Gender, Math, and the FCI

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Gender Gap

A strong gender gap exists on FCI scores in which male students out-perform female students. (Data from 8 different institutions)

Pre % (S.E)Post % (S.E.)<g> (S.E.)Women (N=780)35.6 (.5)57.4 (.7)0.34 (.01)Men (N=1997)50.3 (.4)68.6 (.5)0.39 (.01)

McCullough, 2002. *Gender, Educational Reform, and Instructional Assessment: Part I.* Paper presented at the American Association of Physics Teachers Meeting in Philadelphia, PA. January 2002. Available at http://physics.uwstout.edu/staff/mccullough/physicseduc.htm.

Crouch, C. H. (2002). *Gender, Educational Reform, and Instructional Assessment: Part II*. Paper presented at the American Association of Physics Teachers Meeting in Philadelphia, PA. January 2002. Available at http://mazur-www.harvard.edu/talks/talks.taf?_function=detail&id=417

Mind the Gap

Why does this gender gap exist?Are men better than women at physics?Are women poorer test-takers?Is the test biased against women?Do women have weaker backgrounds in math and physics?

→Let's look at math background

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Methodology

300 non-physics students at UW-Stout English and sociology classes (administering this was very fun!)

Voluntary, anonymous, ungraded testing Given either the original FCI or a more female-centric version (McCullough, 2001) After the test, asked 9 demographic questions

McCullough, 2001. A Gender Context for the Force Concept Inventory. Paper presented at the American Association of Physics Teachers Meeting in San Diego, CA. January 2001. Available at http://physics.uwstout.edu/staff/mccullough/physicseduc.htm

Sample — UW-Stout 312 English and sociology students 45% first-years, 32% sophomores, 13% juniors, 10% seniors 59% women, 41% men 30 different majors, only 43 undecided 64% of women and 53% of men had no previous physics experience 34% of women and 30% of men had high school physics

Math level and FCI score

	Avg. %	Males/	Females/	Males/	Females/
	score (N)	GFCI	GFCI	FCI	FCI
	Pre-	22	31	34	20
	algebra	(6)	(4)	(6)	(12)
	Algebra	25	21	27	19
	50 mg/	(7)	(7)	(6)	(20)
	Geometry	26	22	31	20
u Lake		(30)	(42)	(19)	(48)
es lot	Calculus	33	21	33	23
inoo		(20)	(18)	(16)	(16)
lism	Diff.	59	38	60	アン可当会
Jeve	Eqns.	(2)	(1)	(1)	E Sat D
62t	Other	25	23	33	25
Hial	第二の高	(4)	(6)	(2)	(2)

Math level did not influence FCI score; nor did it interact with gender; gender gap seen

High school math and FCI score

	Avg. %	Males/	Females/	Males/	Females/
	score (N)	GFCI	GFCI	FCI	FCI
2	1/2/2/16		13	DIDAF	7
There	1020	66-0.2	(1)		(1)
di s	2	28	14	27	19
		(6)	(2)	(2)	(6)
之中	2.5	C. T. S. T.		DEALT	10
E.F.	HALL ATT		1. EE PLAT	12 TOTAL	(1)
1	3	26	24	30	20
14		(30)	(24)	(17)	(45)
GOG	3.5		27	THE H	27
292	Stride.	1 ALL LOSAL	(2)		(4)
noo	4	29	21	34	21
nat		(30)	(49)	(29)	(37)
lo	4.5	59	11 - 11	DINCE	ALCO TH
oyos		(1)			A DECK
SIH	5	44	25	30	33
 IO #		(2)	(1)	(1)	(2)
, 11	5.5		PULL		27
EF		HALL SALES	LE FILM	199 Start	(1)
	6	TP ADD	15-2-18		27
		the ford		S. L. Har	(1)
			DEI	C Daiga Aug 02	

Number of high school math courses taken did not influence FCI score; nor did it interact with gender; gender gap seen

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College math and FCI score

$\begin{array}{c ccccc} Avg. 76 & Males/ & Females/ & Males/ & Females/ \\ \hline score (N) & GFCI & GFCI & FCI & FCI \\ \hline 0 & 25 & 24 & 29 & 21 \\ \hline (21) & (36) & (12) & (35) \\ \hline 1 & 28 & 20 & 36 & 22 \\ \hline (26) & (28) & (21) & (30) \\ \hline 2 & 29 & 21 & 27 & 19 \\ \hline (12) & (11) & (10) & (22) \\ \hline 3 & 31 & 23 & 28 & 20 \\ \hline (7) & (2) & (2) & (8) \\ \hline 4 & 43 & 33 & 42 & 20 \\ \hline 93 & (4) & (2) & (3) & (2) \\ \hline 100 \# & & 11 & 13 \\ \hline 10 \# & & (11) & (2) \\ \hline 6 & & 40 & 10 \\ \hline (11) & (1) & (1) \\ \hline \end{array}$		Δυσ 0/2	Males	Females/	Males/	Famalas/
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Avg. 70	Iviaics/	Temales/	Iviaics/	FCIIIaics/
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		score (N)	GFCI	GFCI	FCI	FCI
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		0	25	24	29	21
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			(26)	(28)	(21)	(30)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	2	29	21	27	19
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	to 1 coll ge trat f cou		(12)	(11)	(10)	(22)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		3	31	23	28	20
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			(7)	(2)	(2)	(8)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		4	43	33	42	20
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		行用自然	SP ANDER	6423349	(1)	(1)

Number of college math courses taken did not influence FCI score; nor did it interact with gender; gender gap seen

Conclusion: Math background and FCI score Math background does not have an effect on FCI score for this sample An ANOVA analysis of the data suggests the same conclusion: math doesn't make a significant difference Math and gender did not interact for this sample; but gender gap did show up →Math background doesn't explain gender gap