Teaching statistics to medics using a flipped classroom format

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Research and Evidence Based Medicine

Key part of the pre-clinical teaching

Taught weekly in years 1 and 2

Assessment via MCQs and coursework

Philosophy of science and types of research

Basic statistics (in R)

Study design and critical appraisal skills

REBM in Year 2 of MBChB

Flipped classroom

All didactic content delivered via pre-recorded videos

Weekly practical

Students engage with the content in weekly computer labs or discussion-based tutorials

Assessment

Knowledge and skills were assessed with MCQs in the exams and coursework submission (data analysis and critical appraisal)

Common criticisms of flipped classroom

Non-engagement

Students don't watch the videos and come to class unprepared

Class dynamics

If some students have watched the videos and others have not, it is difficult to lead a practical in a way that suits everyone

Time consuming

Recording high-quality videos takes longer than preparing an in-person lecture

Akçayır, G. and Akçayır, M., 2018

Our research question

Does it matter when students watch the pre-recorded videos?

Is watching the videos before class associated with better performance?

Replicating Foerster et al. (2022)

Pre-class video watching fosters achievement and knowledge retention in a flipped classroom[☆]

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More on Foerster et al. (2022)

- Setting: Undergraduate statistics course at a German university (n = 451)
- 36 videos provided for students to watch
- On average, students watched 50 videos
- On average, students watched the assigned videos 5 days after the class

- **The earlier students watched the assigned videos, the higher their assessment score**

The Edinburgh study (2023)

- Setting: Y2 REBM module (n = 313, participants n = 169)
- 58 videos provided for students to watch, across 20 weeks
- Weekly practical to practice/discuss the content

- Player data from the video platform (Echo360)
  - ***First ping***: *the signal sent to the server when a student started watching a video*
- Data on marks from the VLE
- Questionnaire data: conscientiousness, learning approaches, learning norms
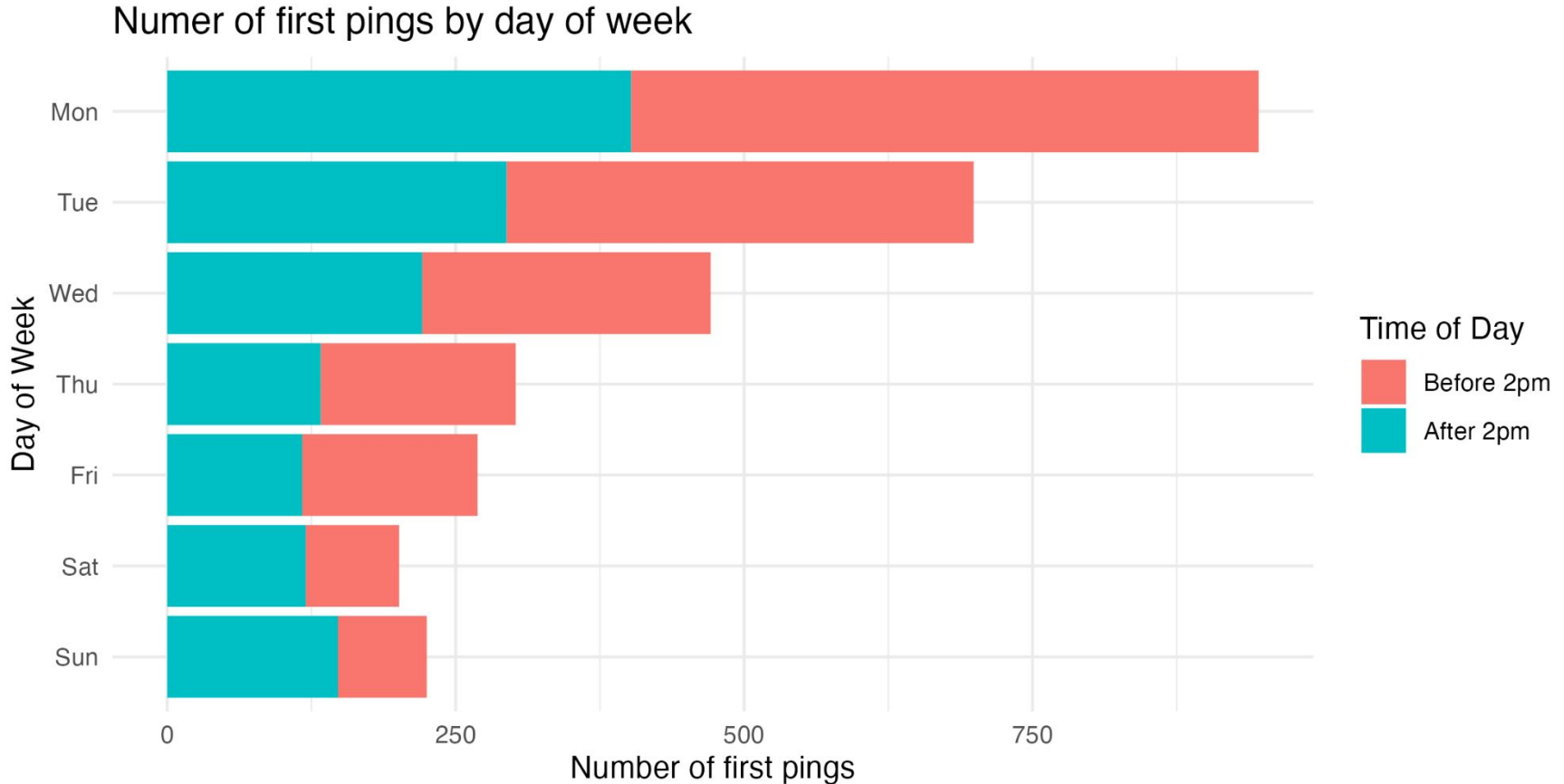
Hypotheses

