Jobseekers' Beliefs about Comparative Advantage and (Mis)Directed Search

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This paper: Does receiving **information about their skills** affect jobseekers' **beliefs**, **job search** and **outcomes**?

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searching for **entry-level jobs** in mainly BPO, hospitality, retail, sales.

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- Has little impact on total search effort or other mechanisms.
- **Raises weekly earnings & hourly wages by $\approx 25\%$ after 3-4 months**.

Contribution

First paper to show how **information about skills** influences **beliefs about comparative advantage, skill-directed job search and outcomes**.

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- jobseeker skills
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Not captured by any one (or two?) of admin data, platform data, or survey data.

Context in Literature

Relative to empirical micro literature on **belief-search linkages**: emphasize **beliefs about comparative advantage** and **skill-directed job search** (Abebe et al., 2022; Alfonsi et al., 2022; Bandiera et al., 2021; Banerjee & Sequeira, 2020; Belot et al., 2022; Conlon et al., 2018; Spinnewijn, 2015)

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Relative to macro-labor literature on **skill mismatch**: provide **empirical microfoundations** for some types of frictions (Baley et al., 2022; Guvenen et al., 2020; Lise & Postel-Vinay, 2020)

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Relative to macro-labor literature on skill mismatch: provide empirical microfoundations for some types of frictions (Baley et al., 2022; Guvenen et al., 2020; Lise & Postel-Vinay, 2020)

Links to literature on **firms' limited information about jobseekers' skills** (Abebe et al., 2021; Abel et al., 2020; Altonji & Pierret, 2001; Arcidiacono et al., 2010; Bassi & Nansamba, 2022; Carranza et al., 2022; Kahn & Lange, 2014; Pallais, 2014)

Outline

Introduction

Economic Environment

Skill Beliefs

Skill-Directed Job Search

Job Search Outcomes

Additional Mechanisms

Conclusion

Economic Environment

Context

South Africa's Gauteng province

- Urban area of $\approx$ 11 million people
- Unemployment $>$ 30% for adults, $>$ 40% for youths
- Main income source is wage labor, mostly in formal firms
- Entry-level employment mainly in services, manufacturing

Similar patterns in many large cities in developing economies

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- Low-income background, almost all Black African

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All are actively searching for jobs, often formally:

- 10 applications sent & 14 hours searched in past week
- $\approx$ 1% of job applications convert to offers
- High search costs: $\approx$ 50% of average earnings

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Assessments **horizontally differentiate** jobseekers, as $\rho = 0.31$.

Why These Skills?

Firms value these skills

- Certifying jobseekers' skills to firms improves labor market outcomes (17% ↑ employment) (Carranza et al., 2022)
- In incentivized resume ranking, 92% of firms rank higher communication or numeracy skills $>$ 1-year training course details

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Firms can partly observe applicants' skills

- Admin data from a firm posting communication & numeracy jobs
- Evaluations of each skill, job suitability and likelihood of interview positively correlate with our skill measures details

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Measure **beliefs about skill quintiles** before and after providing feedback on assessment performance

Measured & Believed Skills Differ

Substantial differences between measured & believed skills

- Define **aligned CA belief** as believed = measured top skill
- 49% of jobseekers have aligned CA belief
- Beliefs don't converge in 3-4 month panel, even for active searchers

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- Noisy assessment during education (Lam et al., 2011; Taylor et al., 2011), few guidance counsellors (Pillay, 2020)
- High unemployment limits learning from work experience
- 3% of jobseekers ever get skill feedback from job applications
- Multidimensional learning is difficult (Banerjee & Sequeira, 2020)

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Similar patterns for employment & wage beliefs (Mueller & Spinnewijn, 2022)

Conceptual Framework

"Directed search with mistakes" (Lentz et al., 2022; Wu, 2021)

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Implications of inaccurate beliefs:

- 'Misdirect' search effort across job types.
- If search effort & skill are 'more complementary' within than between type, lower wages and/or employment.

Skill Beliefs

Experimental Design: "Tight" Experiment

Day-long job search assistance workshops.

- Invitations sent in partnership with job search agency
  - Similar to some existing workshops
  - Invitations don't reveal skill focus of workshops
- Baseline survey, assessments, treatment, job search tasks, endline survey, job search advice
- 8-12 jobseekers per workshop

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Randomly assign each day to

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REPORT ON CANDIDATE COMPETENCIES
-Personal Copy-

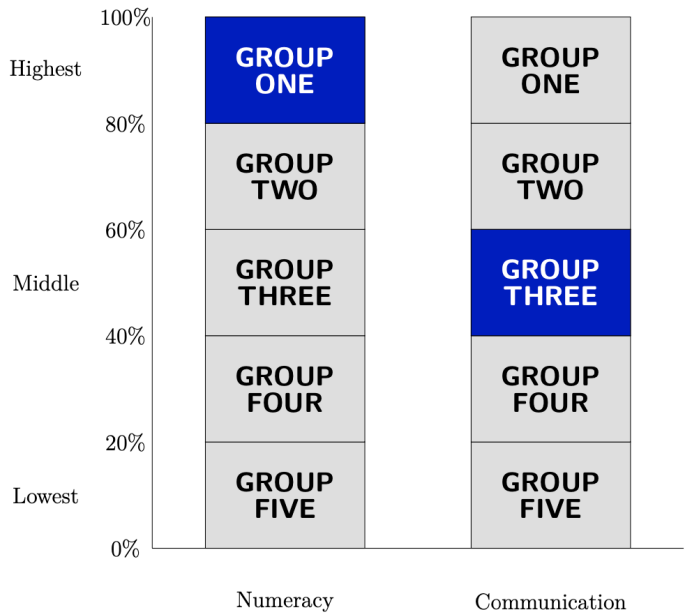
This report contains results from the assessments you took today. These results can help you learn about some of your strengths and weaknesses and inform your job search.

You completed assessments on English Communication (listening and reading comprehension) and Numeracy today.

1. The Numeracy test measures various maths abilities.
2. The Communication test measures English language ability through listening and reading comprehension.

Your results have been compared to a large group of young South African job seekers who have a matric certificate, have completed school in rural areas or townships around Johannesburg and have completed the same assessments.

You scored in the FIRST GROUP of these candidates for Numeracy and the THIRD GROUP for Communication.



Experimental Analysis

Covariates balanced between control and treatment. results

Covariates, inference methods and most outcomes prespecified.

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Jobseekers whose baseline believed CA = measured CA get 'less treatment', so we estimate two prespecified effects:

- average treatment effect
- heterogeneous treatment effects by aligned baseline CA belief

Treatment Aligns Measured & Believed Skill

	Aligned CA belief		Fraction aligned beliefs	
	(1)	(2)	(3)	(4)
Treatment	**0.135*** **			
	(0.035)			
Treatment × Aligned comp adv belief (bl)				
Aligned comp adv belief (bl)				
Treatment effect: Aligned comp adv belief (bl)				
Control mean	0.475			
Observations	278			

Recall **aligned CA belief**: believed top skill = measured top skill

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Treatment effect: Aligned comp adv belief (bl)		**0.072**		
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Driven by jobseekers with baseline unaligned CA beliefs

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Other Beliefs Results

Results are conceptually similar using more continuous measures of misaligned beliefs and skill differences.

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Belief levels & treatment effects don't differ by gender (Bandiera et al., 2022) results

Skill-Directed Job Search

Measuring Search Direction

Measuring search direction is a central part of the paper

Goals

- Collect multiple measures

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- Capture application decisions about individual jobs, not aggregated measures typical in survey data

  (e.g. “How many applications did you submit this week?”)

