

Impostor Phenomenon in UMD Physics Graduate Students

CSAAPT 2023

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Impostor Phenomenon

- **Impostor phenomenon (IP):** the psychological experience of believing that one's accomplishments came about not through one's own ability, but for other reasons
- Examples of “other reasons:” luck, working harder than others would have to for the same success, having manipulated other people's impressions [1]
- Associated with anxiety, depression, low self-esteem, etc. [2]
- Can occur in academic, workplace, or personal relationships
- IP can feed on itself: when an impostor experiences success, they explain away that success, and thus maintain a negative self-perception that colors how they accomplish future goals (“impostor cycle”) [3]

[1] Langford et al, *Psychotherapy: Theory, Research, Practice, Training* 495-501 (1993)

[2] Pákozdy et al, *Current Psychology* (2023)

[3] Noskeau et al, *Frontiers in Psychology* (2021)

Impostor Phenomenon Examples

"I have written 11 books, but each time I think, 'Uh oh, they're going to find out now. I've run a game on everybody, and they're going to find me out.'" —Maya Angelou

"The exaggerated esteem in which my lifework is held makes me very ill at ease. I feel compelled to think of myself as an involuntary swindler." —Albert Einstein

"I have spent my years since Princeton, while at law school and in my various professional jobs, not feeling completely a part of the worlds I inhabit. I am always looking over my shoulder wondering if I measure up." —Sonia Sotomayor

2023 Survey 1

Motivation for design: previous surveys showed IP is prevalent in the department, and we wanted to start asking how we might solve that problem.

Research Question: How is grad student IP related to the relationship with research advisor?

Survey contained two major instruments:

(1) Impostor syndrome

- Clance Imposter Phenomenon Scale (CIPS), clinically validated
- Includes questions like “I can give the impression that I’m more competent than I really am”, with responses on a scale 1 (not at all true) to 5 (very true)
- Final scores are between 20 and 100
- Clinical cutoffs split total scores into mild, moderate, frequent, intense categories

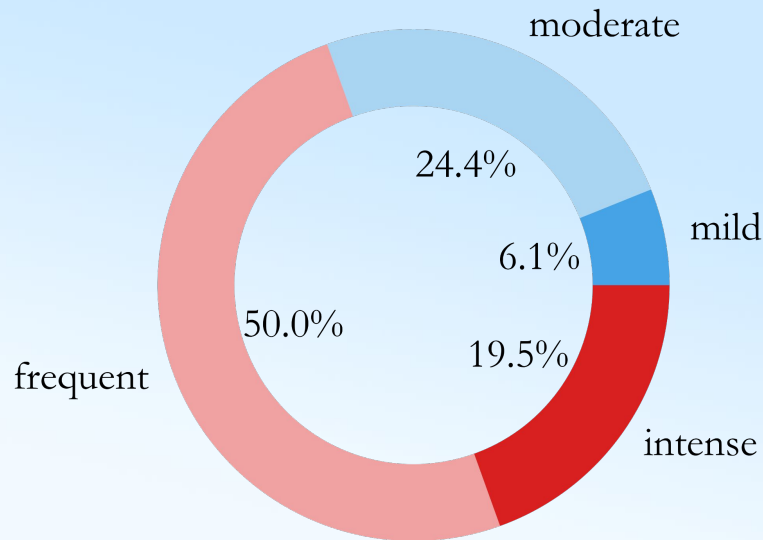
2023 Survey 2

(2) Advisor quality

- Homemade inventory investigating student-advisor communication
- *Quantity*: for example, “How do you feel about how often you discuss your long-term/overall research progress with your advisor”
 - Answers: not often enough, often enough, too often
 - Factor analysis suggested two factors: conversations about **happiness with work** and conversations about **professional development**
- *Quality*: for example, “I am often intellectually ‘lost’ during conversations with my advisor” (agree/disagree scale)
 - 8 total questions each scored on a scale from 1 (strongly disagree) to 5 (strongly agree)

Results: Levels of IP

- 82 total responses
- IP is highly prevalent in our sample
 - Average: 67 (“frequent” IP feelings)
 - Range 24-95 (possible range 20-100)
 - This prevalence has occurred for several years (from previous surveys)
 - Higher average than other samples surveyed in literature [e.g. 1,2]
- Non-male students report 11-point higher average than male students ($p = 0.040$)



[1] Castro et al., *Am. J. Family Therapy* 205-216 (2004).

