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Do we achieve anything by teaching research integrity to starting PhD-students?

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1. Introduction

- Mandatory - In English
- 5 lecturers
- Topics: data management, plagiarism, COI, publication ethics, misbehaviour, …
- 4 times/y for 200-400 first-year PhD researchers : n= > 1000

1. Introduction

Research goal:

- to evaluate research integrity (RI) lecture
- evaluation depends on clearly defined teaching objectives

Specific aims:

1) To evaluate possible short-term effect of education on PhD students' knowledge, attitude and behavior
2) To evaluate possible changes over time: prolonged effect

(Or: why are we teaching RI?)

"The kids don't listen, so I have to repeat myself. I'm always repeating myself. You know, always saying the same thing more than once. I say it once, and then they make me say it again..."

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2. Methods

Knowledge
Attitude
Behaviour

→ Measurable outcomes to determine whether the teaching objectives are met

Questionnaire

- 36 items on knowledge, attitudes and behavior
- 22 actions of research misconduct [1]
- 60 minor and major research misbehaviors [2]
- New items on RI
- Adapted to PhD students (e.g. no items on retraction)

→

Expert content validation process

- 6 experts
- To rate each item: *"1= not relevant"* to *"4=highly relevant"*
- Multirater kappa coefficient of agreement
- 7 items deleted → **29 items**

