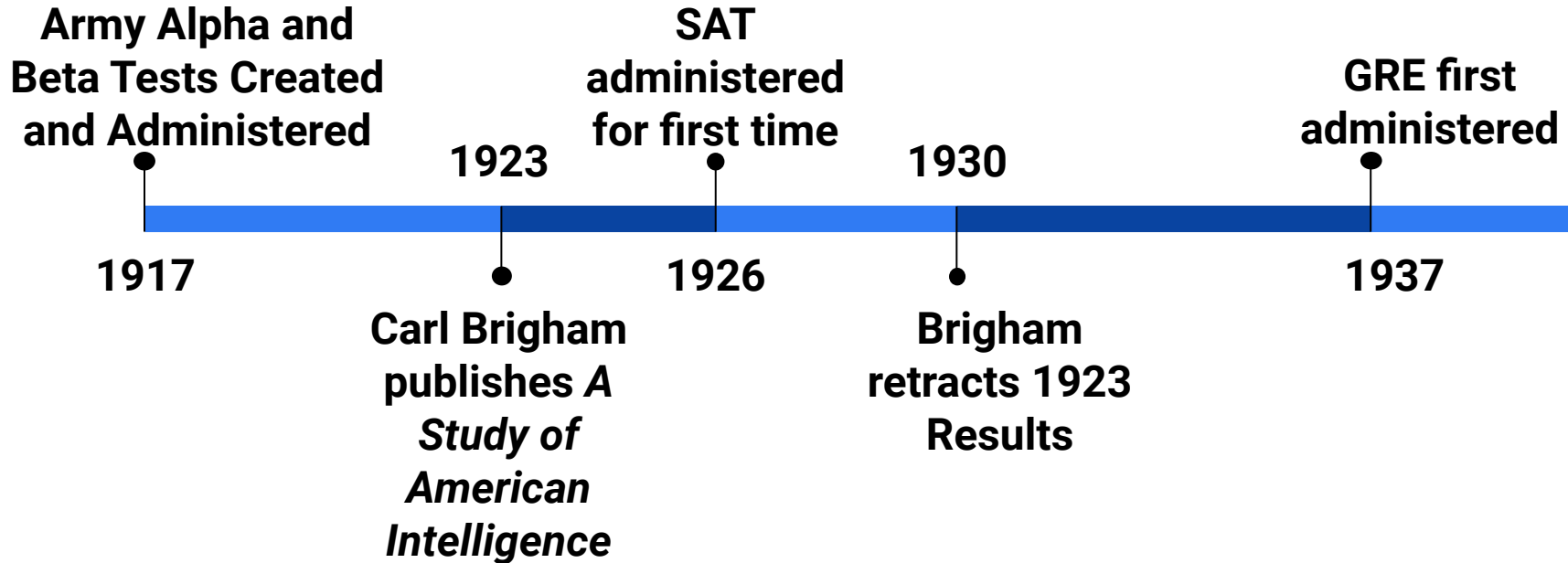


# GRE: Graduate student Rejection and Exclusion

Emily T. Winn  
Tim McEldowney

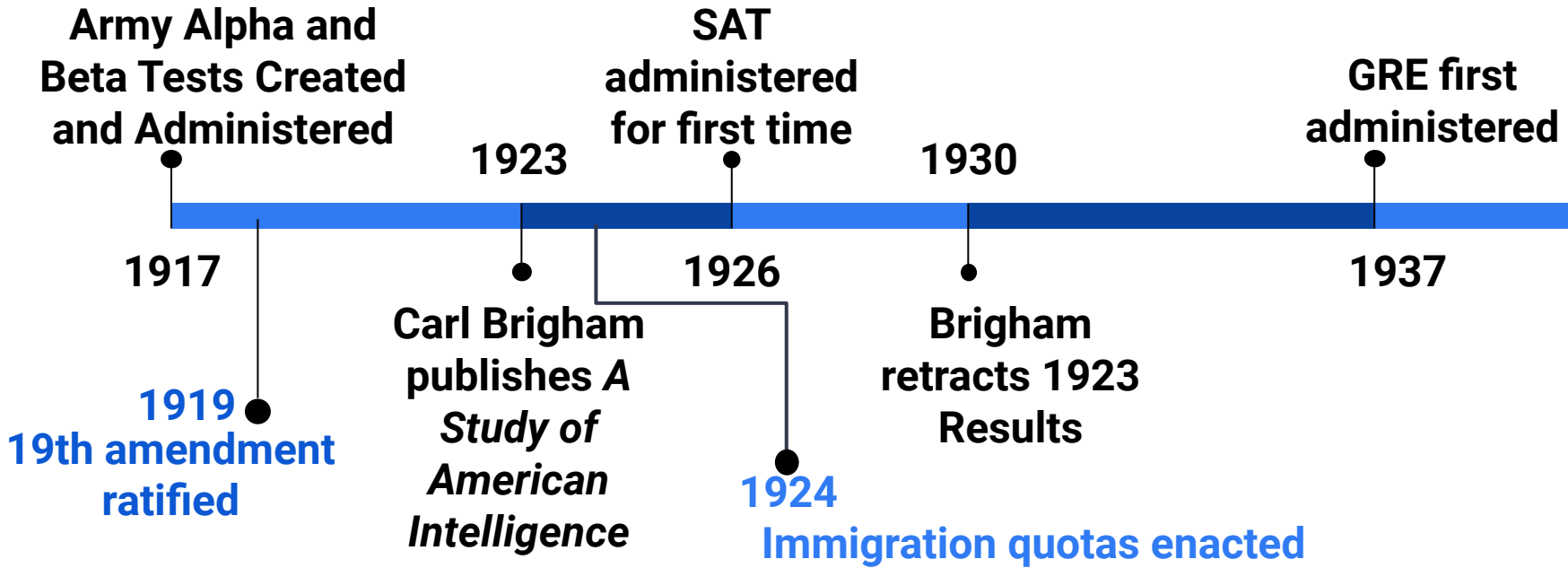
Part 1: The General GRE is  
terrible and you should get  
rid of it

# Background: Some History of Mass Standardized Testing



# Background: Some History of Mass Standardized Testing

## Jim Crow, segregation, Great Migration



# Who Runs the Test?



Educational Testing Services (ETS),  
established in 1947

- World's largest standardized testing organization
- They run the **GRE**, TOEFL, GMAT, Praxis
- Up until at least 2004, **they also determined questions and grading for the SAT** (Lewin 2004)
- In 2020, they made over **1 billion dollars in revenue**, according to ProPublica

# ETS: Active and Ongoing Discrimination

- As of 1998 ETS determined questions in the following way:
  - **Keep “good questions” when white students outscored African American students**
  - **Discard those on which African American students outscored white students.** (Kidder and Rosner, 2002)
- The ETS **only recently stopped flagging accommodations on their score reports** sent to schools
- **Medical, financial discrimination** affects the GRE process as well...
  - Disability accommodations
  - Fee vouchers, costs

# Four Forms to Apply for Accommodations

1. **Application Information**
2. **Accommodations requested**
3. **Certification of Eligibility**
  - a. Four page form that must be filled out by a medical professional in English
  - b. Additional documentation (How much? You have to guess!)
4. **Test Authorization Request Form**
  - a. Here you specify your preferred date/time, and top two locations



# Too much burden to get accommodations

- **All paperwork must be filed at least six weeks prior to exam registration**
- They are allowed to ask you to get retested/evaluated for your disability
- Unlike the SAT/ACT now, ***the presence of an IEP or 504 plan does not guarantee accommodations***
- If they cannot accommodate they suggest to “tell the school you’re applying to”





# The real cost of the GRE (general exam)

The financial cost of the GRE was a major reason students did not take it or apply to graduate programs! (Owens et al, 2014)



# The real cost of the GRE (general exam)

- Test fee: **\$205**
- Official score report: **\$27/school**
- Rescheduling: **\$50**
- Plus any necessary travel/hotel
- Plus study materials
- Max Cancellation refund: **50%**
- Fee Vouchers:
  - Based on FAFSA whether get a **fee waiver for 50% off** the testing fee *for one test*. (Have to schedule after waiver acceptance)