[2] Li et al., *Psi Chi J. of Psych. Res.* 50-57 (2014).

GAQ: General Advisor Quality

CPD: Conversations on Professional Development

CHW: Conversations on Happiness with Work

Results: Perception of Advisor

Exploratory factor analysis gives three factors:

1. General Advisor Quality (GAQ)

Example: “Rate your level of agreement with the following statement: I get the kinds of support I need from my advisor.” (1-5 scale, strongly disagree to strongly agree)

2. Conversations on Professional Development (CPD)

Example: “How do you feel about how often you talk with your advisor about what they would say a ‘successful’ grad student does?” (not often enough, often enough, too often)

3. Conversations on Happiness with Work (CHW)

Example: “How do you feel about how often you talk with your advisor about whether you are happy in your current work?” (not often enough, often enough, too often)

Think of these as three attempts to measure a grad student’s satisfaction with their advisor.

GAQ: General Advisor Quality

CPD: Conversations on Professional Development

CHW: Conversations on Happiness with Work

Results: Relationships

- How is IP score related to ratings of advisor quality?
- Regression with IP as dependent variable and GAQ, CPD, CHW, and demographics as independent variables?
 - No significant predictors of IP score except gender...
 - But the model as a whole is highly significant ($p = 0.01$)
- Advisor quality variables are all highly correlated, so when one variable is in the model, adding other variables to the model doesn't give a lot of new information
- Regression with only one of GAQ, CPD, CHW (together with demographics)?
 - Some relations are significant (GAQ: $p = 0.021$, CHW: $p = 0.033$, CPD: $p = 0.074$)
 - **IP and advisor quality are clearly related!**
- Note: we also asked about frequency of meetings... meeting **more** frequently alone isn't correlated with IP score!

Results Summary

1. **IP is highly prevalent** in our sample of physics grad students
2. Students who report not only more but **better-quality advising** also report **less frequent/intense impostor feelings**, and the relationship between them is strong
3. Our data is insufficient to make suggestions about specific things that are especially important for an advisor to do
4. Non-male students report both **lower-quality advising** and **higher IP scores** than male peers

Suggestions from Literature to Help with IP

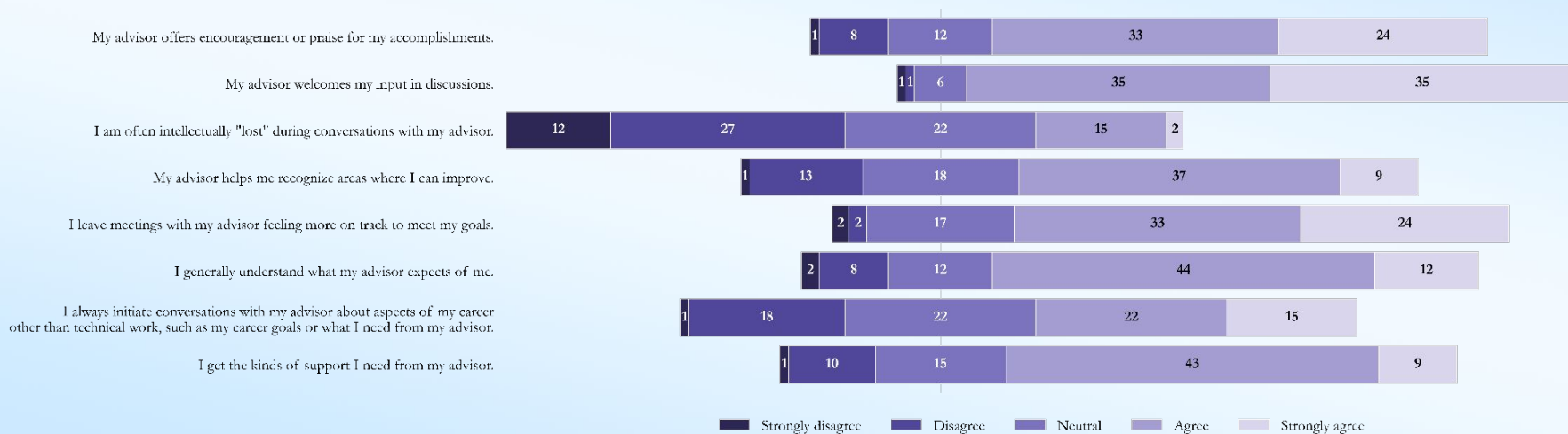
- Discuss and encourage growth mindset in students
- Provide clear and constructive feedback, ideally in low stakes environment
- Normalize IP and discuss your own experiences
- Have discussions with your students about mutual expectations
- Encourage students to socialize with their peers — discussing one's experiences can reassure students that they're working at a reasonable level and meeting external expectations of success
- Know the relevant counseling resources for students who are struggling the most; if IP is interfering with student's work or life, it may be a sign to seek professional help

