Social Comparison and the Value of Performance Trajectory Information: A Field Experiment in the Workplace

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Research Motivation

- Heterogeneity in productivity is common in the workplace
- Employees often compare their performance to coworkers (Lazear 1989; Milgrom 1992; Nickerson and Zenger 2008)
- Social comparison can impose substantial costs on firms (Gino and Pierce 2010; Card 2012; Edelman and Larkin 2015; Cullen and Perez-Truglia 2018)
- Less attention to how to mitigate the costs



Research Motivation

- New workers have strong behavioral responses to upward social comparison
- Comparison is often based on incomplete information
 - Better informed about high-performing coworkers' *current* performance than their *past* performance
- Attribute performance gap to differences in innate ability, rather than experience on the job

 \implies stress, attrition, etc.



Research Questions

- Can firms mitigate the costs of performance comparison by redesigning the information environment?
- What is the impact of sharing senior workers' performance trajectory information on employee turnover, productivity, and wellbeing?





Preview of Results

1. Does performance trajectory information improve employee well-being?

Yes!

Attrition rate drops by 12% among new workers

Works better for the high-performing new workers

2. What is the major mechanism?

Trajectory improves the social comparison process!



Mechanisms

Data supports

➤Social comparison

Data does not support

≻Career concern

≻Worker risk-aversion

➤Increasing competitiveness

≻Hawthorne effects

Theoretical Framework

- $t \in \{0, 1, 2\}$ and two cohorts, senior workers (s = 0) and new workers (s = 1)
- $f_{it} = a_i + r_i \times (t s_i)$
- From the beginning, each worker knows a_i , but not r_i
- New workers do not observe senior workers' performance in period 0
- The impact of sharing coworkers' performance information at the beginning of period 2:

New workers: $u_i = a_i + E_i(r_i) \times 1 - \lambda \sum_{j \in H} E_i(a_j)$

$$u_i = a_i + E_i(r_i) \times 1 - \lambda \sum_{j \in H} E_i(a_j)$$

H1: The Effect of trajectory on new workers

Turnover: Performance trajectory information lowers the attrition rate of new workers

Beliefs: Performance trajectory information lowers new workers' beliefs about the early-stage performance of senior coworkers

$$u_i = a_i + E_i(r_i) \times 1 - \lambda \sum_{j \in H} E_i(a_j)$$

Social comparison: Performance trajectory information improves new workers' stress and mental health conditions.

Career concern: If new workers believe that their returns to experience are positively correlated with those of their high-performing senior coworkers, then performance trajectory information increases new workers' expectations about their future performance

$$u_i = a_i + E_i(r_i) \times 1 - \lambda \sum_{j \in H} E_i(a_j)$$

H2: Peer performance information does not affect the attrition rate of new workers

Senior workers:
$$u_i = a_i + r_i \times 2 - \lambda \sum_{j \in H} E_i(a_j)$$

H3: Performance trajectory information and peer performance information do not affect the attrition rate of senior workers

Multinational Spa Chain





Spa industry >100 billion USD

500+ stores worldwide 160 Chinese stores,42 workers/store

RCT Design



Trajectory



Generate a sample of 8 highperforming senior workers for each region Twice every week: Send the month 1, month 3, month 6, month 12, and last-month performance information of a worker in the sample to all workers in the T1 group of the region

Peer



Message

Treatment Group	Sample Message
Trajectory	In order to promote mutual understanding among [the company]'s employees, today we introduce you to the performance trajectory of Xiaomei (alias). Xiaomei joined [the company] in [region] in [year and month]. In [his/her] first month at [the company], [his/her] customer pick number was [number], [his/her] sales was [number]. * In [his/her] 3rd month, [his/her] customer pick number was [number], [his/her] sales was [number]. * In [his/her] 6th month, [his/her] customer pick number was [number], [his/her] sales was [number]. * In [his/her] 6th month, [his/her] customer pick number was [number], [his/her] sales was [number]. * In [his/her] 12th month, [his/her] customer pick number was [number], [his/her] [his/her] sales was [number]. * Last month, [his/her] customer pick number was [number], [his/her] sales was [number].
Peer	In order to promote mutual understanding among [the company]'s employees, today we introduce you to the performance of Xiaomei (alias). Xiaomei joined [the company] in [region] in [year and month]. Last month, [his/her] customer pick number was [number], [his/her] sales was [number].