# Home Test: Materials Required



(but you need a phone at check in)



Cannot be public space

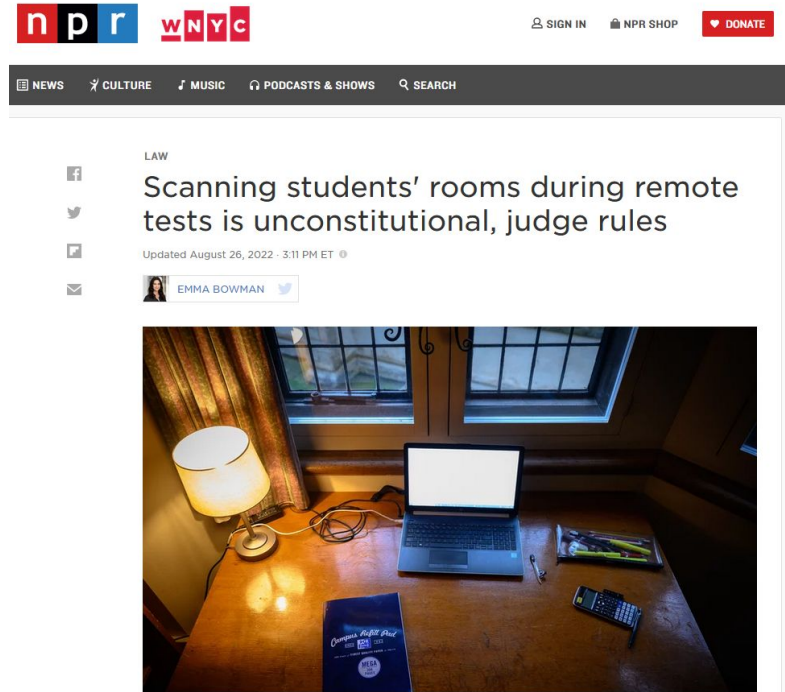


# Home test: Additional Rules

- The camera must be such that the (closed) door of the room is in view at all times
- No facemasks, jewelry (except wedding ring)
- No earbuds or headphones; ears must be visible for test
  - Religious headwear must show ears
- If the wifi cuts out, the score may be cancelled.
- If someone walks in, the score may be cancelled.

# But wait: there's more discrimination!

- Use **facial recognition** to match you with your government issued ID
- They **send your photo to the school** with your score report
- They **scan your room before the exam** (unconstitutional) and they **record you throughout the exam.**



The image shows a screenshot of a news article from NPR WNYC. The article is titled "Scanning students' rooms during remote tests is unconstitutional, judge rules" and is categorized under "LAW". It was updated on August 26, 2022, at 3:11 PM ET. The author is Emma Bowman. Below the text is a photograph of a desk in a room, featuring a laptop, a lamp, a window, and a book titled "Campus Rights Plus".

npr wnyc

SIGN IN NPR SHOP DONATE


NEWS CULTURE MUSIC PODCASTS & SHOWS SEARCH

LAW

Scanning students' rooms during remote tests is unconstitutional, judge rules

Updated August 26, 2022 · 3:11 PM ET

EMMA BOWMAN




# Even assuming no discrimination... The test is not useful

## PLOS ONE

 OPEN ACCESS  PEER-REVIEWED

RESEARCH ARTICLE

### Multi-institutional study of GRE scores as predictors of STEM PhD degree completion: GRE gets a low mark

Sandra L. Petersen , Evelyn S. Erenrich, Dovev L. Levine, Jim Vigoreaux, Krista Gile

Published: October 29, 2018 • <https://doi.org/10.1371/journal.pone.0206570>

- No difference in GRE score for women who completed PhD vs women who left program
- Men who left PhD program had significantly higher verbal and quantitative GRE scores than those who completed PhD