Questions?

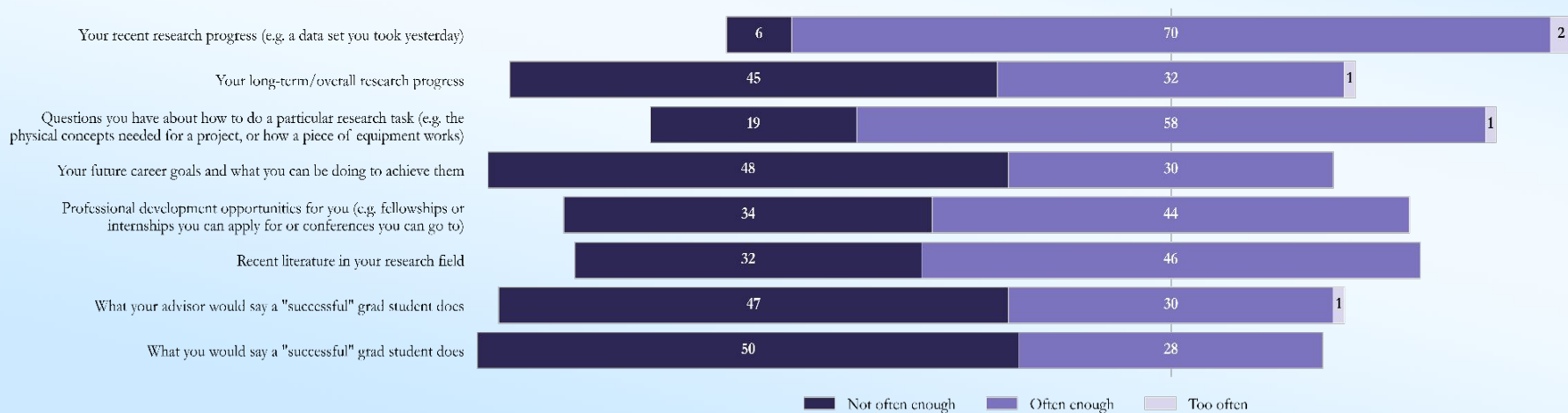
Supplement: Perceptions of Advisor Results

- Exploratory factor analysis gives three factors
- General Advisor Quality (GAQ)
 - Ex: “I get the kinds of support I need from my advisor”
 - On a scale of 1-5, average total score is 3.6 ± 0.5
 - Non-male students report slightly lower scores than male students ($p=0.048$)
- Conversations on Professional Development (CPD)
 - Ex: “How do you feel about how often you talk with your advisor about what they would say a ‘successful’ grad student does?”
 - Average is halfway between “not often enough” and “often enough”, with the entire possible range covered
 - Non-male students report lower scores than male students ($p=0.019$)
 - First and second-years report higher scores than older students ($p=0.026$)
- Conversations on Happiness with Work (CHW)
 - Ex: “How do you feel about how often you talk with your advisor about whether you are happy in your current work?”
 - Average is halfway between “not often enough” and “often enough”, with the entire possible range covered
 - Roughly equal scores across demographic groups

