# How Information about Overdetection Changes Breast Screening Decisions: Mediation Analysis within a Randomised Controlled Trial

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WISER HEALTHCARE

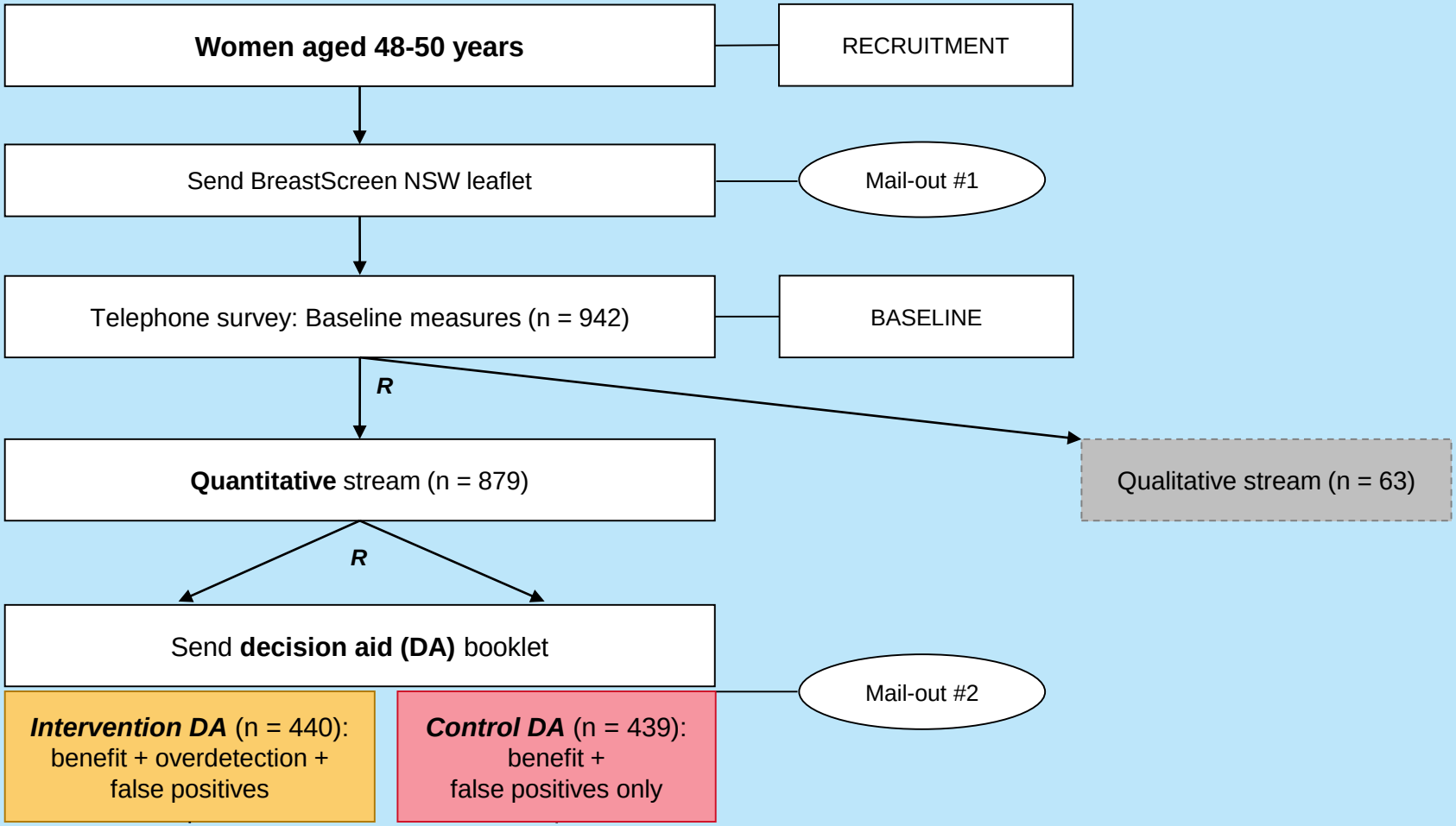
A RESEARCH COLLABORATION FOR REDUCING OVERDIAGNOSIS AND OVERTREATMENT

# BACKGROUND AND OBJECTIVES

- Breast screening can lead to overdetection / overdiagnosis and overtreatment of inconsequential breast cancers
  - Harm to physical and emotional health in short and long term

- "Information should be made available in a transparent and objective way to women invited to screening so that they can make informed decisions" - *Independent UK Panel*

- Need to investigate the effects of giving women information about overdetection