→

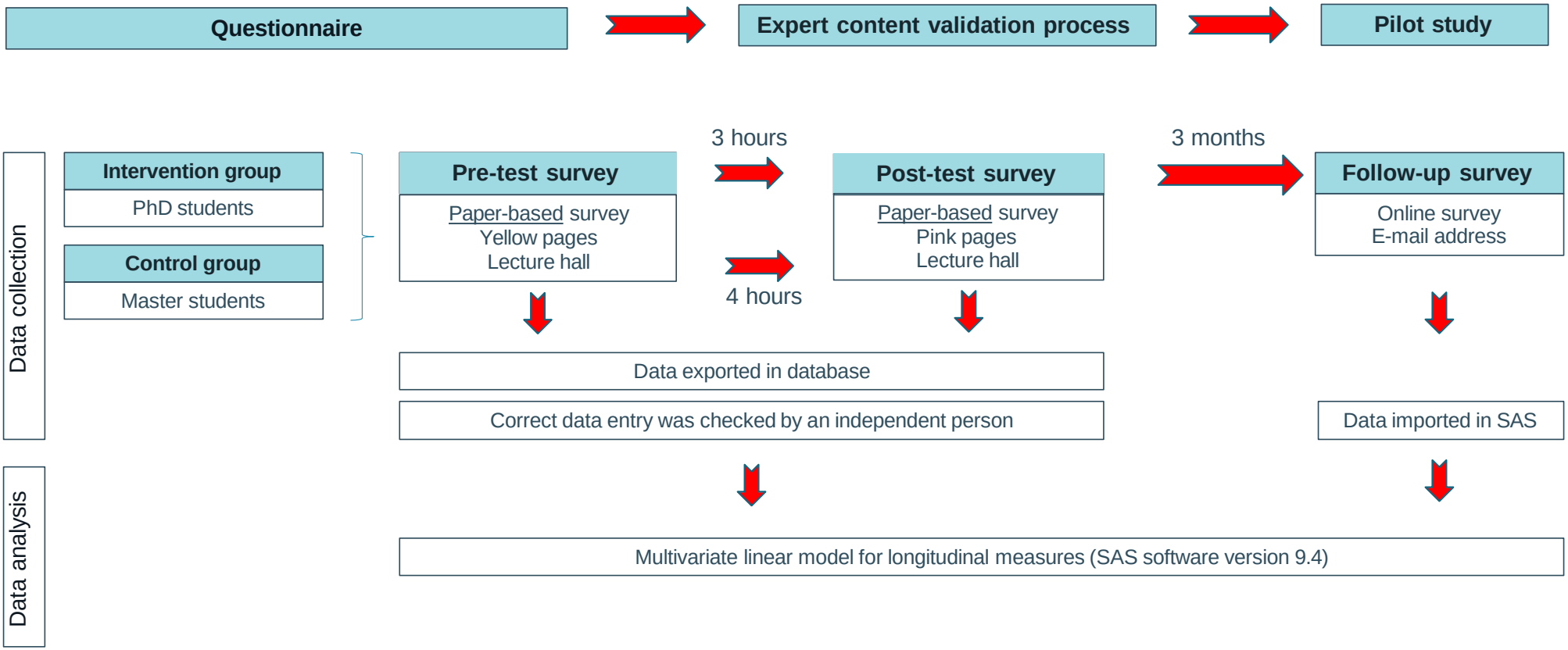
Pilot study

10 PhD students
- *User-friendliness*
- *Layout*

Knowledge: ability to understand/remember concepts, facts related to RI
Attitude: Endorsement/expression of beliefs/attitudes that reflect RI
Behaviour: Actual/planned ethical behaviour/practices of individuals

[1] Godecharle et al. Scientists Still Behaving Badly? A Survey Within Industry and Universities. Sci Eng Ethics. 2018 Dec;24(6):1697–717
[2] Bouter *et al*. Ranking major and minor research misbehaviors: results from a survey among participants of four World Conferences on Research Integrity. Res Integr Peer Rev. 2016 Dec;1(1):17