H1a: The earlier the student watches the videos (in days) relative to the relevant live session, the higher their score on the REBM assessment

H1b: After controlling for conscientiousness, the earlier the student watches the videos (in days) relative to the relevant live session, the higher their score on the REBM assessment

H2: The more videos a student watched, the higher their score on the REBM assessment

Results

When did students watch the videos?

Numer of first pings by day of week

Time of Day
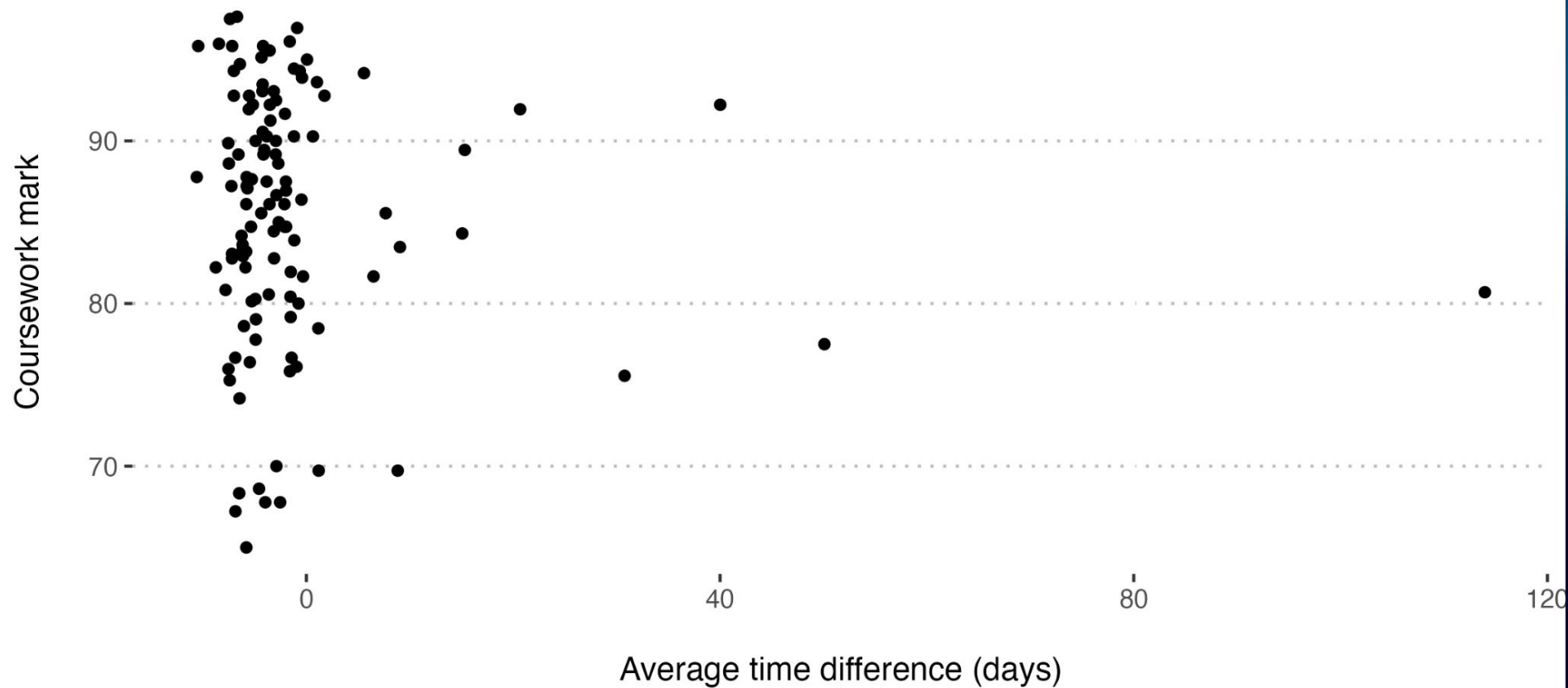- Before 2pm (red)
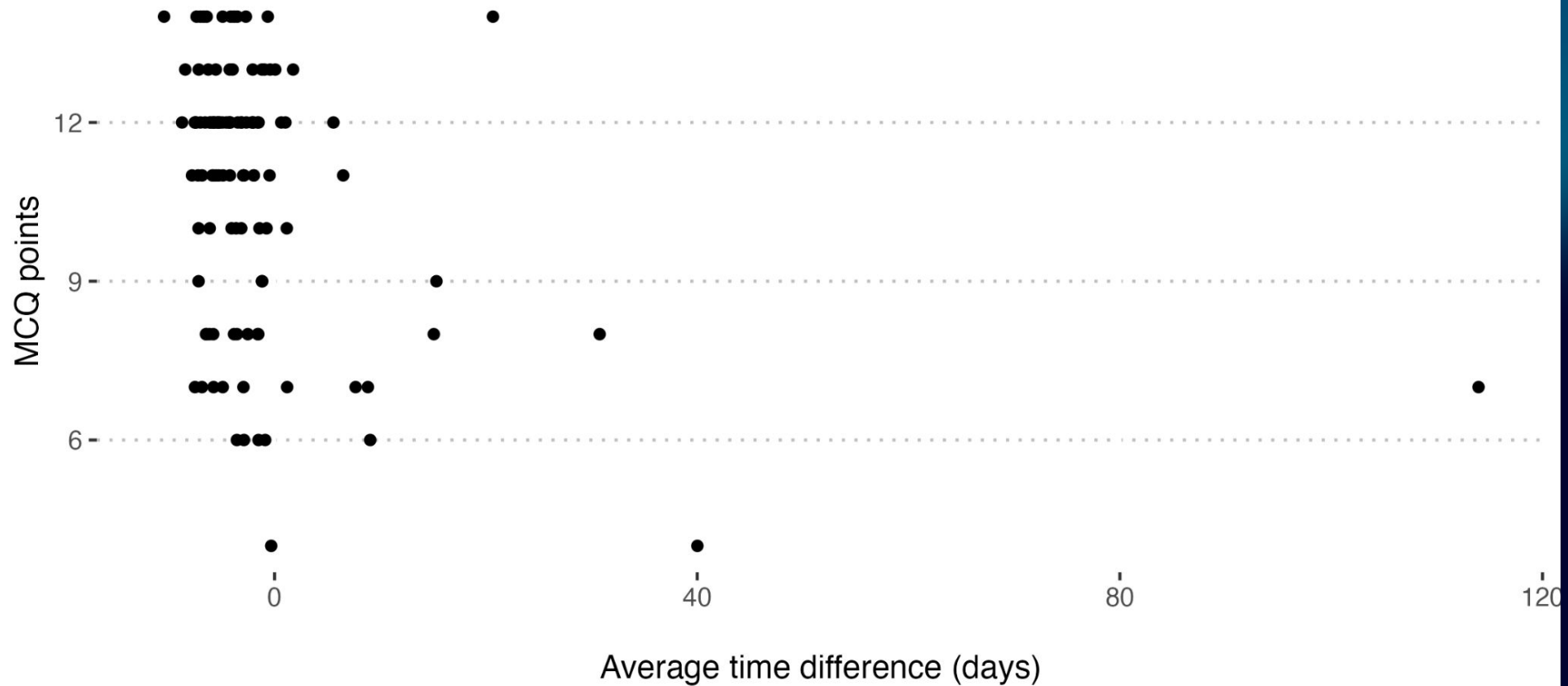- After 2pm (teal)