Women aged 48-50 years
RECRUITMENT
Send BreastScreen NSW leaflet
Mail-out #1
Telephone survey: Baseline measures (n = 942)
BASELINE
R
Quantitative stream (n = 879)
Qualitative stream (n = 63)
R
Send decision aid (DA) booklet
Mail-out #2
Intervention DA (n = 440): benefit + overdetection + false positives
Control DA (n = 439): benefit + false positives only

## 2. Screening leads to finding some breast cancers that are not harmful (over-detection)*

The cancers found by screening are treated to try and prevent problems later. But some cancers found by screening would never cause problems anyway. Cancers like this may grow very slowly or just stay the same. Without screening, they would never be noticed or cause any trouble. **Finding these cancers through screening is called** over-detection **(or** over-diagnosis**).**

**Even after further checks and examination, doctors cannot be sure which cancers will be harmless.** Therefore, treatment is recommended. So, across all the women who have screening, some end up having treatment they do not need.

Breast cancer treatments include surgery, radiotherapy, hormone therapy, and chemotherapy. There are important side effects to these treatments which are described on page 8.

### **Over-detection** over 20 years of screening

Out of 1000 women who have breast screening for 20 years,

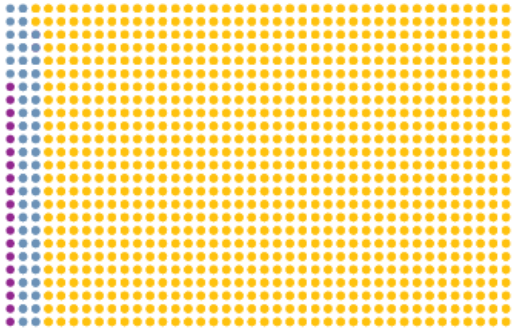
**73** women are diagnosed with breast cancer.

Of these,

- **19 women experience over-detection:** they are diagnosed and treated for a cancer that would not have caused any trouble

  and

- **54** women are diagnosed with breast cancer that is not over-detection.



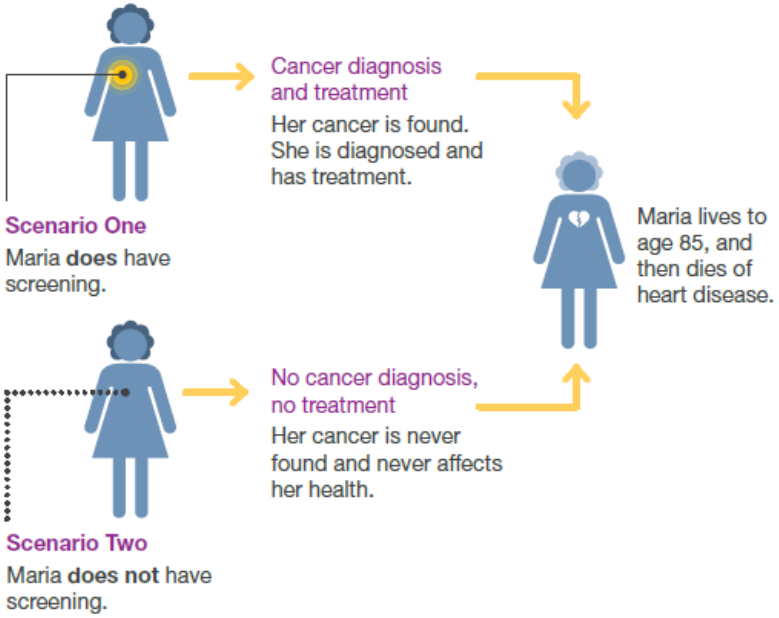
- extra woman diagnosed with breast cancer due to over-detection
- woman diagnosed with breast cancer that is not over-detection
- woman not diagnosed with breast cancer

As this information is new, there is an example of over-detection on the next page.



### Over-detection: an example

Imagine a woman called Maria who develops a small, slow-growing breast cancer in her 50s or 60s. The picture below shows two possible scenarios that could happen to Maria: Scenario 1 (top) is with screening, and Scenario 2 (bottom) is without screening.




**Scenario One**

Maria **does** have screening.

**Scenario Two**

Maria **does not** have screening.