Part 2: The Math Subject  
GRE is terrible and you  
should get rid of it

# Comes with all the issues of the general GRE!

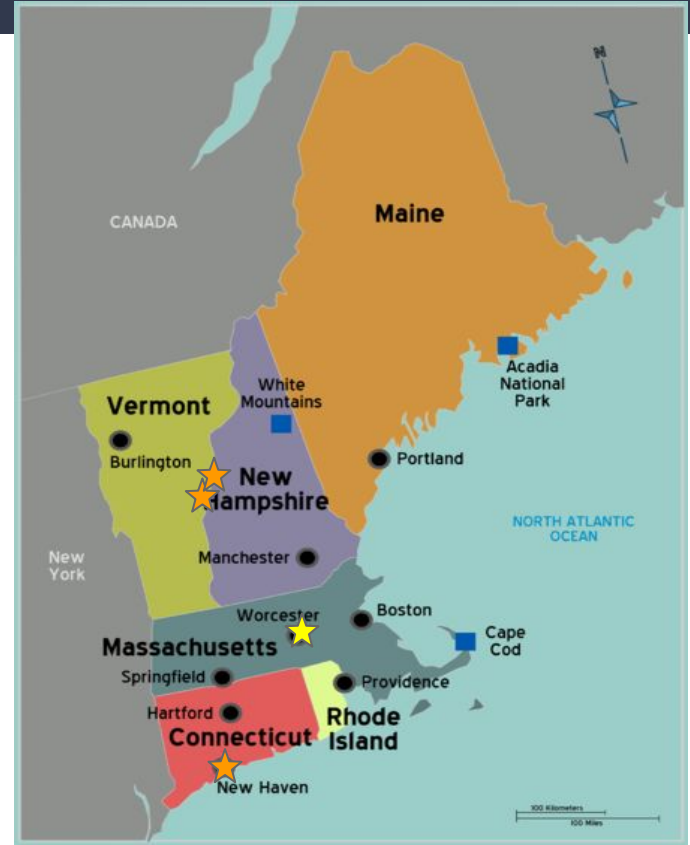
- Accommodations?
  - You have to submit your test locations in advance  
AND pay the subject test fee with the application.
- Costs **\$150**
- Travel costs higher - fewer test locations, test dates
- **Policy on changing test site - \$50!** Even after new locations open up. We had to constantly refresh the site.



# Booking the Test is a Nightmare

Consider a student in Worcester, MA (yellow) trying to book the October GRE subject test

August 16, 2022 - available test sites in orange



# Booking the Test is a Nightmare

Consider a student in Worcester, MA (yellow) trying to book the October GRE subject test

August 23, 2022 - available test sites in orange (New Haven, CT is filled)



# Booking the Test is a Nightmare

Consider a student in Worcester, MA (yellow) trying to book the October GRE subject test

September 1, 2022 - AMS makes statement about lack of availability

September 4, 2022 - new locations open far closer



# Booking the Test is a Nightmare

This happened across the country!

- Chicago
- New York City
- Seattle
- Texas
- California, etc



# And again – it is not informative!

It's 2 hours and 50 minutes for 66 multiple choice questions, 50% calculus, 25% algebra, 25% other topics. (Not about math, there are no proofs, it's about cute tricks). (Roughly 2.5 minutes per question).

This brings us to research on the effectiveness of the Mathematics Subject GRE in identifying quality graduate students.

# Part 2a: Research on the Mathematics Subject GRE

# Error 404

There is no research on the effectiveness of the Mathematics Subject GRE!

(Okay there are some ETS reports on the subject exam but those reports are older than I am.)

Luckily, there is some other literature we can look at to approximate the effectiveness of the subject GRE.

Part 2b: Research on the  
~~Mathematics~~  
Physics Subject GRE



# Physics is rethinking Graduate Admissions

Due to a concerted effort by physicists, physics education researchers, and the American Physical Society (APS) there has been a good number of papers on the Physics GRE and Physics Graduate admissions in general.

Spoiler: The Physics GRE is not a useful admission requirement.