How did we analyse the data?

For each video, we calculated the time interval between the first ping and the starting time of the associated practical

We averaged this interval between all videos for each student, resulting in a single number per student

Avg. Time Difference vs Y2 CW Marks

Hypothesis 1A

The earlier the student watches the videos (in days) relative to the relevant live session, the higher their score on the REBM assessment

Coursework mark: linear regression
B = -0.04, p = .41 (ns)

MCQ mark: negative binomial regression
B = -0.007, p = .02
$e^{-0.007} = 0.99$

For each day's delay in watching the videos, the MCQ mark decreased by 0.99 times (1%).

Hypothesis 1B

The result from 1A will hold after controlling for conscientiousness

Conscientiousness did not change the pattern of results and was not a significant predictor

Hypothesis 2

The more videos a student watched, the higher their score on the REBM assessment

Coursework mark: B = 0.12, p = .11 (ns)

MCQ mark: B = 0.011, p < 0.001
$e^{0.011} = 1.01$

Each additional video watched increased the MCQ mark by a factor of 1.01 (1%).

Summary of results

- When students watched videos, they watched the videos on time
- There was no relationship between the timing or number of videos watched and the coursework mark
- There was a weak relationship between the timing and number of videos watched, and the MCQ mark
- Including conscientiousness in the model did not change the pattern of results

Future directions

Pay closer attention to the videos that students did not watch
(categories: video watched early, video watched late, video not watched)

Gather more data from a more diverse cohort of students

Thanks!

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echo360