2. Methods


Questionnaire
Expert content validation process
Pilot study
Data collection
Intervention group
PhD students
Control group
Master students
Pre-test survey
Paper-based survey
Yellow pages
Lecture hall
3 hours
4 hours
Post-test survey
Paper-based survey
Pink pages
Lecture hall
3 months
Follow-up survey
Online survey
E-mail address
Data exported in database
Correct data entry was checked by an independent person
Data imported in SAS
Data analysis
Multivariate linear model for longitudinal measures (SAS software version 9.4)

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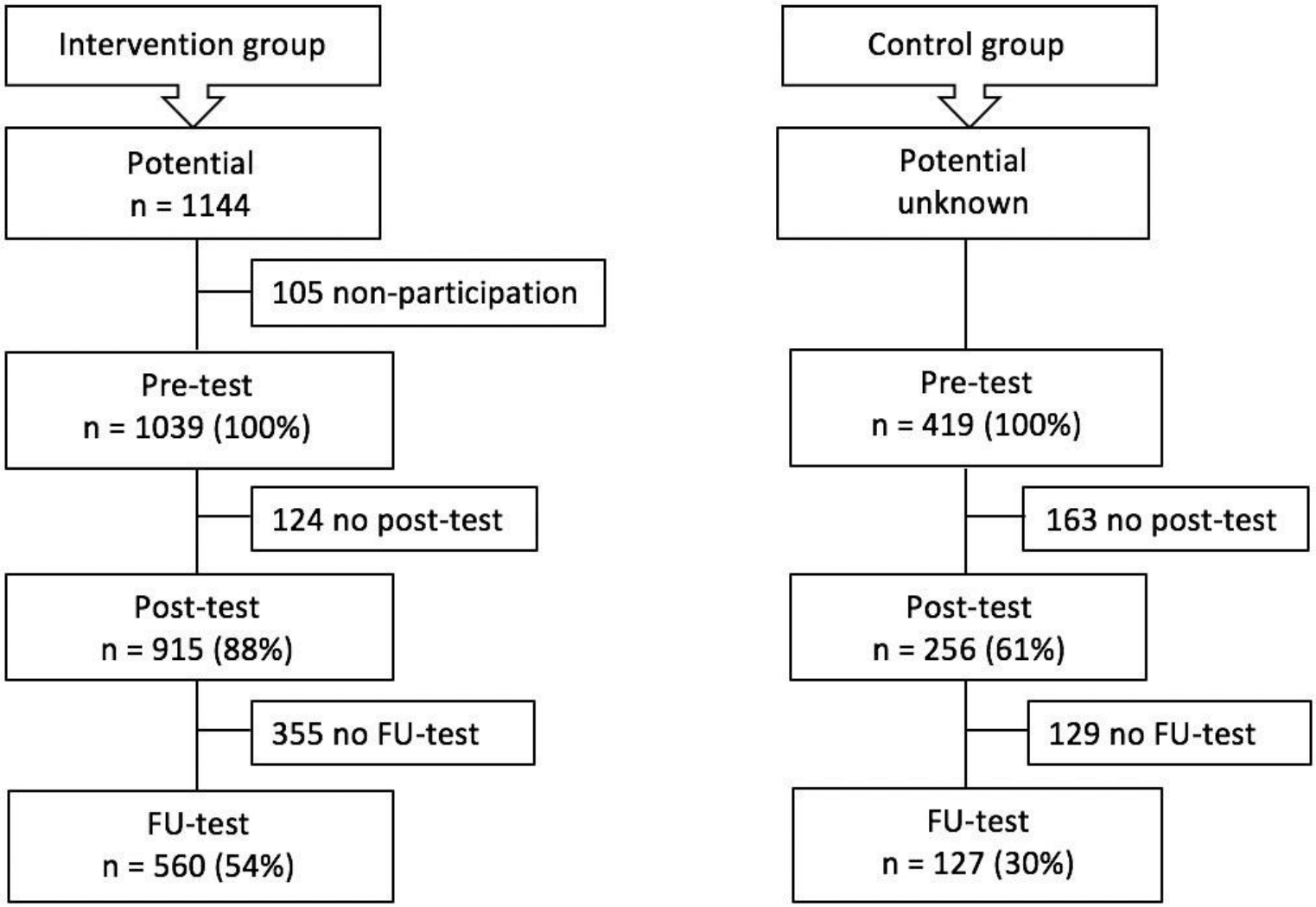
3. Results