Data and Measurement

Attrition	<u>Survey</u>
►Individual attrition	Job satisfaction
	Evaluation of managers
	Stress level
	Mental health
	➢ Beliefs
Performance	Characteristics
➤Days of attendance	≻Entry age
➤Customer picks	≻Gender
≻Individual sales	≻Marital status
➤Compensation	≻Schooling
≻Store revenue	≻Work experience

Implementation: Message timing, statistics, recipients

Econometric Analysis

Treatment vs. control difference

$$Y_{ijt} = \beta_1 \times T_{1i} + \beta_2 \times T_{2i} + \tau_t + \gamma_j + \varepsilon_{ijt}$$

 Y_{ijt} : turnover, productivity, or satisfaction T_i : store's treatment status γ_j : region fixed effect τ_t : month fixed effect

Performance trajectory information reduces the attrition rate of new workers by 12% (ATE)

Table 3: Average Treatment Effects on Attrition (Linear Probability Models)

Dependent Variable	Attrition					
Worker Type	New W	/orkers	Senior Workers			
	(1)	(2)	(3)	(4)		
Trajectory	-2.429**	-2.200**	0.917	1.009		
	(1.110)	(1.114)	(0.805)	(0.700)		
Peer	-0.065	-0.326	0.130	0.110		
	(1.276)	(1.171)	(0.870)	(0.716)		
Month fixed effects		\checkmark		\checkmark		
Region fixed effects	\checkmark	\checkmark	\checkmark	\checkmark		
Mean DV if Treatment=0	20.31	20.31	9.70	9.70		
Number of observations	10171	9579	21799	18448		

Limited effect on individual labor supply or productivity (ATE)

Table 4: Average Treatment Effects on Individual Labor Supply and Productivity

Dependent Variables	Attendance		Customer Pick		log (sales)		log (compensation)	
Worker Type	New	Senior	New	Senior	New	Senior	New	Senior
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trajectory	0.530	-0.359	-0.033	-0.160	0.010	0.000	-0.011	-0.024
	(0.434)	(0.345)	(1.529)	(2.997)	(0.054)	(0.046)	(0.030)	(0.025)
Peer	-0.456	-0.209	-1.083	-8.094*	-0.008	-0.073	0.009	-0.041
	(0.393)	(0.369)	(1.033)	(4.183)	(0.061)	(0.046)	(0.032)	(0.026)
Month fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Region fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Mean DV if Treatment=0	22.17	25.68	17.27	57.01	9.43	9.91	8.71	9.12
Number of observations	9573	18408	9413	17983	9568	18347	9579	18448

The effect of trajectory is more pronounced among high-performing new workers (HTE)

Table 5: Do High-performing Employees Stay? (New Workers)

Dependent Variable	Attr	rition	
Worker Type	Low-performing	High-performing	-
	(1)	(2)	
Trajectory	-1.455	-2.210**	-
	(2.398)	(0.896)	
Peer	-0.877	-0.256	
	(2.359)	(1.099)	
Month fixed effects	\checkmark	\checkmark	
Region fixed effects	\checkmark	\checkmark	
Mean DV if Treatment=0	31.97	9.70	
Number of observations	3761	5818	

Limited effect on store-level performance (ATE)

Table 6: Average Treatment Effects on Store-level Performance

Dependent Variables	log (store revenue)	log (store revenue)	
	(1)	(2)	
Trajectory	0.089	0.052	
	(0.091)	(0.062)	
Peer	-0.111	-0.040	
	(0.085)	(0.051)	
Month fixed effects		\checkmark	
Region fixed effects	\checkmark	\checkmark	
Mean DV if Treatment=0	13.38	13.38	
Number of observations	1120	1120	

Mechanisms

Data supports

➤Social comparison

Data does not support

≻Career concern

≻Worker risk-aversion

➤Increasing competitiveness

≻Hawthorne effects

Social Comparison Mechanism

- 1. The effect of information on individual well-being
- 2. The correlation between stress level/mental health and attrition
- 3. Beliefs about senior workers' *early-stage* performance
- 4. Self-reported stress levels
- 5. The effect of trajectory information on stress of new workers
- 6. Qualitative

New workers from the trajectory group report significantly lower stress and better mental health

Dependent Variables	Job Sati	sfaction	Evaluation	n of Managers	Low	Stress	Mental	Health
Worker Type	New	Senior	New	Senior	New	Senior	New	Senior
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Trajectory	-0.040	-0.037	0.016	-0.021	0.180**	-0.004	0.172**	-0.023
	(0.067)	(0.046)	(0.076)	(0.040)	(0.079)	(0.046)	(0.075)	(0.043)
Peer	-0.104	-0.012	-0.053	-0.034	0.006	-0.081*	-0.028	-0.073
	(0.081)	(0.051)	(0.069)	(0.048)	(0.088)	(0.046)	(0.080)	(0.051)
Month fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Region fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Mean DV if Treatment=0	3.93	3.87	3.99	3.89	2.98	3.00	3.69	3.58
Number of observations	36891	69415	35519	73726	37716	73664	35951	71232

Table 7: Average Treatment Effects on Individual Survey Outcomes

A one standard deviation improvement in stress levels is associated with 10-13% decrease in attrition