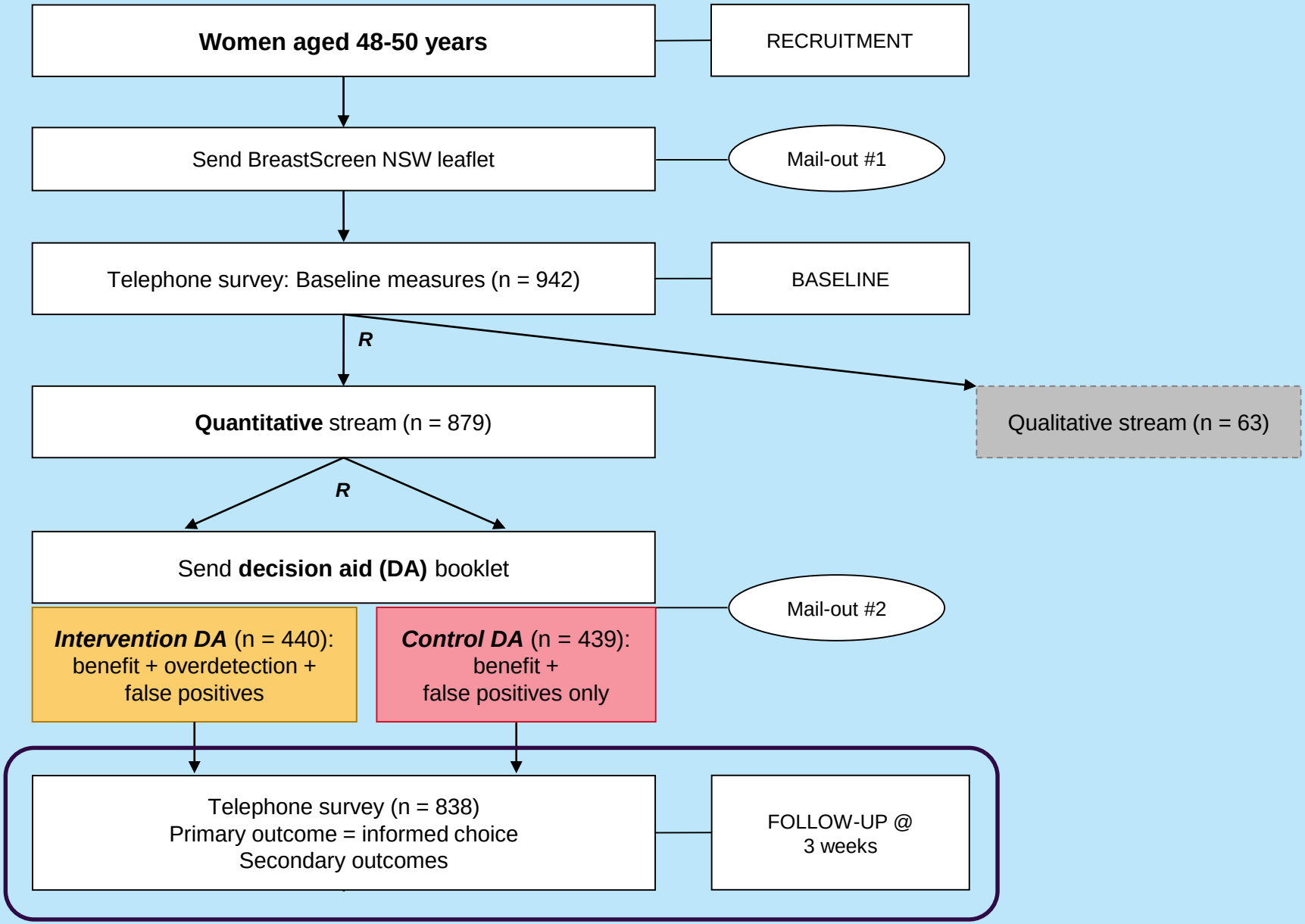
Maria's life span is the same, whether or not she has screening. So if she has screening, she experiences over-detection (a diagnosis and treatment she does not need).

**Putting it together** *

For women in Australia who have breast screening over 20 years:

4 out of 1000 women avoid dying from breast cancer, and 19 out of 1000 women experience over-detection.

So that means **more women experience over-detection than avoid dying** from breast cancer.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Control DA (n = 439): benefit + false positives only
Telephone survey (n = 838)
Primary outcome = informed choice
Secondary outcomes
FOLLOW-UP @ 3 weeks

# SUMMARY OF INITIAL FINDINGS

Compared with the control DA, the **intervention** resulted in

- more women making an **informed choice**
- improved **knowledge** about breast screening
- lower **worry** about developing breast cancer
- less positive **attitudes** towards having breast screening
- lower / *higher* **anticipated regret** for not screening / *screening*
- reduced **intentions** to have breast screening in next 2-3 years