- Response rate



3. Results

- Demographic characteristics

Variable	*Control* *n = 419*	*Intervention* *n = 1039*
Age		
20-29	407 (97%)	801/1024 (77%)
30+	1 (0%)	223/1024 (22%)
Unknown	11 (3%)	15 (1%)
Field of research		
Biomedical Sciences	185 (44%)	274 (26%)
Social Sciences	188 (45%)	157 (15%)
Natural Sciences	27 (6%)	485 (47%)
Humanities	5 (1%)	103 (10%)
Unknown	14 (3%)	20 (2%)
Have you obtained your Bachelor's/ Master's degree in Belgium		
Belgium	382 (91%)	580 (56%)
Outside Belgium	27 (7%)	445 (43%)
Unknown	10 (2%)	14 (1%)
Have you already attended a course or workshop in research integrity?		
Yes	83 (20%)	162 (16%)
No	323 (77%)	863 (83%)
Unknown	13 (3%)	14 (1%)

3. Results

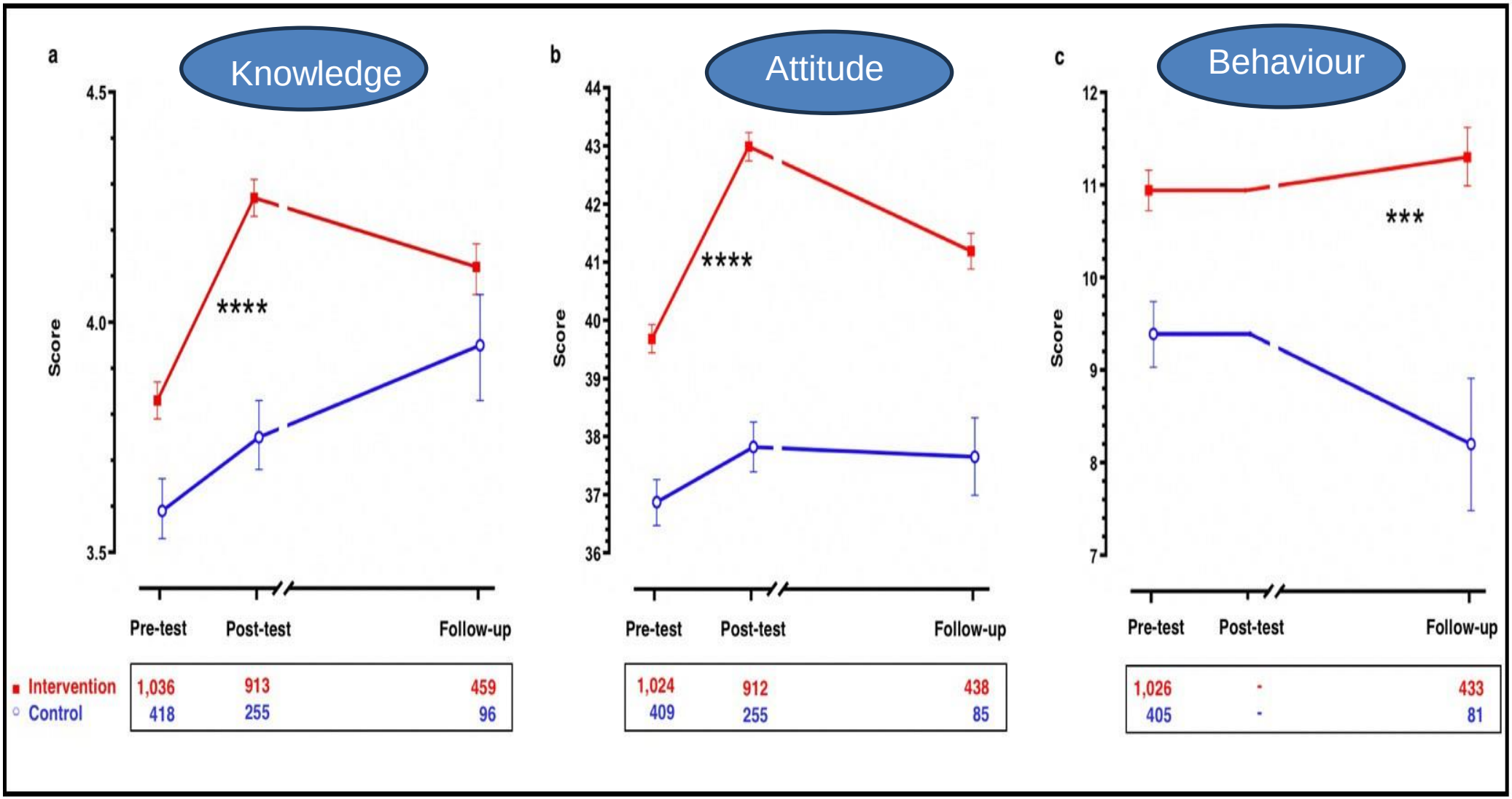
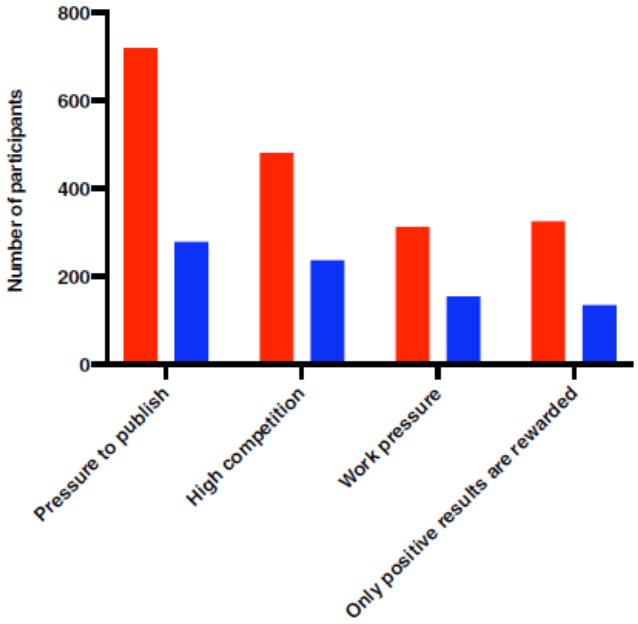