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- Observe skill demand of individual jobs

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Goals

- Collect multiple measures
- Capture application decisions about individual jobs, not aggregated measures typical in survey data

  (e.g. “How many applications did you submit this week?”)
- Observe skill demand of individual jobs
- Limit experimenter demand effects

  (Also limited because jobseekers don’t know about experiment)

Measuring Search Direction

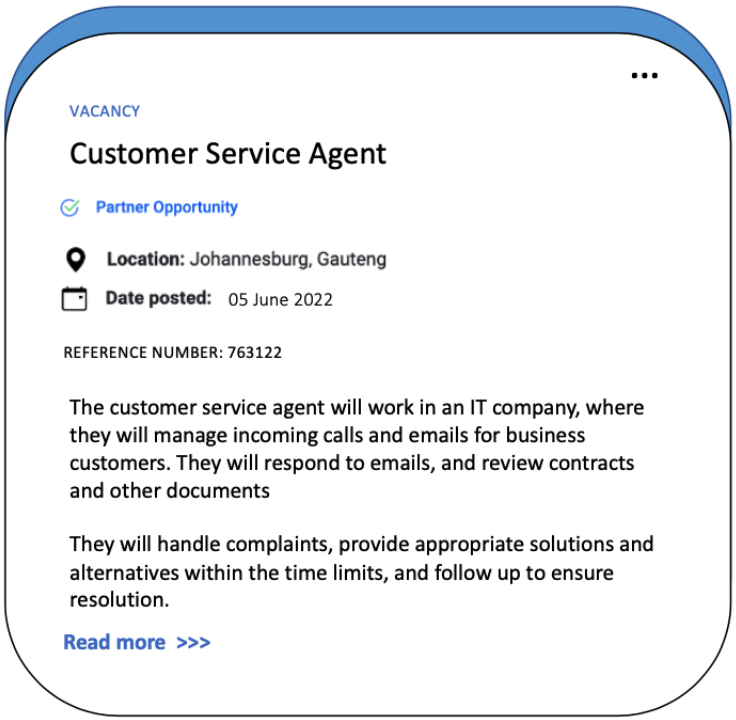
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   - Make 11 choices between pairs of entry-level jobs.
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   - Some real and some realistic job listings, all from search platform run by implementation partner.

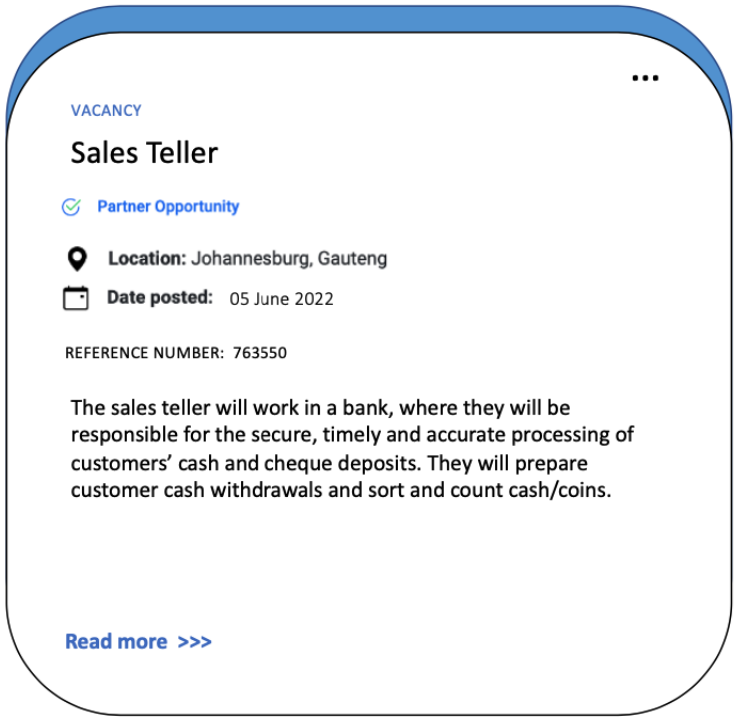
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   - Make 11 choices between pairs of entry-level jobs.
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   - Some real and some realistic job listings, all from search platform run by implementation partner.
   - Incentivised: At least one pair is a real application choice; list of preference-aligned jobs will be given after workshop.

Measuring Skill Demand

Sample job choice shown during task





Measuring Search Direction

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2. **Clicks on links** to real jobs in text messages after workshop. details

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CA-aligned applications - # non-CA-aligned applications

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CA-aligned applications - # non-CA-aligned applications

Combine four measures into a **summary index** (Anderson, 2008)

- More power
- Limit multiple testing

Treatment Aligns Search Direction

	Aligned search index	
	(1)	(2)
Treatment	**0.269****	0.603***
	(0.103)	(0.140)
Treatment × Aligned comp adv belief (bl)		-0.648***
		(0.205)
Aligned comp adv belief (bl)		0.727***
		(0.153)
Treatment effect: Aligned comp adv belief (bl)		-0.045
		(0.131)
Control mean	-0.000	-0.000
Observations	278	278

Treatment **increases search alignment** by **0.27 std deviations.**

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Closes 80% of the "aligned search gap" in the control group.

Treatment Aligns Search Direction

	Aligned search index		% aligned job choices		Δ SMS click rate		Δ planned apps		Δ % aligned platform apps	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	0.269**	0.603***	0.037	0.088**	0.071	0.157	1.420	4.746**	0.063**	0.089*
	(0.103)	(0.140)	(0.034)	(0.038)	(0.061)	(0.096)	(1.261)	(1.763)	(0.023)	(0.048)
Treatment × Aligned comp adv belief (bl)		-0.648***		-0.104**		-0.163		-6.629**		-0.048
		(0.205)		(0.039)		(0.128)		(2.651)		(0.080)
Aligned comp adv belief (bl)		0.727***		0.165***		0.100		8.697***		0.013
		(0.153)		(0.035)		(0.102)		(2.412)		(0.049)
Treatment effect: Aligned comp adv belief (bl)		-0.045		-0.016		-0.005		-1.883		0.041
		(0.131)		(0.034)		(0.081)		(1.807)		(0.044)
Control mean	-0.000	-0.000	0.550	0.550	-0.032	-0.032	4.331	4.331	0.006	0.006
Observations	278	278	278	278	278	278	278	278	278	278

Treatment increases search alignment by 0.27 std deviations.

Driven by jobseekers with initially unaligned CA beliefs.

Closes 80% of the “aligned search gap” in the control group.

Consistent pattern over all measures.

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Consistent **effects on beliefs about returns to search**. results

Current Stage in the Argument

Have shown

- Comparative advantage beliefs are misaligned but malleable.
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- Improve jobseekers' outcomes in the labor market?

Job Search Outcomes

Big Experiment

New sample (Carranza et al., 2022)

- $\approx 4,200$ participants at the same job search agency
- Similar demographics, education, work experience comparison
- Six years earlier, providing partial generalizability test

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Similar effects on beliefs and search direction to tight experiment, using "standard" measures results

Treatment Improves Employment Quality

	Employment quality			
	(1) Index	(2) Earnings	(3) Hourly wage	(4) Written contract
Treatment	0.085**	**6.096****	0.276**	0.017*
	(0.035)	**(2.537)**	(0.122)	(0.010)
Control mean	0.000	**23.779**	1.185	0.120
Observations	4206	4196	4183	4184

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Robust to log, IHS & root transforms, standardizing, winsorizing

Linking Search & Labor Market Outcomes

Earnings effects driven by **wage jobs** that **start after treatment**.

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   - Consistent with higher wages & tenure
   - But match quality is difficult to measure directly

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Dynamics obviously get more complex

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Showing these skill assessment results to firms is difficult, rare & ineffective. results

Limited effects on skill investments, but time horizon is short. results

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Provide **causal evidence** for **each step** of the causal chain.

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May interact with **demand-side information frictions**. (Carranza et al., 2022)

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Where might this matter?

- Education systems deliver noisy feedback
- High & persistent nonemployment
- New job types: structural transformation, displacement, migration

References I

Abebe, G., Caria, A. S., Fafchamps, M., Falco, P., Franklin, S., Quinn, S., . . . Quinn, S. (2021). Anonymity or Distance? Job Search and Labour Market Exclusion in a Growing African City. *Review of Economic Studies*, *88*(3), 1279–1310. doi: 10.1093/restud/rdaa057

Abebe, G., Caria, S., Fafchamps, M., Falco, P., Franklin, S., Quinn, S., & Shilpi, F. (2022). Matching Frictions and Distorted Beliefs: Evidence from a Job Fair Experiment. *Working Paper*.

Abel, M., Burger, R., & Piraino, P. (2020). The value of reference letters: Experimental evidence from south africa. *American Economic Journal: Applied Economics*, *12*(3), 40–71.

Alfonsi, L., Namubiru, M., & Spaziani, S. (2022). Meet your future: Experimental evidence on the labor market effects of mentors. *Working Paper*.

References II

Alfonso Naya, V., Bied, G., Caillou, P., Crepon, B., Gaillac, C., Peerennes, E., & Sebag, M. (2021). *Designing labor market recommender systems: the importance of job seeker preferences and competition.* (Working Paper)

Altonji, J., & Pierret, C. (2001). Employer learning and statistical discrimination. *Quarterly Journal of Economics*, *116*(1), 313-335.

Anderson, M. L. (2008). Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association*, *103*(484), 1481–1495. doi: 10.1198/016214508000000841

Arcidiacono, P., Bayer, P., & Hizmo, A. (2010). Beyond signaling and human capital: Education and the revelation of ability. *American Economic Journal: Applied Economics*, *2*(4), 76-104.