# MEDIATION ANALYSIS

**Intervention:** information about overdetection

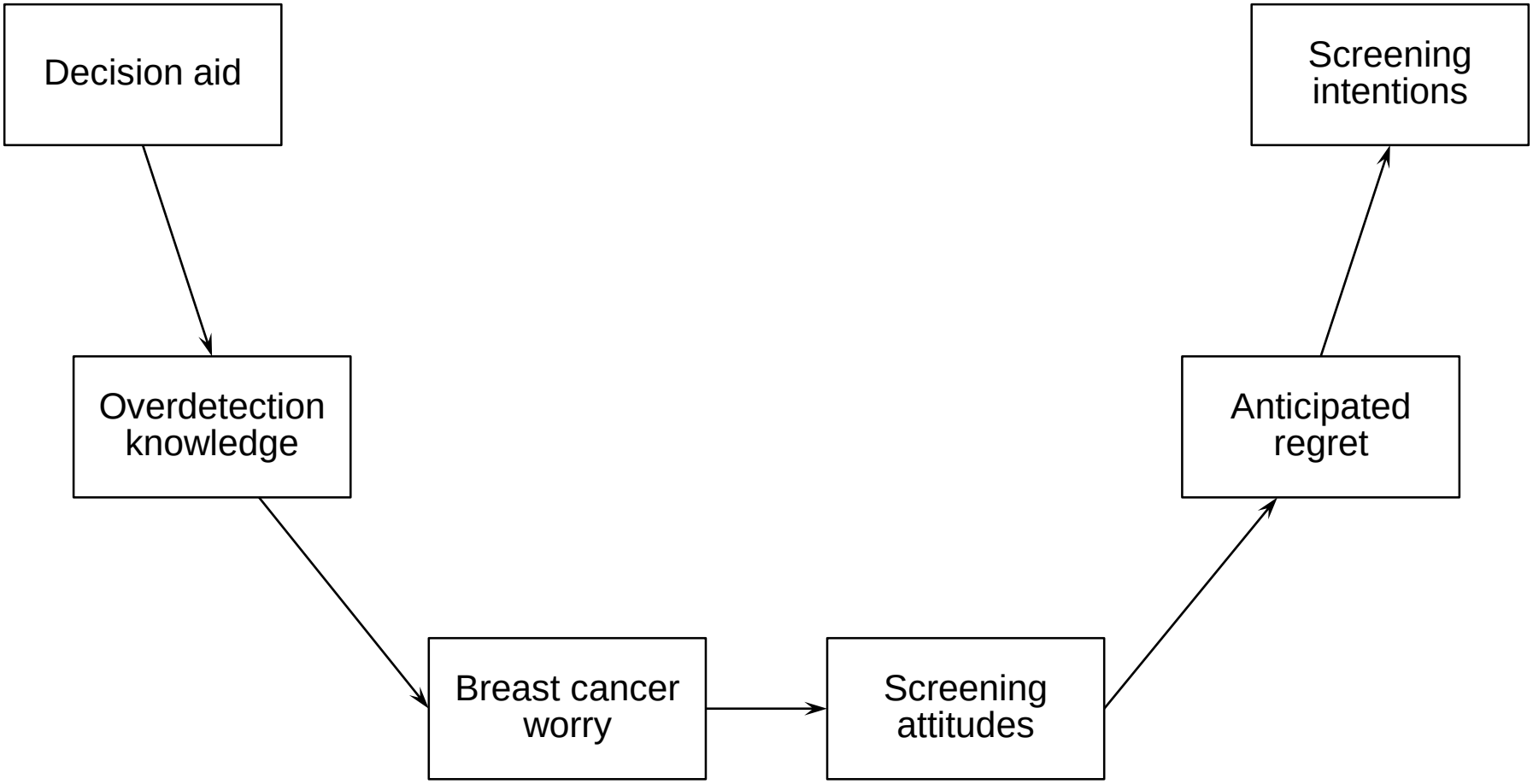
- Mediators:
  - **knowledge** about overdetection
  - **worry** about breast cancer
  - **attitudes** to breast screening
  - **anticipated regret**
- **Outcome: intentions**

# MEASURES

**Intervention:** information about overdetection

- Mediators:
  - **knowledge** about overdetection (total score range 0 to 10)
  - **worry** about breast cancer (1 item, 4-point response scale)
  - **attitudes** to breast screening (total score range 6 to 30)
  - **anticipated regret** differential (*not screening – screening*)
- **Outcome: intentions** (1 item, 5-point response scale)