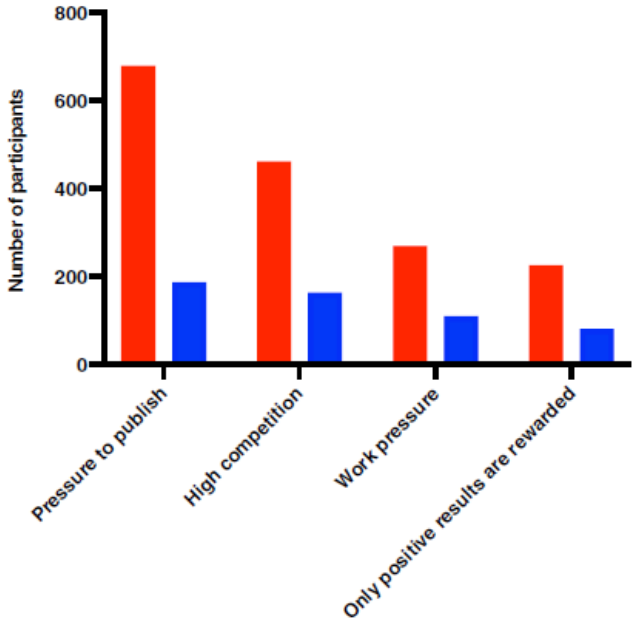
Figure 2 Participants' knowledge, attitude and behaviour on research integrity and misconduct. *Pre-test* indicates scores immediately prior to a 3-hour course on research integrity (intervention) or another course (controls). *Post-test* indicates scores immediately after the course. *Follow-up* indicates scores after 3 months. ***a,*** Sum of six knowledge items (minimum 0, maximum 6). ***b,*** Sum of 10 attitudes items (minimum 10, maximum 50). ***c,*** Sum of five behaviour items (minimum 5, maximum 15), behaviour questions were not asked at post-test. Data are shown as means with 95% confidence intervals. ****P<0.001*, **** *P<0.0001* for the differences in *change* with respect to pre-test values between both groups, as determined by multivariate linear models for longitudinal measurements, using a direct likelihood approach. Numbers of respondents are indicated below the graphs and may differ from those shown in Figure 1 because of missing data.

