

$E=mc^2$   $\Sigma F=ma$   $E_k=\frac{1}{2}mv^2$   $pV=nRT$   $s(t)=s(o)+v(o)t+\frac{1}{2}at^2$   $Q=mc\Delta T$   $E_z=mgh$   $v(t)=v(o)+at$   
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 $E_k=\frac{1}{2}mv^2$   $pV=nRT$   $s(t)=s(o)+v(o)t+\frac{1}{2}at^2$   $Q=mc\Delta T$   $E_z=mgh$   $v(t)=v(o)+at$   $E=mc^2$   $\Sigma F=ma$

# 'Whatever you do, you will never get them to work'; pre-academic male students in physics education.

Male 'effortless achievement' in advanced physics.

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# Introduction

The literature (and teachers) agree:  
Male students hardly work for school.

Laddishness

in general:  
Underachievement  
and failure

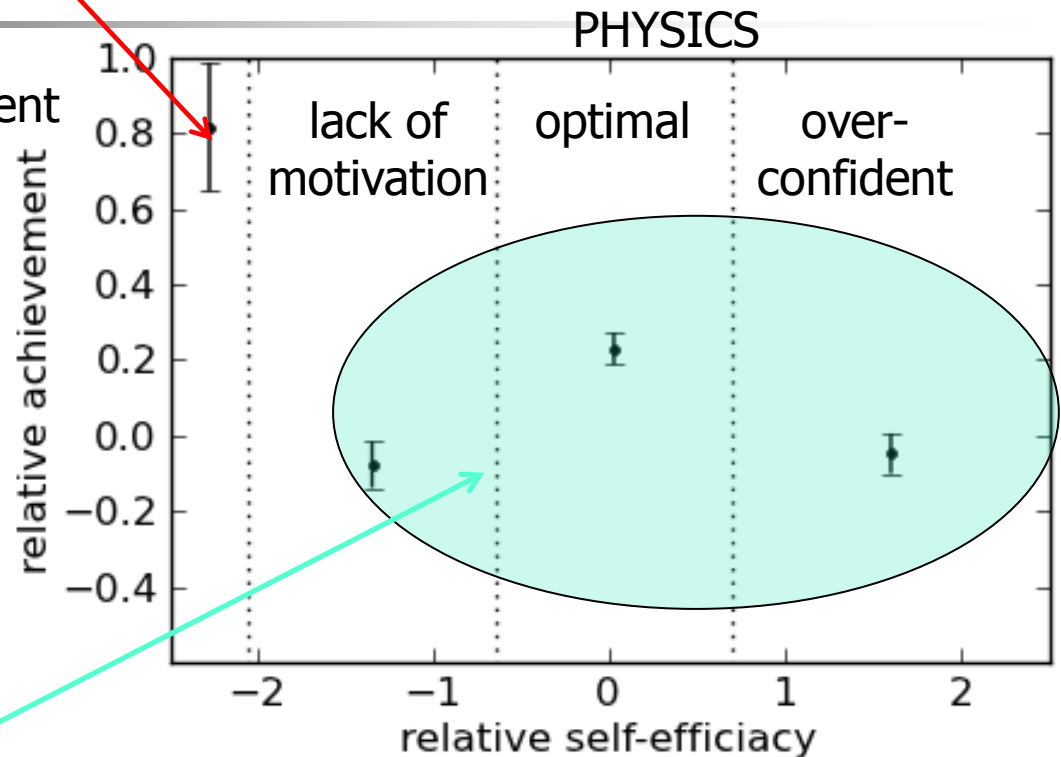
STEM:  
Effortless  
achievement

??????



# Effortless achievement students

Variation of physics achievement around the 'obvious' relation between physics achievement and capability



BANDURA – social cognitive theory:

variation of self-efficacy around the 'obvious' relation between self-efficacy and achievement.

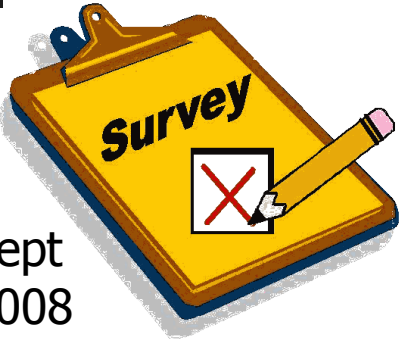
# Objective

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My aim was to determine in which aspects of Dutch physics teaching male 'effortless achievement' students differ from other male students.