# SERIAL MEDIATION MODEL



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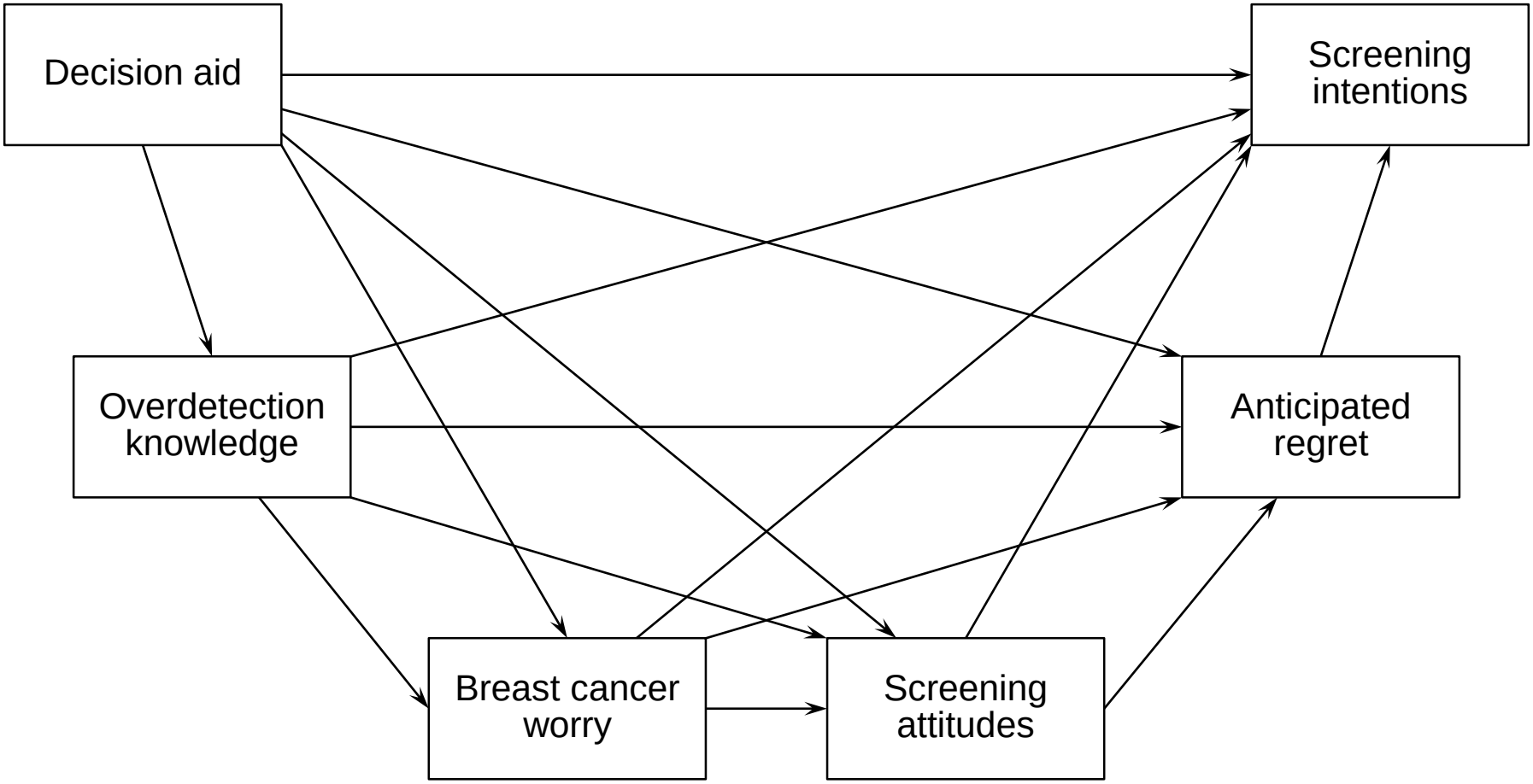
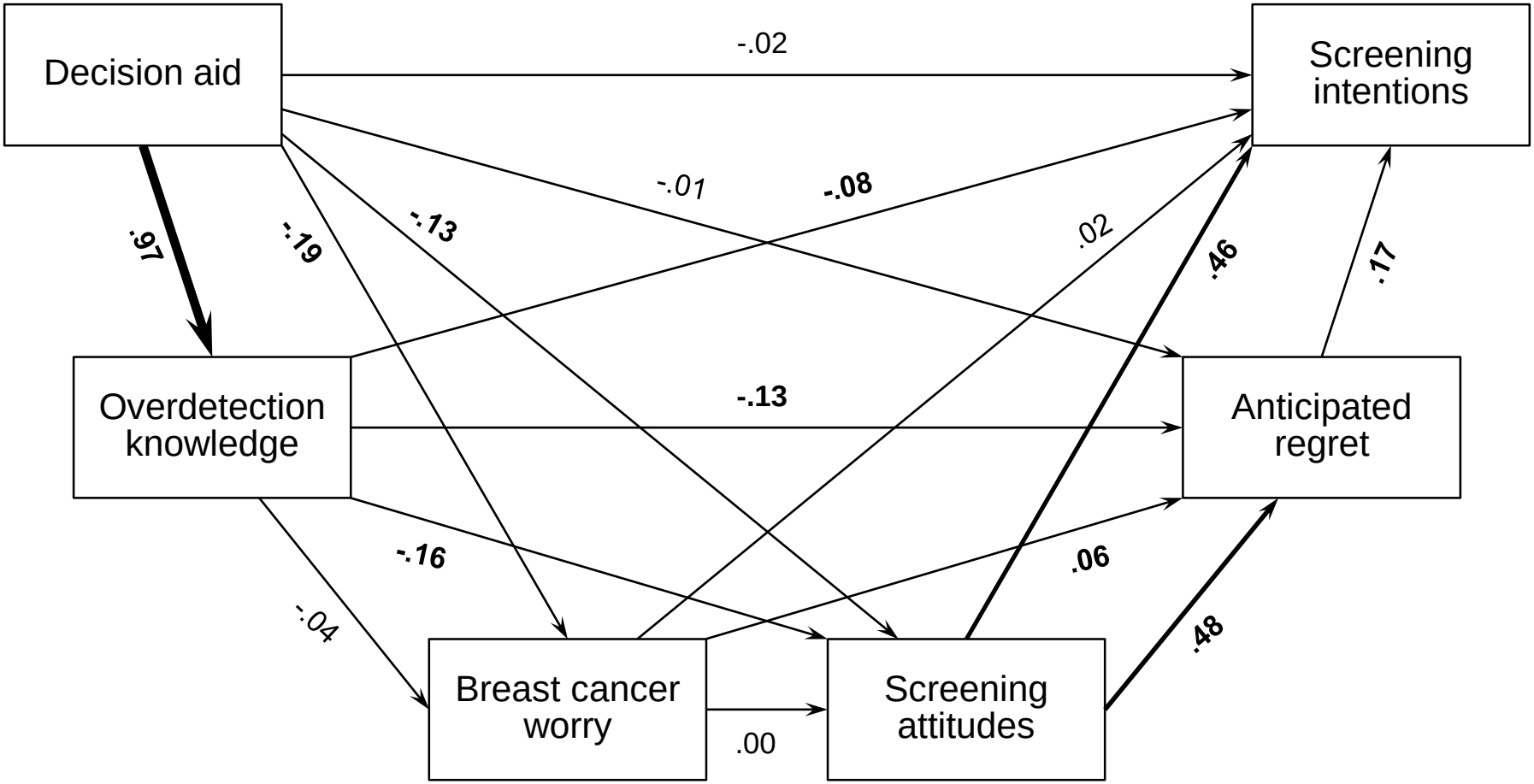