Baley, I., Figueiredo, A., & Ulbricht, R. (2022). Mismatch cycles. *Journal of Political Economy*, *130*(11).

References III

Bandiera, O., Bassi, V., Burgess, R., Rasul, I., Sulaiman, M., & Vitali, A. (2021). The search for good jobs: Evidence from a six-year field experiment in uganda. *SSRN Working Paper 3910330*.

Bandiera, O., Parekh, N., Petrongolo, B., & Rao, M. (2022). Men Are from Mars, and Women Too: A Bayesian Meta-analysis of Overconfidence Experiments. *Economica*, *89*(S1), 38-70.

Banerjee, A. V., & Sequeira, S. (2020). Spatial Mismatches and Imperfect Information in the Job Search. *CEPR Discussion Paper 14414*.

Bassi, V., & Nansamba, A. (2022). Screening and signalling non-cognitive skills: Experimental evidence from uganda. *The Economic Journal*, *132*(642), 471–511.

Belot, M., Kircher, P., & Mueller, P. (2022). Do the long-term unemployed benefit from automated occupational advice during online job search? *IZA Discussion Paper 15452*.

References IV

Carranza, E., Garlick, R., Orkin, K., & Rankin, N. (2022). Job search and hiring with limited information about workseekers' skills. *American Economic Review*, *112*(11), 3547–83.

Conlon, J. J., Pilossoph, L., Wiswall, M., & Zafar, B. (2018). Labor Market Search With Imperfect Information and Learning. *NBER Working Paper 24988*.

Donovan, K., Lu, J., & Schoellman, T. (2022). *Labor market dynamics and development.* (Working Paper, Yale University)

Gibbons, R., Katz, L., Lemieux, T., & Parent, D. (2005). Comparative advantage, learning, and sectoral wage determination. *Journal of Labor Economics*, *23*(4), 681-724.

Guvenen, F., Kuruscu, B., Tanaka, S., & Wiczer, D. (2020). Multidimensional Skill Mismatch. *American Economic Journal: Macroeconomics*, *12*(1), 210–244. doi: 10.1257/mac.20160241

Kahn, L., & Lange, F. (2014). Employer learning, productivity, and the earnings distribution: Evidence from performance measures. *Review of Economic Studies*, *84*(1), 1575-1613.

References V

Lam, D., Ardington, C., & Leibbrandt, M. (2011). Schooling as a lottery: Racial differences in school advancement in urban south africa. *Journal of Development Economics*, *95*(2), 121–136.

Lentz, R., Maibom, J., & Moen, E. (2022). Competitive or random search? *Working Paper*.

Lise, J., & Postel-Vinay, F. (2020). Multidimensional skills, sorting, and human capital accumulation. *American Economic Review*, *110*(8), 2328–76.

Mueller, A. I., & Spinnewijn, J. (2022). Expectations data, labor market and job search. In R. Bachmann, G. Topa, & W. van der Klaauw (Eds.), *Handbook of economic expectations* (pp. 677–710). Netherlands: Elsevier Science.

Pallais, A. (2014). Inefficient hiring in entry-level labor markets. *American Economic Review*, *104*(11), 3565-3599.

Pillay, A. L. (2020). Prioritising career guidance and development services in post-apartheid south africa. *African Journal of Career Development*, *2*(1), 1–5.

References VI

Roy, A. D. (1951). Some thoughts on the distribution of earnings. *Oxford Economic Papers*, *3*(2), 135–146.

Spinnewijn, J. (2015). Unemployed but Optimistic: Optimal Insurance Design With Biased Beliefs. *Journal of the European Economic Association*, *13*(1), 130–167.

Taylor, S., van der Berg, S., Reddy, V., & van Rensburg, D. J. (2011). How well do south african schools convert grade 8 achievement into matric outcomes? *Stellenbosch University, Department of Economics Working Papers 13/2011*.

Wu, L. (2021). Partially directed search in the labor market. *Working Paper*.

Zimmermann, F. (2020). The Dynamics of Motivated Beliefs. *American Economic Review*, *110*(2), 337–363. doi: 10.1257/aer.20180728

Pre Treatment Beliefs Measurement

Survey question

Think about 100 people who are job-seekers from Johannesburg aged 18-34 with a matric from a township or rural school. Imagine that we rank everyone according to their results on the ***numeracy*** *assessment.*
We create five equal size groups. The first group are the 20 people with the highest numeracy results. The second group are the 20 people with the next best results – they are less good than the top 20, but better than the other 60 people. The fifth group are the 20 people with lower strong numeracy results than the other 80.
Out of these five groups we just talked about, what group do you think you are most likely to be in based on your ***numeracy*** *assessment result?*

$\rightarrow$ We measure a **point estimate** of jobseekers' beliefs.

back

Post Treatment Beliefs Measurement

Survey question

Think about 100 people who are job-seekers from Johannesburg aged 18-34 with a matric from a township or rural school. Imagine that we rank everyone according to their ***Numeracy skills****, from lowest to highest. This ranking is based on* ***overall Numeracy skills****, not only the numeracy skills that were tested in the Numeracy assessment you just took.*

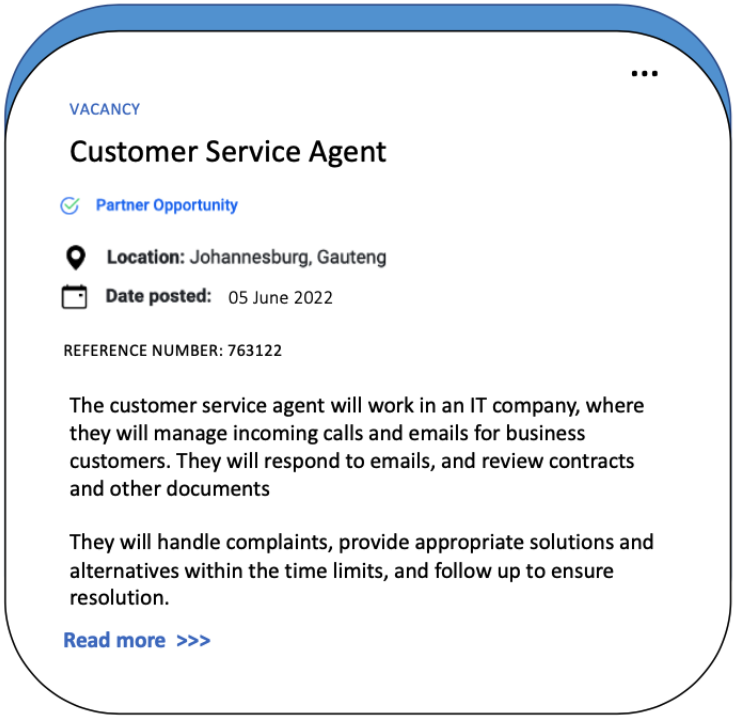
We create five equal size groups. The first group are the 20 people with the strongest numeracy skills. The second group are the 20 people with the next best skills – they are less good than the top 20, but better than the other 60 people. The fifth group are the 20 people with less strong numeracy skills than the other 80.

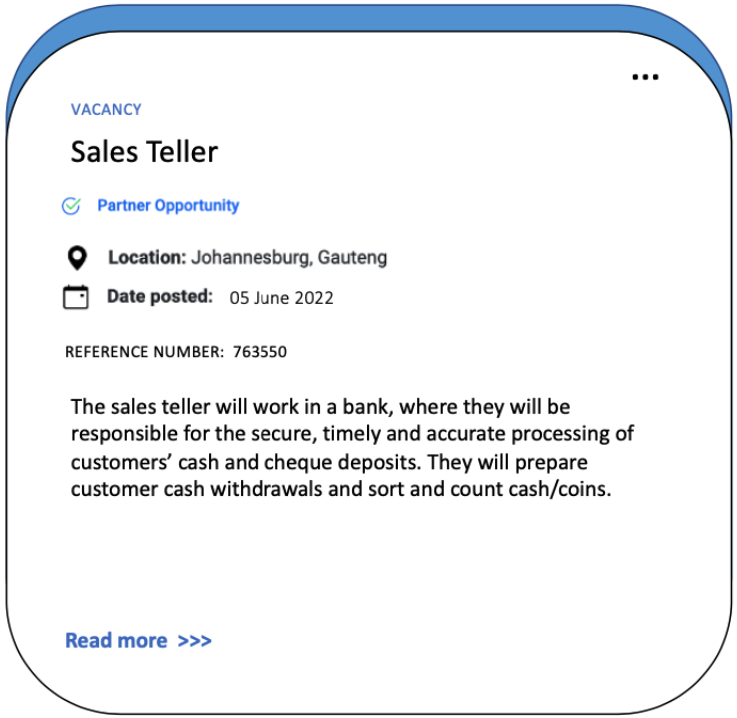
Here are five boxes showing the five groups of people ranked according to their ***numeracy*** *Please place buttons on each of the boxes to show what you think the chances are that you are in each group.*

→ We also measure **the distribution** of jobseekers' beliefs.

back

Incentivized Job Choice Task





Job pairs were matched based on ratings by professional labor market agents.