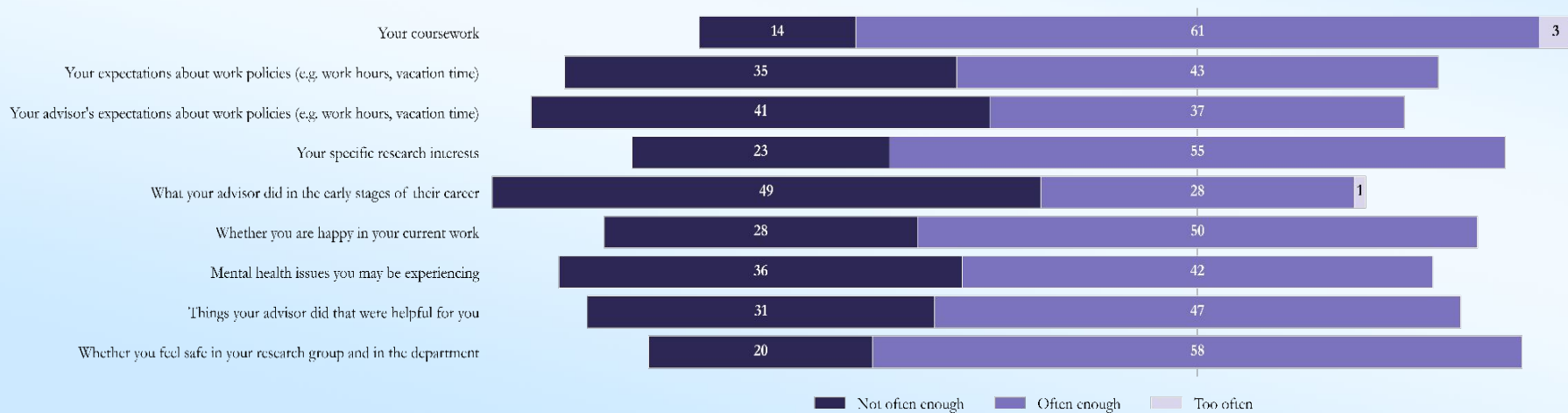
Supplement: General Advisor Quality Questions



Supplement: Conversations about Professional Development Questions



Supplement: Conversations about Happiness with Work Questions



Supplement: Regression 1 (Demographics Only)

OLS Regression Results						
Dep. Variable: sCIPS	R-squared: 0.129					
Model: OLS	Adj. R-squared: 0.090					
Method: Least Squares	F-statistic: 3.344					
Date: Wed, 11 Oct 2023	Prob (F-statistic): 0.0242					
Time: 13:20:03	Log-Likelihood: -96.919					
No. Observations: 72	AIC: 201.8					
Df Residuals: 68	BIC: 210.9					
Df Model: 3						
Covariance Type: nonrobust						
	coef	std err	t	P> t	[0.025	0.975]
Intercept	-0.3992	0.203	-1.967	0.053	-0.804	0.006
C(semesters_coded)[T.older]	0.1605	0.232	0.692	0.492	-0.303	0.624
C(nationality_coded)[T.International]	0.1410	0.236	0.597	0.553	-0.331	0.613
C(gender_coded2)[T.nm]	0.7677	0.247	3.105	0.003	0.274	1.261
Omnibus: 0.652	Durbin-Watson: 2.308					
Prob(Omnibus): 0.722	Jarque-Bera (JB): 0.774					
Skew: -0.195	Prob(JB): 0.679					
Kurtosis: 2.674	Cond. No. 3.45					

Supplement: Regression 2a (GAQ)

OLS Regression Results	
Dep. Variable: sCIPS	R-squared: 0.195
Model: OLS	Adj. R-squared: 0.147
Method: Least Squares	F-statistic: 4.062
Date: Sat, 14 Oct 2023	Prob (F-statistic): 0.00523
Time: 15:17:25	Log-Likelihood: -94.055
No. Observations: 72	AIC: 198.1
Df Residuals: 67	BIC: 209.5
Df Model: 4	
Covariance Type: nonrobust	
	coef std err t P> t [0.025 0.975]
Intercept	-0.3152 0.200 -1.579 0.119 -0.714 0.083
C(semesters_coded)[T.older]	0.1414 0.225 0.629 0.532 -0.307 0.590
C(nationality_coded)[T.International]	0.0656 0.231 0.284 0.777 -0.396 0.527
C(gender_coded2)[T.nm]	0.6527 0.244 2.672 0.009 0.165 1.140
sAQ	-0.2641 0.112 -2.355 0.021 -0.488 -0.040
Omnibus: 0.030	Durbin-Watson: 2.358
Prob(Omnibus): 0.985	Jarque-Bera (JB): 0.187
Skew: -0.020	Prob(JB): 0.911
Kurtosis: 2.754	Cond. No. 3.53