N=811. Outcome and mediator variables were standardised prior to analysis. Analyses controlled for baseline measures of screening intentions, attitudes, basic knowledge, stage of decision making, breast cancer family history, birthplace, language, education, marital status, parent status, work status, and age.

# MEDIATION ANALYSIS RESULTS



| Path | Effect | SE | 95% CI | |
|---|---|---|---|---|
| **Total effect** | **-.2768** | **.0540** | **-.3828** | **-.1708** |
| Direct effect | -.0192 | .0501 | -.1175 | .0791 |
| **Total indirect effect** | **-.2576** | **.0449** | **-.3488** | **-.1734** |
| Specific indirect effects | | | | |
| **01. Knowledge** | **-.0731** | **.0267** | **-.1281** | **-.0230** |
| 02. Knowledge, worry | -.0010 | .0017 | -.0073 | .0007 |
| **03. Knowledge, attitudes** | **-.0700** | **.0171** | **-.1071** | **-.0396** |
| **04. Knowledge, anticipated regret** | **-.0201** | **.0072** | **-.0375** | **-.0088** |
| 05. Knowledge, worry, attitudes | -.0001 | .0007 | -.0023 | .0011 |
| 06. Knowledge, worry, anticipated regret | -.0004 | .0005 | -.0021 | .0002 |
| **07. Knowledge, attitudes, anticipated regret** | **-.0121** | **.0040** | **-.0220** | **-.0059** |
| 08. Knowledge, worry, attitudes, anticipated regret | -.0000 | .0001 | -.0004 | .0021 |
| 09. Worry | -.0047 | .0050 | -.0191 | .0021 |
| 10. Worry, attitudes | -.0003 | .0027 | -.0063 | .0046 |
| **11. Worry, anticipated regret** | **-.0020** | **.0014** | **-.0063** | **-.0003** |
| 12. Worry, attitudes, anticipated regret | -.0001 | .0005 | -.0012 | .0008 |
| **13. Attitudes** | **-.0618** | **.0285** | **-.1178** | **-.0065** |
| **14. Attitudes, anticipated regret** | **-.0106** | **.0056** | **-.0241** | **-.0016** |
| 15. Anticipated regret | -.0012 | .0104 | -.0216 | .0200 |