Job-seekers are truthfully told that at least one of the job pairs will be a real application choice.

Job-seekers complete 11 job choices in random order.

back

SMS Measurement

SMS text

Hi [firstname], we are contacting you in relation to the workshop you participated in at the Braamfontein Recreation Centre. We found a job opportunity for a [job title] post on the SAyouth.mobi site that you might be interested in. The job is within travelling distance of Braamfontein. Please follow the link if you would like to apply: [https://ury.io/XXXX]

- All participants receive three SMS about five days after the treatment.
- Everyone receives one numeracy job, one communication job, and one job that matched their revealed type in the job choice task.
- The SMS were sent in random order.
- We track clicks on the links included in the SMS.

Search direction measure: **Difference in click rate between jobs that are aligned with comparative advantage in skills and those that are not.**

back

Platform Measurement

We observe all interactions of jobseekers on the online job-search platform SAYouth.mobi.

$\rightarrow$ On average, jobseekers applied to 16 jobs on the platform in 30 days.
We focus on all clicks on application buttons for job opportunities within 30 days of the treatment.

We classify jobs as numeracy or communication jobs based on a list of common numeracy and communication heavy jobs.

$\rightarrow$ On average 20% of applications of jobseekers are classified as either numeracy and communication heavy.

Search direction measure: **Difference in % applied jobs that are aligned with comparative advantage in skills and those that are not.**

back

Measuring Skill Beliefs

Imagine we line everyone up according to what score they got, from lowest to highest. Then we divide the group into three. The lower third are the people who got the lowest scores. The top third are the people who got the highest scores. The middle third are the rest of the people.

Would you be in the top third, middle third or bottom third of people on the numeracy test?

back

Measuring Search Direction (Field Experiment

Survey question

Think about the types of jobs that you are applying for. Think about what skills are important for these jobs. Rank the following skills from 1 (most important) to 3 (least important).

- *Numeracy/maths skills*
- *Literacy/communications skills*
- *Problem-solving skills*
- *Soft-skills.*

We define aligned search as ranking (one of) the top skill higher than the two other considered skills (ignoring soft-skills).

back

REPORT ON CANDIDATE COMPETENCIES
-Personal Copy-

This report contains results from the assessments you took at Harambee in Phase 1 and Phase 2. These results can help you learn about some of your strengths and weaknesses and inform your job search.

You completed assessments on English Communication (listening, reading and comprehension) and Numeracy today in Phase 2. In Phase 1, you completed a Concept Formation assessment which asked you to identify patterns.

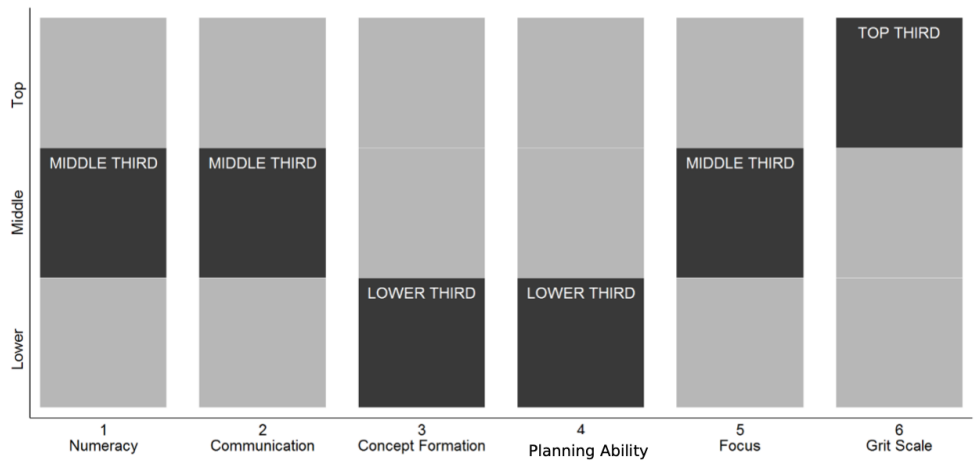
1. The Numeracy tests measure various maths abilities. Your score is the average of the two maths tests you did today at Harambee.
2. The Communication test measures English language ability through listening, reading and comprehension.
3. The Concept Formation test measures the ability to understand and solve problems. Candidates with high scores can generally solve complex problems, while lower scores show an ability to solve less complex problems.

You also did some games and questionnaires to measure your soft skills:

4. The Planning Ability Test measures how you plan your actions in multi-step problems. Candidates with high scores generally plan one or more steps ahead in solving complex problems.
5. The Focus Test looks at your ability to pick out which information is important in confusing environments. Candidates with high scores are able to focus on tasks in distracting situations.
6. The Grit Scale measures candidates' determination when working on difficult problems. Candidates with high scores spend more time working on the problems rather than choosing to pursue different problems.

Your results have been compared to a large group of young South African job seekers who have a matric certificate, are from socially disadvantaged backgrounds and have been assessed by Harambee.

You scored in the MIDDLE THIRD of candidates assessed by Harambee for Numeracy, MIDDLE THIRD for Communication, LOWER THIRD for Concept Formation, LOWER THIRD for Planning Ability, MIDDLE THIRD for Focus and TOP THIRD for the Grit Scale.



DISCLAIMER
Please note that this is a confidential assessment report and is intended for use by the person specified above. Assessment results are not infallible and may not be entirely accurate.

Firms value skills over one year of formal qualification

	Top (1)	Middle (2)	Bottom (3)	Share (4)	Most important skill (5)	Share (6)
1	Num	Com	Educ	52.24%	Numeracy	56.72%
2	Num	Educ	Com	4.48%		
3	Com	Num	Educ	28.36%	Communication	34.33%
4	Com	Educ	Num	5.97%		
5	Educ	Num	Com	1.49%	Educaction	8.95%
6	Educ	Com	Num	7.46%		
				100.00%		100.00%

Firms' preferences for skills differ across skill domains.

$\rightarrow$ There is scope for targeting to improve outcomes.

Back

Beliefs about returns to numeracy skills

	Self	Better skills	Worse skills	self- better	p(self- better=0)	self - worse	p(self- worse=0)
Expected months to get a job — N apps in next 30 days	3.09	2.35	4.18	0.74	0.02	-1.08	0.00
Expected monthly earnings (2021 USD PPP)	878.71	997.17	733.34	-118.46	0.00	145.37	0.00

job seekers expect people with higher numeracy skills to do better.

Back

Beliefs & Skills Predict Search

	(1) # applications in past 30 days (ihs)	(2) Search hours past 7 days (ihs)	(3) Res. wage (ihs)	(4) Exp. wage (ihs)	(5) Exp. search dur. (ihs)	(6) Exp. # apps (ihs)
Average skill tercile (z-scored)	0.091****	0.119****	0.055****	0.088****	-0.011	0.094****
	(0.016)	(0.018)	(0.015)	(0.013)	(0.014)	(0.014)
Average belief about skill tercils (z-scored)	0.091****	0.118****	0.022	0.042***	-0.097****	0.109****
	(0.015)	(0.018)	(0.014)	(0.013)	(0.014)	(0.014)
β_*skill* $-$ β_*belief*	-0.000	0.001	0.033	0.046**	0.086***	-0.015
ctest_se	(0.024)	(0.028)	(0.022)	(0.020)	(0.021)	(0.022)
Outcome mean	2.421	2.952	8.817	9.126	1.781	3.083
# observations	4096	4026	4108	4104	4058	4109
R^2	0.088	0.038	0.024	0.030	0.014	0.076

Back

No Search Effort - Perceived Skill Interaction

	Expected search duration in months (ihs)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Expected # apps		Expected # apps / 2		Expected # apps * 2	
E[# apps] (ihs)	-0.021	-0.020	0.016	0.020	-0.081***	-0.084***
	(0.015)	(0.015)	(0.024)	(0.024)	(0.024)	(0.024)
Average skill belief (z-scored)	-0.090***	-0.061	-0.052**	0.089	-0.118***	-0.194***
	(0.013)	(0.046)	(0.021)	(0.073)	(0.021)	(0.072)
E[# apps] × Average skill belief (z-scored)		-0.010		-0.047**		0.025
		(0.015)		(0.023)		(0.023)
Control mean	1.781	1.781	1.843	1.843	1.580	1.580
# obs	4302	4302	2143	2143	2160	2160
R-squared	0.015	0.015	0.007	0.009	0.045	0.046

Back

Beliefs in the Big Field Experimental

	Mean	SD	Obs.
Demographics			
Black African	0.92	0.27	4389
Male	0.38	0.48	4389
Age	23.67	3.28	4389
Completed secondary education only	0.61	0.49	4389
Any other post-secondary qualification	0.22	0.41	4389
University degree / diploma	0.17	0.37	4389
Labor market background			
Did any search in past 7 days	0.97	0.17	4389
Worked in past 7 days	0.37	0.48	4389
Earnings from all jobs in last 7 days conditional on having job	596.62	795.50	1324
Has worked in permanent wage job before	0.09	0.29	4377
Skills and beliefs			
Average skill tercile (0 to 2)	1.02	0.60	4389
% accurate beliefs (out of 3)	0.38	0.31	4378
% overconfident beliefs (out of 3)	0.50	0.35	4378
% underconfident beliefs (out of 3)	0.12	0.21	4378
Aligned belief about comparative advantage	0.20	0.40	4312

Levels of misalignment vary across experiments because of measurement difference (terciles and more skills).