# The Physics Subject GRE is Terrible

 | RESEARCH ARTICLE | SCIENTIFIC COMMUNITY



## Typical physics Ph.D. admissions criteria limit access to underrepresented groups but fail to predict doctoral completion

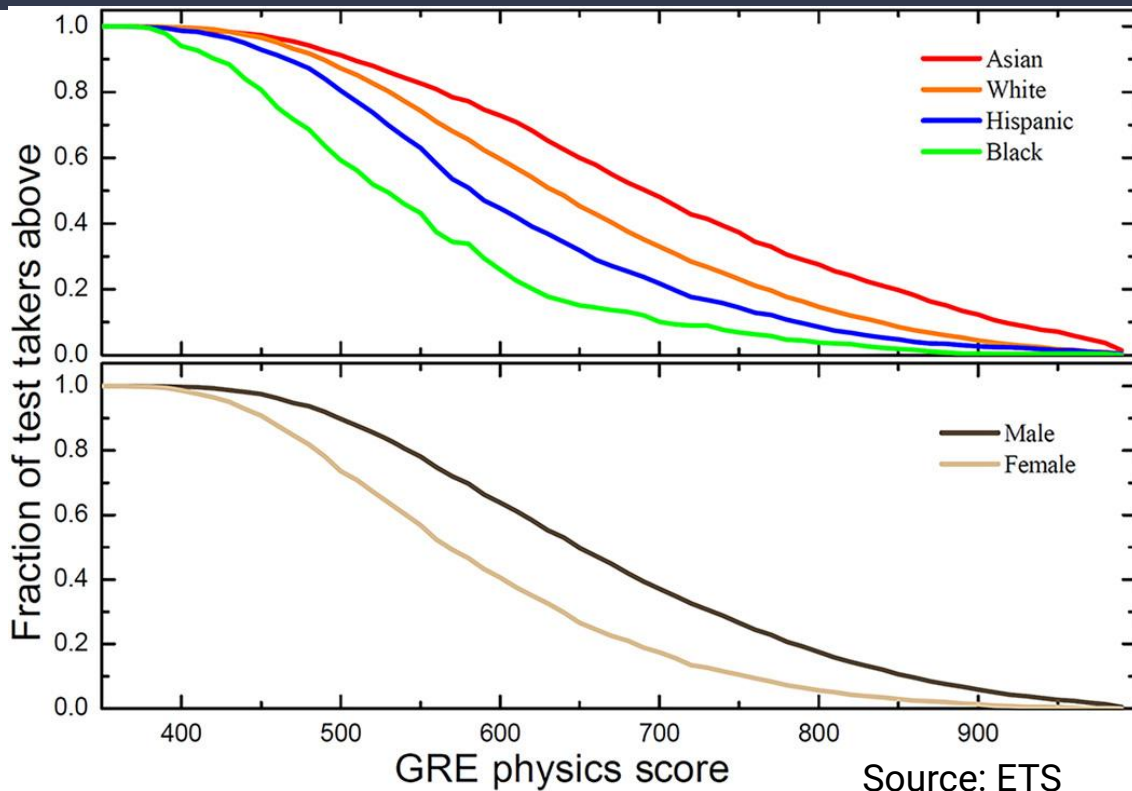
[CASEY W. MILLER](#)  , [BENJAMIN M. ZWICKL](#)  , [JULIE R. POSSELT](#), [RACHEL T. SILVESTRINI](#), AND , [THEODORE HODAPP](#)  [Authors Info & Affiliations](#)

SCIENCE ADVANCES • 23 Jan 2019 • Vol 5, Issue 1 • DOI: [10.1126/sciadv.aat7550](https://doi.org/10.1126/sciadv.aat7550)

- Higher GRE scores are not associated with higher doctoral completion rates.
- There is a statistically significant gap between median male and female scores. There are similar differences by race/ethnicity.

# The Physics Subject GRE Discriminates

“Given that we find that Ph.D. completion is not correlated with the GRE-P score, the misuse of the test in admissions will negatively affect diversity without being able to identify individuals able to complete a physics Ph.D.” (Miller et al., 2019)



# The Physics Subject GRE Does Not Help

PHYSICAL REVIEW PHYSICS EDUCATION RESEARCH **17**, 010144 (2021)

Editors' Suggestion

## Physics Graduate Record Exam does not help applicants “stand out”

Nicholas T. Young<sup>1,2</sup> and Marcos D. Caballero<sup>1,2,3,4</sup>

<sup>1</sup>*Department of Physics and Astronomy, Michigan State University, East Lansing, Michigan 48824, USA*