3. Results: 3 most important reasons for misconduct

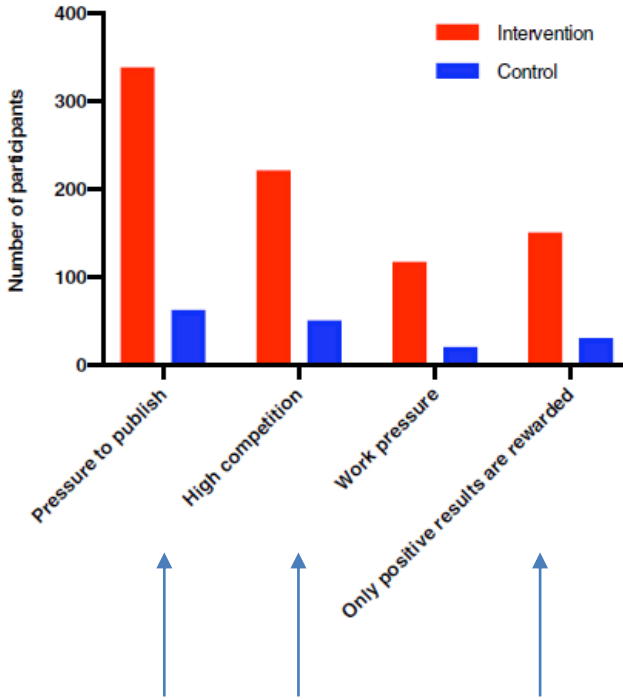
Pre-test



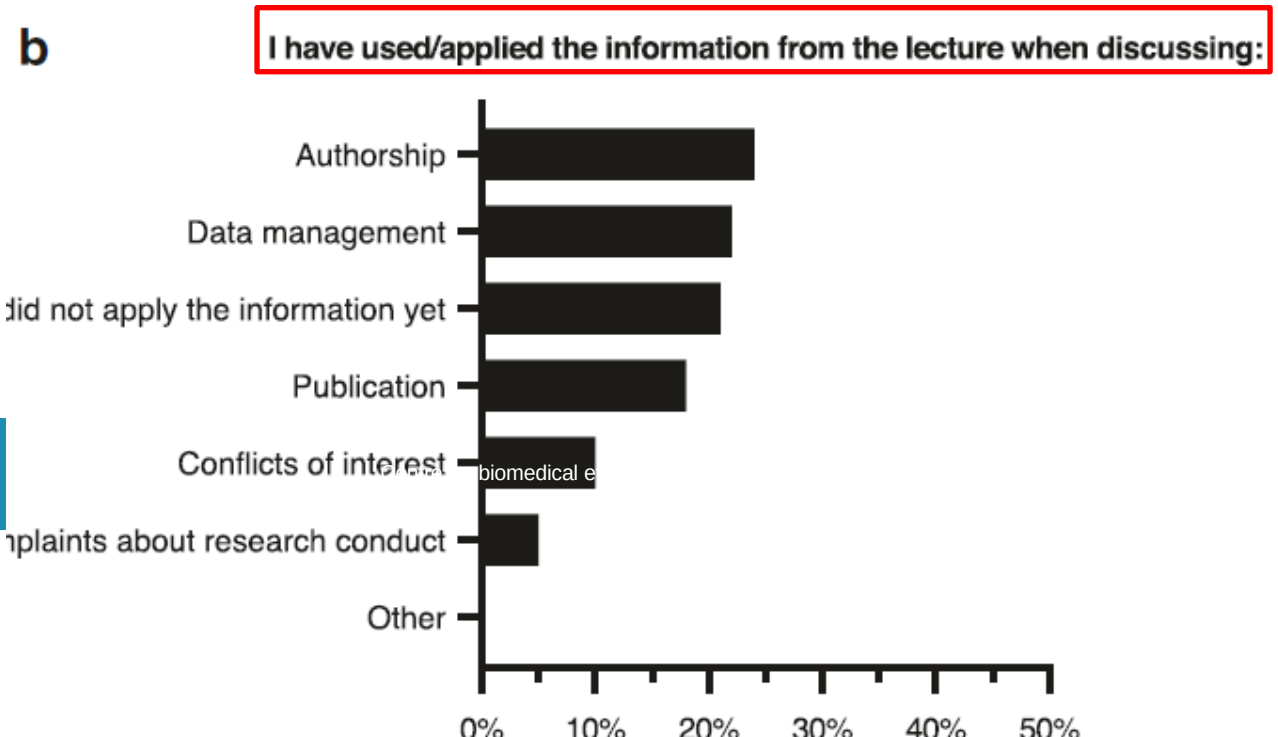
Post-test



Follow-up



3. Results: additional questions follow-up (= 3m after course)



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4. Discussion

- Significant though modest **improvement in knowledge and attitude**, and a **prolonged impact for some behavioural items**
- **Discussing RI** and even **applying** the content of the lecture in daily research practice
- Conversations outside the RI lecture: **influence on actual *practice* of science**

- Strengths of the study:
  - Large sample (N = 1039 *vs* n = 419)
  - Immediate impact & retention over three months
  - All disciplinary fields
  - Internationally highly diverse study population (43% obtained his Master's degree outside Belgium)
- Limitations:
  - Control group: Master students
  - Traditional lecture-based teaching **contributes little to long-term knowledge** retention

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5. Conclusion

- Positive ‘return of investment’ in RI teaching: it is on the agenda of Phd students

- But RI education is only one component:
  - System of science
  - Research environment
  - Other forms of education (e.g. case based, in 3rd year; P’s, …)

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Thank you:

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- PhD & master participants
- Colleagues/Teachers

Thank you for your attention!

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