Misalignment of comparative advantage beliefs persists in the panel, even for active searchers results

back

Belief Persistence in the Control Group

	Aligned comparative advantage belief			% aligned skill belief		
	(1)	(2)	(3)	(4)	(5)	(6)
Endline	-0.004 (0.011)	-0.001 (0.016)	-0.015 (0.013)	0.009 (0.008)	0.009 (0.011)	0.004 (0.010)
Endline × Above median search effort		-0.008 (0.025)			0.000 (0.014)	
Above median search effort		0.035* (0.019)			0.003 (0.012)	
Endline × Worked last 7 days			0.034 (0.022)			0.015 (0.014)
Worked last 7 days			-0.005 (0.014)			0.013 (0.016)
Constant	0.200*** (0.009)	0.183*** (0.014)	0.202*** (0.010)	0.379*** (0.007)	0.377*** (0.007)	0.375*** (0.009)
Observations	4405	4315	4315	4456	4365	4365

On beverage, jobseekers slightly align their belief about skill levels but not beliefs about comparative advantage.

back

Impact on beliefs by confidence and gender

	Aligned com. adv. belief		Av. abs. dev. from assessments		% aligned skill domains		% overconf. beliefs		% underconf. beliefs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	0.103**	0.052	-0.085***	-0.093***	0.078***	0.063	-0.022	-0.025	-0.057***	-0.043
	(0.044)	(0.081)	(0.014)	(0.025)	(0.026)	(0.051)	(0.018)	(0.033)	(0.016)	(0.034)
Treatment × Female		0.074		0.012		0.022		0.004		-0.021
		(0.095)		(0.029)		(0.062)		(0.042)		(0.039)
Female		0.047		-0.032*		-0.033		0.016		0.017
		(0.060)		(0.018)		(0.042)		(0.025)		(0.026)
Treatment effect: Female		0.126**		-0.081***		0.085**		-0.021		-0.064***
		(0.053)		(0.016)		(0.032)		(0.023)		(0.019)
Control mean	0.465	0.465	0.375	0.375	0.173	0.173	0.646	0.646	0.181	0.181
Observations	278	278	278	278	278	278	278	278	278	278

Underconfident beliefs are more likely to update than overconfident beliefs.

→ This also holds within individual. results

There is no discernible difference by gender.

- Descriptively results
- Treatment effects (above and here)

back

Gender Differences in Baseline Beliefs

	Female	Male	Δ	p(Δ = 0)	Δ(*adjusted*)	p(Δ(*adjusted*) = 0)	N
thisstat1							
Aligned comp. adv belief (assessment result)	0.56	0.48	-0.08	0.25	-0.03	0.59	278
Aligned comp. adv belief	0.50	0.46	-0.04	0.50	-0.01	0.84	278
thisstat4							
Fraction corrrect beliefs (assessment result)	0.15	0.20	0.06	0.14	0.04	0.16	278
Fraction aligned beliefs (general skill)	0.23	0.21	-0.03	0.47	-0.06	0.13	278
Fraction overcofident beliefs (general skill)	0.62	0.59	-0.03	0.59	0.05	0.10	278
Fraction underercofident beliefs (general skill)	0.15	0.20	0.06	0.17	0.01	0.69	278
thisstat9							

There is little evidence of gender differences in beliefs about skills.

bigger experiment

◂ back

Gender Differences in Baseline Beliefs (Big Experiment)

	Female	Male	Δ	p(Δ = 0)	Δ(*adjusted*)	p(Δ(*adjusted*) = 0)	N
Skills and beliefs							
Average skill tercile (0 to 2)	0.94	1.14	0.20	0.00			4389
Average skill tercile belief (0 to 2)	1.52	1.58	0.06	0.00	0.04	0.01	4378
% accurate beliefs (out of 3)	0.35	0.42	0.07	0.00	0.01	0.20	4378
% overconfident beliefs (out of 3)	0.53	0.45	-0.09	0.00	0.01	0.24	4378
% underconfident beliefs (out of 3)	0.11	0.13	0.01	0.06	-0.02	0.00	4378
Aligned belief about comparative advantage	0.19	0.23	0.04	0.01	0.03	0.03	4312

$\Rightarrow$ Conditional on skills, there is little difference by gender.

back

No Gender Heterogeneity in Treatment Effects

	Aligned comp. adv. belief		Fraction aligned beliefs	
	(1)	(2)	(3)	(4)
Treatment	0.156***	0.155***	0.150***	0.153***
	(0.021)	(0.020)	(0.019)	(0.015)
Treatment × Female	-0.032	-0.026	-0.021	-0.016
	(0.027)	(0.026)	(0.020)	(0.017)
Female	-0.029	-0.011	-0.051***	0.003
	(0.018)	(0.016)	(0.015)	(0.012)
Treatment effect: Female	0.124***	0.130***	0.128***	0.136***
	(0.013)	(0.015)	(0.013)	(0.010)
Control mean	0.196	0.196	0.388	0.388
Observations	4191	4118	4205	4195
Controls		X		X

→ None of the interaction effects by gender are significant

back

Belief Updating at the Skill-Individual–Level.

	Dependent variable: Aligned belief dummy			
	(1)	(2)	(3)	(4)
Treatment × *AC_bl*	0.096***	0.092***		
	(0.016)	(0.016)		
Treatment× *OC_bl*	0.154***	0.156***	0.067***	0.076***
	(0.011)	(0.011)	(0.023)	(0.023)
Treatment × *UC_bl*	0.203***	0.205***	0.136***	0.144***
	(0.028)	(0.028)	(0.034)	(0.034)
p(Treatment × *OC_bl*= Treatment × *UC_bl*)	0.136	0.130	0.065	0.063
Control mean	0.385	0.385	0.385	0.385
Number of observations	12497	12497	12486	12486
Skill fixed effects		✓		✓
Individual fixed effects			✓	✓

Columns (3) and (4) test whether individuals with both over- and under-confident beliefs update either belief more.

back

Further results about labor market beliefs

- Beliefs about jobs predict choices in the job choice task, which is not changed by the treatment. details
- Treatment increases expected returns to directed search. details
- Treatment increases wage expectations for jobseekers with misaligned beliefs. details
- Treatment increases general labor market expectations for jobseekers with misaligned beliefs (not significant). details
- Treatment effects on job-specific beliefs are consistent but noisily estimated. details

back

Beliefs are predictive of job choices

	Marginal effects on choice of numeracy job (logit estimation)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$E[Wage^{num}] - E[Wage^{com}]$ (w)	0.067***	0.075***	0.065**	0.075**	0.067***	0.077***	0.065**	0.073**
	(0.025)	(0.026)	(0.029)	(0.031)	(0.025)	(0.025)	(0.030)	(0.030)
Treatment $\times$ $E[Wage^{num}] - E[Wage^{com}]$ (w)					0.045	0.042	-0.017	-0.021
					(0.038)	(0.038)	(0.045)	(0.044)
# observations	925	925	800	800	1840	1840	1610	1610
Job pair fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Individual fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

A difference in 100 USD in expected weekly earnings increases choice probability by 6.7pp.