Supplement: Regression 2b (CHW)

OLS Regression Results						
Dep. Variable:	sCIPS	R-squared:	0.186			
Model:	OLS	Adj. R-squared:	0.137			
Method:	Least Squares	F-statistic:	3.825			
Date:	Sat, 14 Oct 2023	Prob (F-statistic):	0.00736			
Time:	15:19:32	Log-Likelihood:	-94.468			
No. Observations:	72	AIC:	198.9			
Df Residuals:	67	BIC:	210.3			
Df Model:	4					
Covariance Type: nonrobust						
	coef	std err	t	P> t	[0.025	0.975]
Intercept	-0.3520	0.199	-1.771	0.081	-0.749	0.045
C(semesters_coded)[T.older]	0.1537	0.226	0.680	0.499	-0.297	0.605
C(nationality_coded)[T.International]	0.0942	0.231	0.408	0.685	-0.367	0.556
C(gender_coded2)[T.nm]	0.6971	0.243	2.870	0.005	0.212	1.182
sHWW	-0.2485	0.114	-2.172	0.033	-0.477	-0.020
Omnibus:	0.888	Durbin-Watson:	2.400			
Prob(Omnibus):	0.641	Jarque-Bera (JB):	0.990			
Skew:	-0.214	Prob(JB):	0.609			
Kurtosis:	2.617	Cond. No.	3.48			

Supplement: Regression 2c (CPD)

OLS Regression Results						
Dep. Variable:	sCIPS	R-squared:	0.169			
Model:	OLS	Adj. R-squared:	0.120			
Method:	Least Squares	F-statistic:	3.414			
Date:	Sat, 14 Oct 2023	Prob (F-statistic):	0.0134			
Time:	15:20:16	Log-Likelihood:	-95.194			
No. Observations:	72	AIC:	200.4			
Df Residuals:	67	BIC:	211.8			
Df Model:	4					
Covariance Type:	nonrobust					
		coef	std err	t	P> t 	[0.025 0.975]
Intercept		-0.2830	0.210	-1.350	0.182	-0.701 0.135
C(semesters_coded)[T.older]		0.0339	0.239	0.142	0.887	-0.443 0.510
C(nationality_coded)[T.International]		0.1370	0.232	0.589	0.558	-0.327 0.601
C(gender_coded2)[T.nm]		0.6287	0.255	2.466	0.016	0.120 1.138
sPD		-0.2200	0.121	-1.813	0.074	-0.462 0.022
Omnibus:	0.750	Durbin-Watson:	2.306			
Prob(Omnibus):	0.687	Jarque-Bera (JB):	0.859			
Skew:	-0.164	Prob(JB):	0.651			
Kurtosis:	2.577	Cond. No.	3.76			

Supplement: Regression 3 (GAQ, CHW, CPD)

OLS Regression Results						
Dep. Variable:	sCIPS	R-squared:	0.222			
Model:	OLS	Adj. R-squared:	0.150			
Method:	Least Squares	F-statistic:	3.085			
Date:	Sat, 14 Oct 2023	Prob (F-statistic):	0.0101			
Time:	15:21:15	Log-Likelihood:	-92.850			
No. Observations:	72	AIC:	199.7			
Df Residuals:	65	BIC:	215.6			
Df Model:	6					
Covariance Type: nonrobust						
	coef	std err	t	P> t	[0.025	0.975]
Intercept	-0.2725	0.206	-1.322	0.191	-0.684	0.139
C(semesters_coded)[T.older]	0.0958	0.236	0.405	0.687	-0.377	0.568
C(nationality_coded)[T.International]	0.0629	0.231	0.272	0.787	-0.399	0.525
C(gender_coded2)[T.nm]	0.5983	0.251	2.383	0.020	0.097	1.100
sAQ	-0.1666	0.132	-1.260	0.212	-0.431	0.097
sHWW	-0.1539	0.126	-1.220	0.227	-0.406	0.098
sPD	-0.0842	0.137	-0.616	0.540	-0.357	0.189
Omnibus:	0.366	Durbin-Watson:	2.413			
Prob(Omnibus):	0.833	Jarque-Bera (JB):	0.536			
Skew:	-0.107	Prob(JB):	0.765			
Kurtosis:	2.636	Cond. No.	4.04			