children
- This is important as it is predictive of educational attainment