back

Expected relative returns to search shift

	Index		ΔE [offers per app]		ΔE [time to job]		ΔE [wage]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.079	0.282*	0.045**	0.059**	-0.042	0.061	-12.987	583.534*
	(0.101)	(0.147)	(0.017)	(0.027)	(0.188)	(0.274)	(225.554)	(323.719)
Treatment × Aligned comp adv belief (bl)		-0.442*		-0.031		-0.222		-1272.809**
		(0.222)		(0.042)		(0.380)		(540.218)
Aligned comp adv belief (bl)		0.450**		0.049		0.146		943.259**
		(0.198)		(0.036)		(0.271)		(448.218)
Treatment effect: Aligned comp adv belief (bl)		-0.160		0.027		-0.161		-689.274*
		(0.151)		(0.027)		(0.258)		(370.022)
Control mean	0.000	0.000	0.028	0.028	0.271	0.271	207.511	207.511
Observations	278	278	269	269	272	272	278	278

Jobseekers expect higher returns to applying to jobs that align with their comparative advantage.

back

Treatment effects on wage beliefs

	Index		Wage expectations (w)		Minimum expected wage (w)		Maximum expected wage (w)		Reservation wage (w)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	0.099	0.319*	9.566	22.119	8.934	19.180*	0.650	3.115	1.318	3.805
	(0.104)	(0.179)	(7.740)	(14.852)	(6.090)	(10.607)	(11.984)	(24.259)	(3.628)	(5.948)
Treatment × Aligned comp adv belief (bl)		-0.461*		-26.041		-21.065		-6.425		-5.366
		(0.258)		(21.034)		(17.531)		(38.832)		(6.578)
Aligned comp adv belief (bl)		0.247		10.018		4.604		20.878		5.287
		(0.208)		(17.725)		(15.279)		(29.176)		(4.039)
Control mean	-0.000	-0.000	212.045	212.045	131.392	131.392	324.076	324.076	109.567	109.567
Observations	278	278	278	278	278	278	278	278	277	277

Treatment effect heterogeneity is in line with treatment effects on search direction.

back

Treatment effects on labor market beliefs

	Index		Callbacks / apps (w)		Offers / apps (w)		Month to job (w)		p(employed in 1 months)		p(employed in 3 months)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	0.095	0.264	-0.001	0.039	-0.006	0.016	0.011	0.228	3.493	8.674**	4.235*	8.431**
	(0.122)	(0.194)	(0.023)	(0.036)	(0.021)	(0.031)	(0.247)	(0.392)	(2.238)	(3.748)	(2.315)	(4.042)
Treatment × Aligned comp adv belief (bl)		-0.360		-0.086		-0.049		-0.444		-10.821*		-8.678*
		(0.247)		(0.057)		(0.042)		(0.470)		(6.003)		(5.126)
Aligned comp adv belief (bl)		0.234		0.061		0.049		0.069		4.789		2.647
		(0.228)		(0.043)		(0.036)		(0.386)		(4.416)		(4.186)
Control mean	0.000	0.000	0.391	0.391	0.257	0.257	2.466	2.466	54.094	54.094	68.230	68.230
Observations	278	278	276	276	274	274	275	275	278	278	278	278

Treatment effect heterogeneity is in line with treatment effects on search direction but not significant.

back

Treatment effects on labor market beliefs

	Desirability (sd)	Expected earnings (w)	Job offer probability
	(1)	(2)	(3)
Treatment	-0.038	-3.240	-0.022
	(0.031)	(6.739)	(0.022)
Treatment × Aligned skill req.	0.008	3.873	0.011
	(0.030)	(3.491)	(0.015)
Aligned skill req.	0.030	-3.297	0.017
	(0.023)	(2.461)	(0.010)
Control mean	-0.000	193.588	0.544
Observations	2770	2770	2770

Earning and employment effects are consistent, but small and noisily estimated.

back

Treatment Aligns Beliefs and Search Direction with Measured Skill (Field Experiment)

	Beliefs		Search direction
	(1) Aligned comp. adv. belief	(2) Fraction aligned beliefs	(3) Aligned search
Treatment	0.139***	0.142***	0.050***
	(0.011)	(0.009)	(0.010)
Control mean	0.196	0.388	0.165
Observations	4118	4195	4205

Beliefs are only measured for three of the six assessed skills.

$\rightarrow$ Measure of comparative advantage does not fully capture changes in beliefs.

Search direction is measured using a qualitative, retrospective survey question over three of the six skills. details

back

Treatment Effects on Variance of Beliefs about Skills

	Average variance in beliefs		Variance numeracy beliefs		Variance communication beliefs	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.049	-0.071	-0.029	-0.062	-0.068	-0.080
	(0.054)	(0.077)	(0.058)	(0.087)	(0.055)	(0.076)
Treatment × Aligned comp adv belief (bl)		0.056		0.077		0.036
		(0.129)		(0.147)		(0.129)
Aligned comp adv belief (bl)		-0.148		-0.145		-0.152
		(0.095)		(0.101)		(0.099)
Treatment effect: Aligned comp adv belief (bl)		-0.015		0.014		-0.045
		(0.089)		(0.098)		(0.092)
Control mean	0.644	0.644	0.679	0.679	0.609	0.609
Observations	278	278	278	278	278	278

The average variance of beliefs decreases by 8% of the control group mean (insignificant).

back

Treatment Aligns Beliefs and Search Direction with Measured Skill (Field Experiment) - Heterogeneity by Prior

	Beliefs		Search direction
	(1) Aligned comp. adv. belief	(2) Fraction aligned beliefs	(3) Aligned search
Treatment	0.142***	0.134***	0.060***
	(0.011)	(0.009)	(0.012)
Treatment × Aligned comp adv belief (bl)	-0.014	0.043**	-0.057*
	(0.036)	(0.020)	(0.032)
Aligned comp adv belief (bl)	0.157***	-0.008	-0.013
	(0.027)	(0.013)	(0.024)
Treatment effect: Aligned comp adv belief (bl)	0.129***	0.177***	0.003
	(0.034)	(0.020)	(0.028)
Control mean	0.196	0.388	0.165
Observations	4118	4131	4131

back

Job Seekers Understand Relative Skill Requirements

	(1) Average	(2) Job pair 1	(3) Job pair 2	(4) Job pair 3	(5) Job pair 4	(6) Job pair 5
Panel A: Restricted sample						
Δ Skill differential	2.470***	2.292***	2.079***	2.264***	2.458***	3.256***
	(0.144)	(0.248)	(0.200)	(0.229)	(0.189)	(0.222)
Observations	277	277	277	277	277	277

We elicit perceived skill requirements S_k^j for each job j on two skill dimensions $k \in num, comm$ and calculate the difference as $(S_{num}^{num} - S_{comm}^{num}) - (S_{num}^{comm} - S_{comm}^{comm})$.

$\rightarrow$ Positive values indicate that jobseekers perceive relative skill requirements in line with the coding of our experts.

back

Revealing Skill Demand Increases Effect on Search Direction

	Choice aligned with comparative advantage	
	(1) Misaligned baseline beliefs	(2) Aligned baseline beliefs
Treatment	0.039	0.023
	(0.032)	(0.034)
Treatment × Skill req. revealed	0.130**	-0.114
	(0.063)	(0.085)
Treatment effect: Skill req. revealed	0.169***	-0.091
	(0.060)	(0.077)
Control mean	0.413	0.413
Observations	1573	1485

back

Heterogeneity by aligned baseline beliefs

	Work quantity					Work quality			
	(1) Index	(2) Job offers (w)	(3) Worked month 1	(4) Worked month 2	(5) Worked last 7 days	(6) Index	(7) Earnings (w)	(8) Hourly wage (w)	(9) Written contract
Treatment	0.065*	0.036	0.037**	0.009	0.013	0.097**	7.467**	0.355**	0.018
	(0.035)	(0.024)	(0.015)	(0.018)	(0.014)	(0.041)	(3.230)	(0.149)	(0.011)
Treatment × Aligned comp adv belief (bl)	-0.079	-0.023	-0.057	-0.015	-0.017	-0.054	-4.697	-0.304	-0.002
	(0.075)	(0.044)	(0.042)	(0.034)	(0.031)	(0.062)	(5.261)	(0.251)	(0.022)
Aligned comp adv belief (bl)	0.053	0.009	0.045	0.018	-0.014	-0.004	2.796	0.244	-0.023
	(0.055)	(0.032)	(0.028)	(0.024)	(0.019)	(0.044)	(3.577)	(0.178)	(0.015)
Treatment effect: Aligned comp adv belief (bl)	-0.015	0.013	-0.019	-0.006	-0.004	0.043	2.770	0.051	0.016
	(0.069)	(0.043)	(0.038)	(0.029)	(0.027)	(0.048)	(4.140)	(0.219)	(0.018)
Control mean	-0.000	0.195	0.465	0.437	0.309	0.000	25.424	1.267	0.120
Observations	4131	4071	4127	4130	4130	4132	4122	4111	4111