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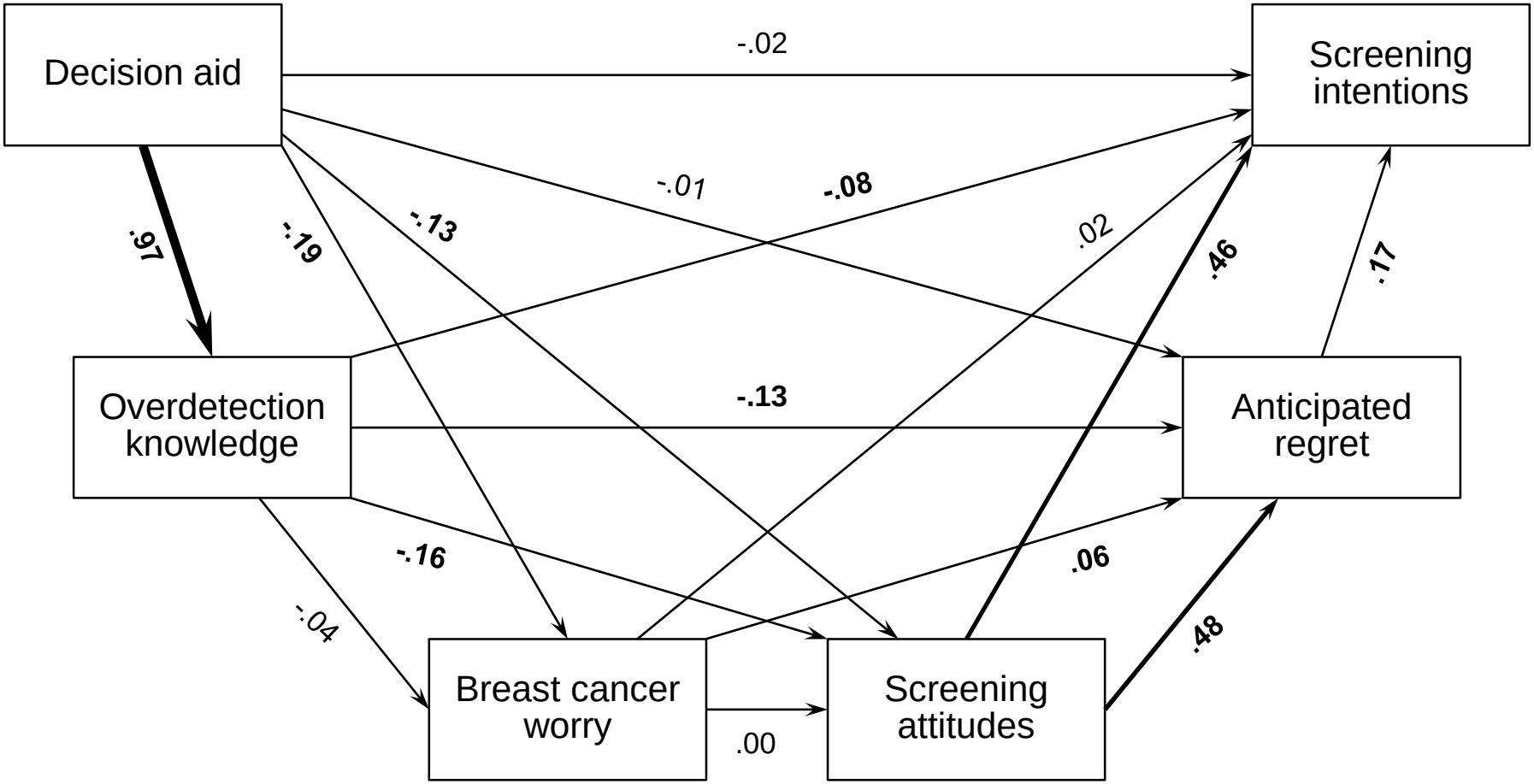