<sup>2</sup>*Department of Computational Mathematics, Science, and Engineering, Michigan State University, East Lansing, Michigan 48824, USA*

<sup>3</sup>*Center for Computing in Science Education & Department of Physics, University of Oslo, N-0316 Oslo, Norway*

<sup>4</sup>*CREATE for STEM Institute, Michigan State University, East Lansing, Michigan 48824, USA*



(Received 24 August 2020; accepted 1 June 2021; published 23 June 2021)

- Having a high physics GRE score did not increase the applicant's chances of being admitted to the schools if they had other negative factors: low GPA, comes from a smaller undergraduate school.
- However, having a low physics GRE score did penalize otherwise competitive applicants.

Part 3: Holistic  
Admissions (Eliminating  
GRE does not let you off  
the hook!)

# Holistic Review

Holistic review uses all available information about the applicants not just easily sortable statistics.

“Everything matters, nothing matters the most.” (Posselt, 2016)

# Suggestions for Holistic Review

- Start by talking to your faculty about what they are looking for in new graduate students.
- What is the ideal student in terms of qualifications and experience? What courses does this student need?
- Create a rubric based off of these suggestions and have your selection committee base evaluations on that rubric.
- Break up the work so that on initial review every applicant is scored by **two** reviewers.

This is a lot of work compared to sorting a spreadsheet. But finding the students who will fit into your department is not a trivial task.

# Ethical Student Retainment

- How much money is lost by your program by admitting students just to kick them out?
- Does your program actually train students or just assume the “best” will survive?
- **You need to believe that every student you admit can get a PhD.**
- You need to be aware of what issues may come up (poor grades, medical issues, family responsibilities) and support them through it.
- Most importantly, make sure they have someone to advocate for them before they choose an advisor.



# Schools that Already Dropped the Requirement

Brown University (math)

Cornell University (applied math)

Emory University

Harvard University (applied math)\*

Montana State University\*

Ohio State University\*

Princeton University (math)\*

Rice University (math)\*

Rochester Institute of Technology\*

Temple University

Tufts University\*

University of Chicago (math)\*

University of Michigan

University of Minnesota\*

Virginia Tech\*

\*denotes schools who won't consider scores

# In Conclusion

- The general GRE is terrible
- The math GRE is horrible
  - (Presumably. If we study it the same way as the Physics GRE)
- There's a better way to do admissions but you have to figure it out for your program
- Regardless, it should not involve standardized tests

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Knowledge-GAP: Undergraduate  
Knowledge of the Mathematics  
Graduate School Application  
Process (NSF # 2126018)

# References

*2022–23 GRE® Bulletin Supplement for Test Takers with Disabilities or Health-Related Needs.* (2022). Educational Testing Services.

<https://www.ets.org/content/dam/ets-org/pdfs/gre/bulletin-supplement-test-takers-with-disabilities-health-needs.pdf>

Cochran, G. L., Hodapp, T., & Brown, E. E. A. (2018). Identifying barriers to ethnic/racial minority students' participation in graduate physics. *2017 Physics Education Research Conference Proceedings*, 92–95.

<https://doi.org/10.1119/perc.2017.pr.018>

Danielle Douglas-Gabriel & John D. Harden. (2021, February 7). To protect taxpayer dollars, the Education Dept. Is disproportionately auditing Black and Latino college students. *The Washington Post*.

<https://www.washingtonpost.com/education/2021/02/07/fafsa-verification-black-latino-college-aid/>

# References

Katie Langin. (2019, May 29). A wave of graduate programs drops the GRE application requirement. *Science*.