The effects are substantially smaller for individuals with initially aligned comparative advantage beliefs.

back

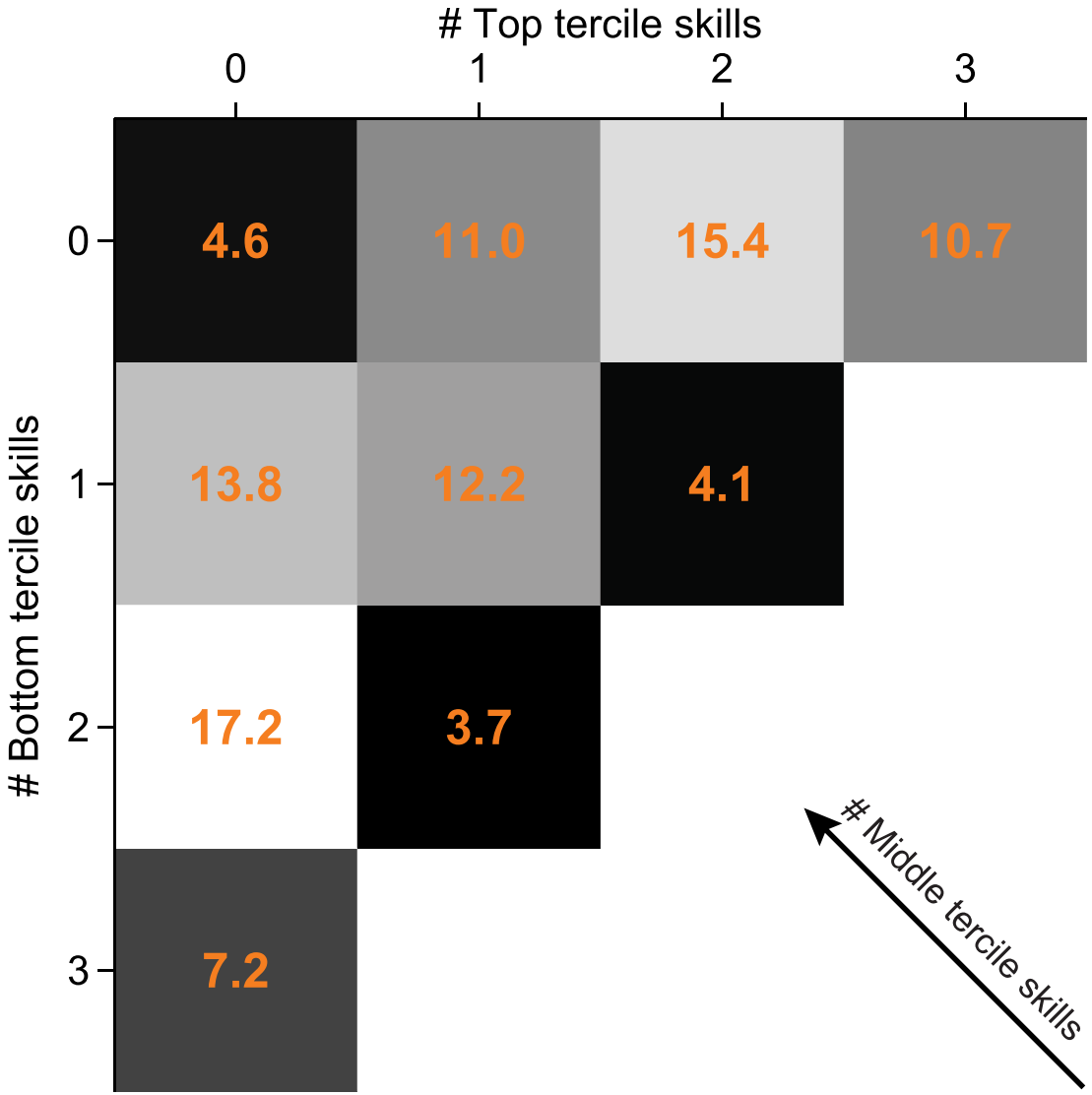
Effects are driven by wage jobs started after treatment

	Earnings (w)					Written contract	
	(1) Start before treatment	(2) Start after treatment	(3) Tenure	(4) Wage employment	(5) Self employment	(6) Start before treatment	(7) Start after treatment
Treatment	1.985*	4.607**	10.303	6.923***	-0.405	0.003	0.014
	(1.072)	(2.237)	(8.297)	(2.562)	(0.694)	(0.004)	(0.010)
Control mean	4.164	21.095	51.369	18.463	4.184	0.018	0.102
Observations	4176	4176	4173	4174	4174	4184	4184

Outcomes are multiplied with the indicated mediator.

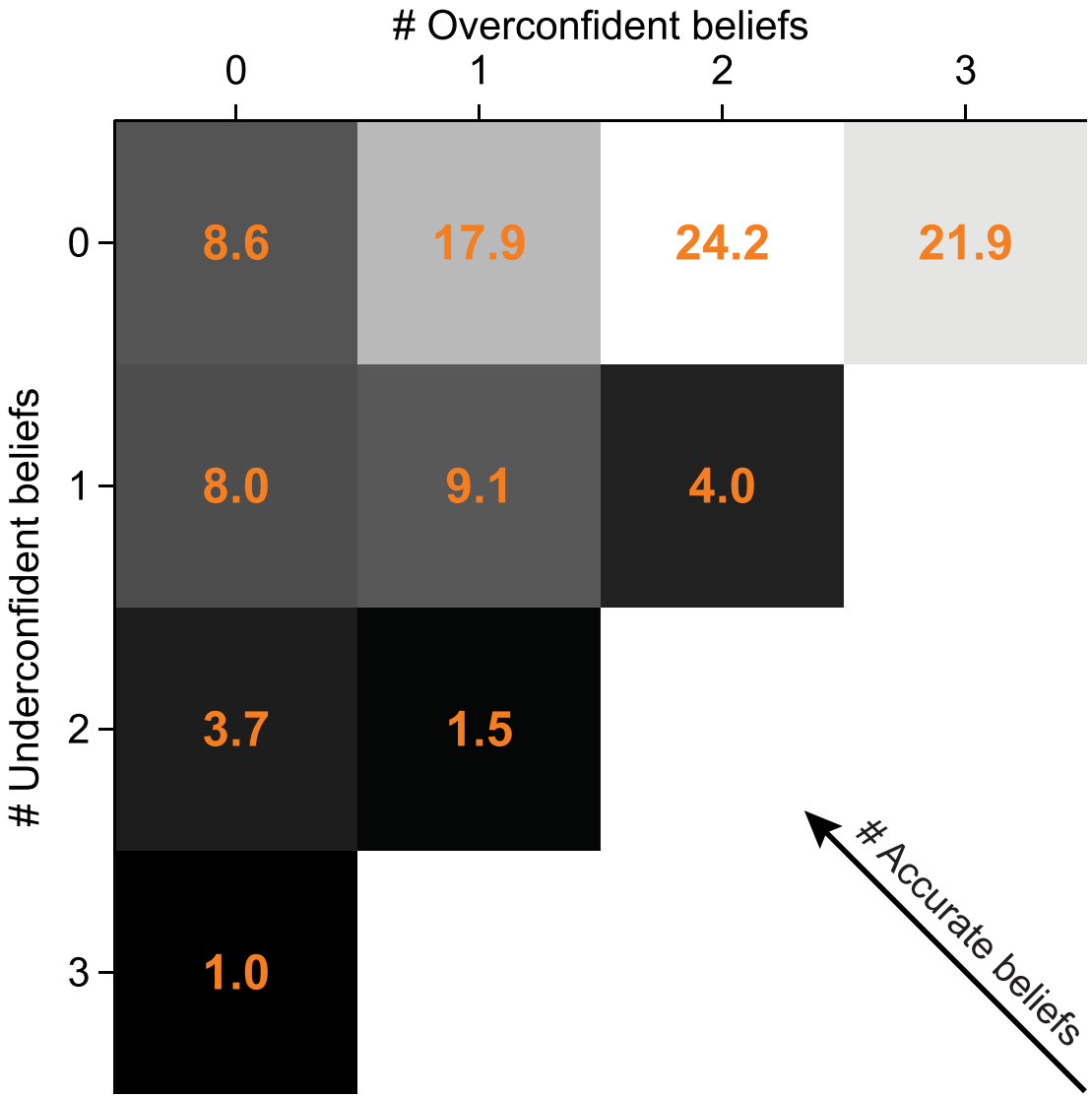
back

Skill Variation Within Individuals



back

Belief Variation Within Individuals



Back

Effects on Employment Quantity Are Limited

	Work quantity				
	(1) Index	(2) Job offers (w)	(3) Worked month 1	(4) Worked month 2	(5) Worked last 7 days
Treatment	0.045	0.015	**0.023***	0.007	0.009
	(0.032)	(0.017)	(0.013)	(0.015)	(0.013)
Control mean	-0.000	0.182	0.465	0.437	0.309
Observations	4205	4140	4201	4204	4204

Treated jobseekers **find jobs slightly earlier**.