Dependent Variable	Attrition				
Worker Type	New	Senior	New	Senior	
	(1)	(2)	(3)	(4)	
Low Stress	-2.047*** (0.499)	-1.240*** (0.312)			
Mental Health			-1.411*** (0.484)	-0.460 (0.299)	
Month fixed effects	V	\checkmark	\checkmark	V	
Region fixed effects	√ 20.31	√ 9.70	√ 20.31	√ 9.70	
Number of observations	8149	15885	8669	16732	

Table 8: The Effect of Stress and Mental Health on Attrition

New workers from the trajectory group have lower beliefs about senior workers' early-stage performance

Dependent Variable	Beliefs about Senior Workers' Early-career Performance			
Worker Type	New	Senior		
	(1)	(2)		
Trajectory	-0.238**	0.056		
	(0.079)	(0.067)		
Peer	0.148	0.080		
	(0.097)	(0.066)		
Region fixed effects	\checkmark	\checkmark		
Mean DV if Treatment=0	3.54	3.40		
Number of observations	932	1851		

The survey question asks: "Compared to my estimate half a year ago, I believe the actual performance of senior workers (from the same region) in their early tenure stage is (1=much lower, 2=lower, 3=roughly the same, 4=higher, 5=much higher)."

New workers from the trajectory group experience stress levels that are 0.26 standard deviations lower

Dependent Variable	Low	Stress
Worker Type	New	Senior
	(1)	(2)
Trajectory	0.257**	-0.130
	(0.116)	(0.095)
Peer	-0.018	-0.046
	(0.125)	(0.067)
Region fixed effects	\checkmark	\checkmark
Mean DV if Treatment=0	2.57	2.73
Number of observations	1022	1988

The survey question asks: "Compared to half a year ago, my stress level is (1=much higher, 2=higher, 3=roughly the same, 4=lower, 5=much lower)."

Lower first-month performance of senior workers leads new workers to report lower stress subsequently

Table A10: The Effect of Coworkers' Performance Trajectory Information on Stress of New Workers

Dependent Variable	Low Stress
Coworkers' performance in the 1st month	-0.521**
	(0.251)
Coworkers' performance in the last month	0.0886
	(0.134)
lagged (Stress Score)	0.294***
	(0.0197)
Store fixed effects	\checkmark
Number of observations	5576

"I had poor performance during the sales campaign last summer. I was so upset with myself, I cried several times at work, and wasn't sure whether I should hold on. The information made me realize that it is alright to have such a performance during my current stage. It was not great, but definitely acceptable. I believe I can overcome the difficulty and gradually become stronger"

"Senior workers have been like god since I joined the firm, and it was beyond imagination to surpass them. Now that I know many of them accomplished that step by step, they are also ordinary human beings. My current performance is still much lower than the top worker's in my store, but I have a higher tolerance for myself"

Limited effect on forecasts of own future performance

Table A11: Average Treatment Effects on New Workers' Forecasts on Own Future Performance

Dependent Variables	log (forecast on next month's sales)	log (forecast on sales in three months)
	(1)	(2)
Trajectory	0.153	0.0473
	(0.0976)	(0.0766)
Peer	-0.125	-0.128
	(0.0913)	(0.0806)
log (sales)	0.419***	0.332***
	(0.0289)	(0.0241)
Month fixed effects	\checkmark	\checkmark
Region fixed effects	\checkmark	\checkmark
Number of observations	3023	3088

Limited effect on individual labor supply or productivity (ATE)

Table 4: Average Treatment Effects on Individual Labor Supply and Productivity

Dependent Variables	Atten	Attendance Customer Pick		log (sales)		log (compensation)		
Worker Type	New (1)	Senior (2)	New (3)	Senior (4)	New (5)	Senior (6)	New (7)	Senior (8)
Trajectory	0.530	-0.359	-0.033	-0.160	0.010	0.000	-0.011	-0.024
	(0.434)	(0.345)	(1.529)	(2.997)	(0.054)	(0.046)	(0.030)	(0.025)
Peer	-0.456	-0.209	-1.083	-8.094*	-0.008	-0.073	0.009	-0.041
	(0.393)	(0.369)	(1.033)	(4.183)	(0.061)	(0.046)	(0.032)	(0.026)
Month fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Region fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Mean DV if Treatment=0	22.17	25.68	17.27	57.01	9.43	9.91	8.71	9.12
Number of observations	9573	18408	9413	17983	9568	18347	9579	18448

Does trajectory reassure risk-averse workers?

Table A13: The Effect of Information on the Certainty of Self-predicted Future Performance

Dependent Variable	Certainty of Predictions
Trajectory	0.024
	(0.038)
Peer	0.083**
	(0.041)
Region fixed effects	\checkmark
Number of observations	17363

Does trajectory affect self-perceived volatility or competitiveness?