<https://www.science.org/content/article/wave-graduate-programs-drop-gre-application-requirement>

Levesque, E. M., Bezanson, R., & Tremblay, G. R. (2015). *Physics GRE Scores of Prize Postdoctoral Fellows in Astronomy* (arXiv:1512.03709). arXiv. <http://arxiv.org/abs/1512.03709>

Miller, C., & Stassun, K. (2014). A test that fails. *Nature*, *510*(7504), 303–304. <https://doi.org/10.1038/nj7504-303a>

Miller, C. W., Zwickl, B. M., Posselt, J. R., Silvestrini, R. T., & Hodapp, T. (2019). Typical physics Ph.D. admissions criteria limit access to underrepresented groups but fail to predict doctoral completion. *Science Advances*, *5*(1), eaat7550. <https://doi.org/10.1126/sciadv.aat7550>

# References

Department of Fair Employment & Housing v. Law School Admissions Council (LSAC), 3:12-cv-01830 (Northern District of California March 20, 2020). <https://clearinghouse.net/case/12446/>

Emma Bowman. (2022, August 26). *Scanning students' rooms during remote tests is unconstitutional, judge rules* [Org]. NPR.

<https://www.npr.org/2022/08/25/1119337956/test-proctoring-room-scans-unconstitutional-cleveland-state-university>

Hirschfeld, M., Moore, R. L., & Brown, E. (1995). Exploring the Gender Gap on the GRE Subject Test in Economics. *The Journal of Economic Education*, 26(1), 3. <https://doi.org/10.2307/1183461>

Jed Applerouth. (2016, December 15). Sweeping Changes to SAT and ACT Accommodations [Blog]. *Applerouth*. <https://www.applerouth.com/blog/2016/12/15/sweeping-changes-to-sat-and-act-accommodations/>

# References

Owens, L. M., Zwickl, B. M., Franklin, S. V., & Miller, C. W. (2020). Physics GRE Requirements Create Uneven Playing Field for Graduate Applicants. *2020 Physics Education Research Conference Proceedings*, 382–387.

<https://doi.org/10.1119/perc.2020.pr.Owens>

Petersen, S. L., Erenrich, E. S., Levine, D. L., Vigoreaux, J., & Gile, K. (2018). Multi-institutional study of GRE scores as predictors of STEM PhD degree completion: GRE gets a low mark. *PLOS ONE*, 13(10), e0206570.

<https://doi.org/10.1371/journal.pone.0206570>

Posselt, J. R. (2016). *Inside graduate admissions: Merit, diversity, and faculty gatekeeping*. Harvard University Press.

# References

Ruth Charney & Catherine Roberts. (2022, September 1). *Statement from AMS President, AMS Executive Director on Mathematics GRE Subject Test.*

[https://www.ams.org/news?news\\_id=7076&fbclid=IwAR2cnbbJflan8n0n1kT5wQRVlx3Bhka3DljyqEyUGoigsKIMxPHHItHMAGo](https://www.ams.org/news?news_id=7076&fbclid=IwAR2cnbbJflan8n0n1kT5wQRVlx3Bhka3DljyqEyUGoigsKIMxPHHItHMAGo)

Tamar Lewin. (2004, March 3). An Evolving Relationship, Kept Together for the Students. *The New York Times*.

<https://www.nytimes.com/2004/03/03/nyregion/an-evolving-relationship-kept-together-for-the-sake-of-the-students.html>

*The GRE General Test: One test for graduate, business, and law school.* (n.d.). ETS GRE.

<https://www.ets.org/gre/test-takers/general-test/register/fees.html#accordion-c2d76ded4b-item-821fa2a2a9>

*The GRE Mathematics Test.* (n.d.). Educational Testing Services.

<https://www.ets.org/content/dam/ets-org/pdfs/gre/fact-sheet-math.pdf>



# References

U.S. Department of Justice, Civil Rights Division, Disability Rights Section. (n.d.). *ADA Requirements: Testing Accommodations* [Gov]. Www.Ada.Gov. [https://www.ada.gov/regs2014/testing\\_accommodations.html](https://www.ada.gov/regs2014/testing_accommodations.html)

William C. Kidder & Jay Rosner. (2002). How the SAT Creates Built-in-Headwinds: An Educational and Legal Analysis of Disparate Impact. *Santa Clara Law Review*, 43(1), 131–212.

Young, N. T., & Caballero, M. D. (2021). Physics Graduate Record Exam does not help applicants “stand out.” *Physical Review Physics Education Research*, 17(1), 010144. <https://doi.org/10.1103/PhysRevPhysEducRes.17.010144>