# Method data



Sept  
2008

Dutch **academic** freshman  
science students:  
approximately 18 years old  
12 universities  
including medical schools.

# respondents: 3212 (31%)

- student background
- high school physics:
  - lessons
  - teachers
  - work attitude
  - capability & achievement
  - tests & grading

→ Male advanced physics  
N=1115

→ Effortless  
N=28

# Analysis

Difference between effortless and rest: T-tests (PASW Statistics 18.0)



# Significant differences between effortless and others

6-point scale: 0-5

Time invested in physics outside of the lessons	all others	28	***
	effortless	11	
Part of mandatory exercises completed	all others	0.46	***
	effortless	0.24	
Frequency learning by rote tests	all others	2.0	***
	effortless	1.1	
Self-evaluation: works hard for physics	all others	1.8	***
	effortless	0.5	
General capability (Cottaar, 2012)	all others	-0.02	**
	effortless	0.64	
Final Exam Grade Physics	all others	7.3	***
	effortless	8.4	
Achievement in physics relative to capability	all others	0.08	***
	effortless	0.82	
Frequency tests grades sufficient in high school	all others	4.2	**
	effortless	4.6	
Frequency lessons being understood	all others	4.1	*
	effortless	4.5	
Difference exam grades advanced physics	all others	0.06	*
	effortless	-0.15	

'Effortless students' work hardly at all.

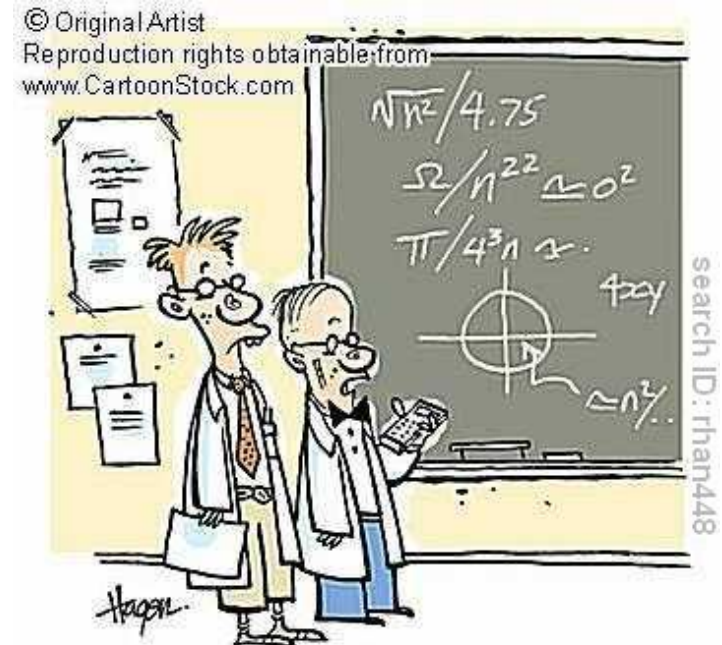
'Effortless students' have very high capability especially for physics.

Higher level testing for school based finals.

\* p<0.05; \*\* p<0.01; \*\*\* p<0.001

# Exceptionally talented

'Even though I hardly liked physics in high school, I have chosen to study the combination of math and physics at university. Even here [at university] I hardly have to work for it and in high school I did nothing at all. I skipped lessons quite a lot and was often bored...'



I'M AFRAID THE NUMBERS DON'T LIE NORTON,  
WE'RE DEFINITELY NERDS.



# Tip of the iceberg

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Only 2,5% of the male advanced (and regular) physics samples  
BUT.... the 'problem' is larger

1. Border between 'effortless' and 'lack of motivation' not strict.
2. Physics teachers: one or two of them tempt less talented classmates to work less, too



# Schools with challenging testing

Bandura: obstacle to train resilience?



Not really effortless...

Other things are necessary to change attitude towards working.  
(or... the tests are not challenging enough for **these** students to be an obstacle)

Gives feedback (through mistakes) these students lack because they do not work and probably also do not pay enough attention in class to detect their (low number of) wrong ideas.

But still: How **do** we get them to work???

Some students really need much more challenge than they can get in the high school setting (in the Netherlands at least).