Table A14: Treatment Effects on Self-perceived Performance Volatility and Competitiveness

Dependent Variables:	Perceived Volatility		Competitiveness		
Worker Type	New	Senior	New	Senior	
	(1)	(2)	(3)	(4)	
Trajectory	-0.026	-0.010	0.143	0.120*	
	(0.063)	(0.051)	(0.088)	(0.063)	
Peer	-0.036	0.092	-0.095	-0.102	
	(0.043)	(0.064)	(0.090)	(0.071)	
Region fixed effects	\checkmark	\checkmark	\checkmark	\checkmark	
Mean DV if Treatment=0	3.52	3.31	4.00	3.76	
Number of observations	984	1946	916	1751	

Columns 1-2 ask: "Compared to half a year ago, the actual variance of individual productivity is (1=much smaller, 2=smaller, 3=roughly the same, 4=larger, 5=much larger) than what I estimated." Columns 3-4 ask: "...., my sense of competitiveness is (1=much smaller, 2=smaller, 3=roughly the same, 4=larger, 5=much larger)"

Conclusion

- Information about senior workers' performance trajectory improves the retention of new workers
 - Social comparison mechanism
- Highlights an important informational friction that exacerbates the social comparison process
- Cost mitigation: Pay compression, "technology choice", corporate scope decisions (Nickerson and Zenger 2008)
- External validity: salience of past performance, luck





Thank you!

Literature

Social Comparison

Nickerson and Zenger 2008; Gino and Pierce 2009; Larkin et al. 2012; Kacperczyk et al. 2015; Gartenberg and Wulf 2017

- The impact of pay transparency and inequality Lazear 1989; Card et al. 2012; Mas and Pallais 2017; Breza et al. 2018; Fahn and Zanarone 2021
- Career concerns and salary dynamics Lazear and Rosen 1981; Harris and Holmstrom 1982; Gibbons and Murphy 1992; Dewatripont et al. 1999
- Peer pressure and stress on workplace outcome Kandel and Lazear 1992; Mohen et al. 2008, Kocher et al. 2012

Multinational Spa Chain



Category	Dimension	Sample Questions		
	Satisfaction	How satisfied are you with your job in the company?		
	Trust	How much trust do you have for the company?		
Job Satisfaction	Sense of belonging	How much sense of belonging do you have for your job and the company?		
	Recommendation	Have you suggested or helped family or friends get a job at the company?		
	Staying	Are you willing to stay in the company for long?		
	Care	Do your managers talk to/care about you?		
	Problem-solving	Are managers capable of resolving problems when you need them?		
Manager Evaluation	Willing to turn to	If you have troubles, how willing are you to reach out to your manager for help?		
	Leave	If you ask for leave when it is really necessary, how easy is it for you to get approval from you manager?		
	Fairness	How fair do you think your manager is?		
Pressure	Pressure	How much pressure do you feel on the job?		
	Optimism	I've been feeling optimistic about the future		
	Useful	I've been feeling useful		
Mental Health	Exhaustion	I've been feeling relaxed		
	Energy	I've been feeling interested in other people and have en- ergy to spare		
	Problem-solving	I've been dealing with problems well		
	Self-feeling	I've been feeling good about myself		
	Closeness	I've been feeling close to other people		
	Being loved	I've been feeling loved		
	Curiosity	I've been interested in new things		
	Cheerful	I've been feeling cheerful		

Category	Sample Questions	
Forecast on next month's	What is your forecast of your sales in July?	
sales	How confident are you about your forecast?	
Forecast on sales in	What is your forecast of your sales in September?	
three months	How confident are you about your forecast?	
Belief about average sales of peers in the last months	What is your estimate of the average June sales of your peers (whose start dates at the company are within two months from yours) in the same region?	
	How confident are you about your estimate?	
Belief about senior workers' early performance	Some workers in your region joined the company last July. What is your estimate of their average sales last September?	
7 I	How confident are you about your estimate?	

Table A2: Survey questions on beliefs

High-performing workers suffer from significantly higher stress

Table A3: Stress Levels of High-performing and Low-performing Workers

1 –	Dependent Variable	Low Stress
	High-performer	-0.195** (0.079)
	Month fixed effects	\checkmark
	Region fixed effects	\checkmark
	Number of observations	6356

Forecast of future performance leads to lower attrition

Table A12: Effects of Individual Performance Forecasts on Attrition

Dependent Variable	Attrition			
Worker Type	New Workers	Senior Workers		
log (forecast of next month's sales)	-2.13**	0.156		
	(0.909)	(0.582)		
log (forecast of sales in three months)	1.13	-0.902*		
	(1.17)	(0.536)		
log (sales)	-1.74*	-1.26***		
	(1.03)	(0.343)		
Month fixed effects	\checkmark	\checkmark		
Region fixed effects	\checkmark	\checkmark		
Number of observations	1508	4583		