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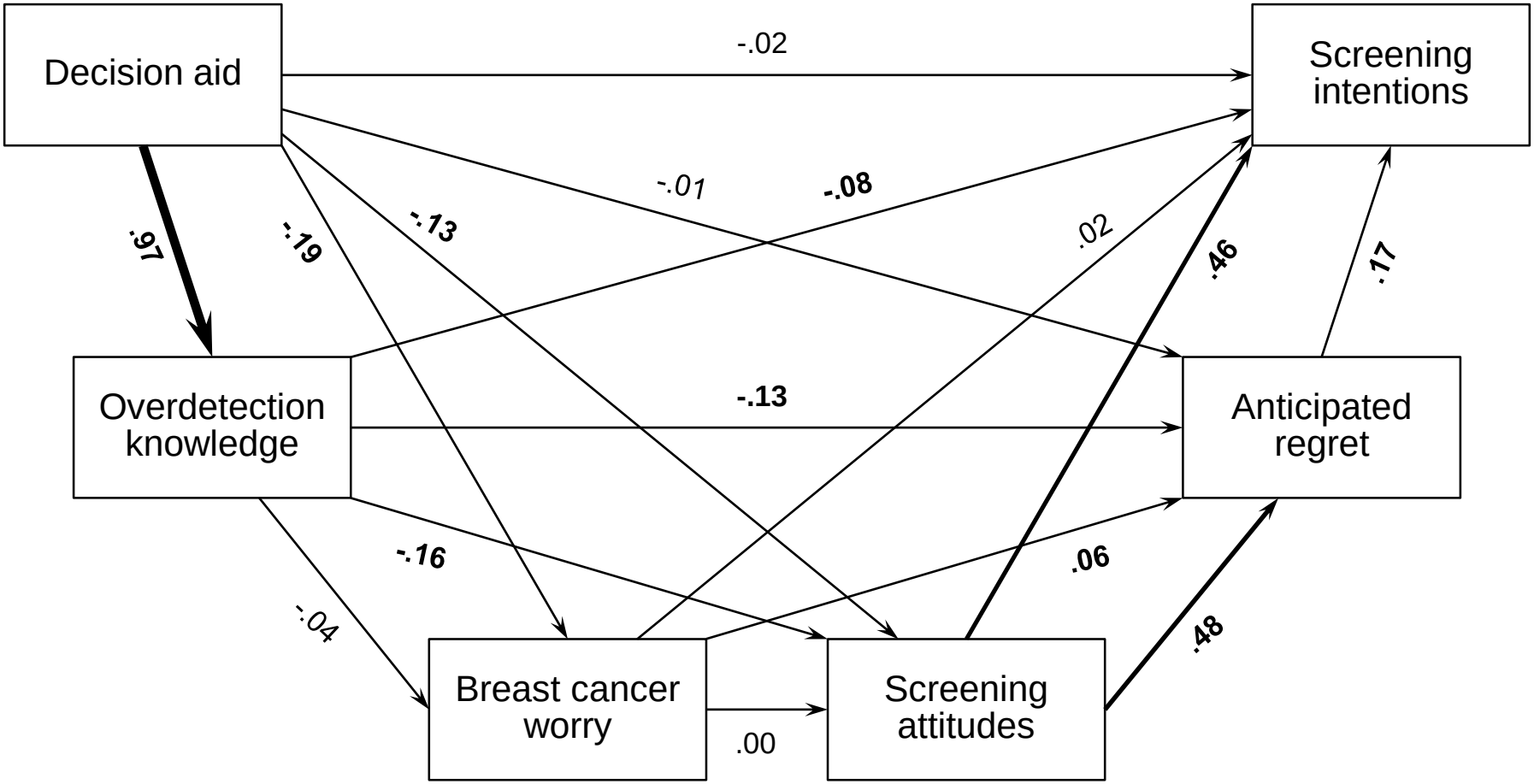

# SUMMARY AND CONCLUSIONS

- Effect of info about overdetection on screening intentions was mediated through multiple cognitive and affective pathways:
  - Intervention improved knowledge and shifted attitudes
    - These cognitive mechanisms were particularly important
  - Anticipated regret also played a role; worry not so much

- Limitation: outcome and mediator data are cross-sectional

- In emotive context, evidence-based info influenced cognitions
- Underscores importance of effective communication of harm and benefit info to support well-informed decision making

# ACKNOWLEDGEMENTS


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