There is no measurable effect on employment after 2-3 months.

back

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- Relative wages & offer probabilities predict job choices. results

Jobseekers partly observe jobs' skill requirements

- Jobseekers' assessments of jobs' skill demand correlate with expert assessments. results
- Treatment effects on search direction are stronger when skill requirements are revealed. results

back

Summary Statistics

	Mean	SD	Obs.
Demographics			
Black African	0.92	0.27	4389
Male	0.38	0.48	4389
Age	23.67	3.28	4389
Completed secondary education only	0.61	0.49	4389
Any other post-secondary qualification	0.22	0.41	4389
University degree / diploma	0.17	0.37	4389
Labor market background			
Did any search in past 7 days	0.97	0.17	4389
Worked in past 7 days	0.37	0.48	4389
Earnings from all jobs in last 7 days conditional on having job	596.62	795.50	1324
Has worked in permanent wage job before	0.09	0.29	4377
Skills and beliefs			
Average skill tercile (0 to 2)	1.02	0.60	4389
% accurate beliefs (out of 3)	0.38	0.31	4378
% overconfident beliefs (out of 3)	0.50	0.35	4378
% underconfident beliefs (out of 3)	0.12	0.21	4378
Aligned belief about comparative advantage	0.20	0.40	4312

◂ design

Balance table

	Restricted sample					Full sample				
	(1) Control	(2) Treatment	(3) Δ	(4) p(Δ = 0)	(5) N	(6) Control	(7) Treatment	(8) Δ	(9) p(Δ = 0)	(10) N
Panel A: Demographics										
Black African	1.00	1.00	0.00	.	278	0.99	0.99	0.01	0.41	372
Male	0.33	0.32	-0.01	0.74	278	0.28	0.29	0.00	0.92	372
Age	26.42	26.40	-0.02	0.84	278	26.89	26.79	-0.09	0.91	372
Completed secondary education only	0.67	0.71	0.04	0.48	278	0.67	0.68	0.01	0.92	372
University degree / diploma	0.09	0.08	-0.01	0.91	278	0.10	0.06	-0.04	0.14	372
Other post-secondary education	0.14	0.14	-0.01	0.61	278	0.14	0.16	0.02	0.40	372
Panel B: Labor market background										
Any work in the last 7 days	0.35	0.31	-0.04	0.41	278	0.35	0.32	-0.03	0.49	372
Has worked in permanent wage job before	0.23	0.27	0.04	0.50	278	0.24	0.27	0.03	0.44	372
Earnings in 2021 USD (last 7 days, winsorized)	46.28	43.53	-2.75	0.85	277	47.45	50.52	3.07	0.69	371
Written contract	0.09	0.16	0.06	0.04	278	0.11	0.18	0.07	0.03	372
Panel C: Search behavior										
Any job search in last 30 days	0.96	0.96	-0.01	0.72	278	0.96	0.96	-0.00	0.90	372
Applications (last 7 days, winsorized)	11.31	8.69	-2.62	0.10	278	11.46	10.49	-0.97	0.54	372
Search expenditure in 2021 USD (last 7 days, winsorized)	23.98	21.47	-2.51	0.25	278	24.42	22.65	-1.77	0.28	372
Hours spent searching (last 7 days, winsorized)	13.75	13.90	0.15	0.92	278	14.06	14.23	0.17	0.88	371
Job offers (last 30 days, winsorized)	0.14	0.21	0.07	0.11	278	0.20	0.23	0.03	0.51	372
Panel D: Search alignment with comparative advantage										
Δ planned apps (w, aligned - misaligned)	0.94	0.53	-0.41	0.55	278	0.57	0.40	-0.17	0.77	372
Δ % platform apps (aligned - misaligned)	-0.00	-0.00	0.00	0.76	278	-0.00	-0.00	0.00	0.77	372
Panel E: Aligned comp. adv. belief										
General skill	0.47	0.50	0.04	0.68	278	0.43	0.46	0.03	0.69	369
Assessment result	0.53	0.54	0.01	0.95	278	0.45	0.46	0.02	0.82	371
Panel F: % aligned beliefs										
Assessment result	0.18	0.15	-0.03	0.34	278	0.15	0.14	-0.02	0.55	371
General skill	0.18	0.26	0.08	0.12	278	0.18	0.24	0.06	0.17	369

back

Balance table

	Full sample					Non-attritted sample				
	(1) Control	(2) Treatment	(3) Δ	(4) p(Δ = 0)	(5) N	(6) Control	(7) Treatment	(8) Δ	(9) p(Δ = 0)	(10) N
Panel A: Demographics										
Black African	0.93	0.91	-0.03	0.34	4389	0.93	0.91	-0.03	0.30	4206
Male	0.39	0.36	-0.03	0.04	4389	0.39	0.36	-0.03	0.03	4206
Age	23.55	23.79	0.29	0.07	4389	23.53	23.80	0.31	0.05	4206
Completed secondary education only	0.62	0.59	-0.04	0.20	4389	0.62	0.59	-0.04	0.17	4206
Any other post-secondary qualification	0.21	0.22	0.01	0.61	4389	0.22	0.23	0.01	0.63	4206
University degree / diploma	0.16	0.18	0.03	0.29	4389	0.15	0.18	0.04	0.24	4206
Panel B: Labor market background										
Worked in past 7 days	0.36	0.39	0.02	0.22	4389	0.36	0.39	0.02	0.19	4206
Earnings in USD (last 7 days, winsorized)	30.09	32.52	3.58	0.13	4389	29.84	32.49	3.79	0.11	4206
Has worked in permanent wage job before	0.09	0.09	-0.01	0.61	4377	0.10	0.09	-0.01	0.35	4195
Panel C: Search behavior										
Did any search in past 7 days	0.97	0.97	0.01	0.07	4389	0.97	0.98	0.01	0.02	4206
# applications (last 30 days, winsorized)	9.31	9.37	0.03	0.95	4346	9.13	9.27	0.13	0.79	4165
Search expenditure in USD (last 7 days, winsorized)	32.09	31.14	-1.11	0.34	3912	32.02	31.15	-0.95	0.42	3747
# job offers (last 30 days, winsorized)	0.77	0.84	0.04	0.64	4335	0.78	0.87	0.07	0.44	4152
Panel D: Skills beliefs										
Aligned belief about comparative advantage	0.20	0.21	0.01	0.49	4312	0.20	0.21	0.01	0.67	4132
% aligned beliefs	0.38	0.38	-0.01	0.49	4378	0.38	0.37	-0.01	0.45	4196

back

Comparison of experimental samples

Table: Big experiment

	(1) Mean	(2) Median	(3) SD	(4) Min	(5) Max	(6) Obs.
Panel A: Demographics						
Black African	0.92	1.00	0.27	0.00	1.00	4389
Male	0.38	0.00	0.48	0.00	1.00	4389
Age	23.67	23.14	3.28	18.04	35.08	4389
Completed secondary education only	0.61	1.00	0.49	0.00	1.00	4389
Any other post-secondary qualification	0.22	0.00	0.41	0.00	1.00	4389
University degree / diploma	0.17	0.00	0.37	0.00	1.00	4389
Panel B: Labor market background						
Worked in past 7 days	0.37	0.00	0.48	0.00	1.00	4389
Earnings in USD (last 7 days, winsorized)	31.26	0.00	75.72	0.00	476.00	4389
Has worked in permanent wage job before	0.09	0.00	0.29	0.00	1.00	4377
Panel C: Search behavior						
Did any search in past 7 days	0.97	1.00	0.17	0.00	1.00	4389
# applications (last 30 days, winsorized)	9.34	5.00	12.85	0.00	90.00	4346
Search expenditure in USD (last 7 days, winsorized)	30.97	20.40	33.05	0.00	204.00	3995
# job offers (last 30 days, winsorized)	0.80	0.00	2.66	0.00	20.00	4335
Panel D: Skills beliefs						
Aligned belief about comparative advantage	0.20	0.00	0.40	0.00	1.00	4312
Fraction of aligned skill beliefs beliefs and assessments	0.38	0.33	0.31	0.00	1.00	4378

Table: Tight experiment

	(1) Mean	(2) Median	(3) Min	(4) Max	(5) SD	(6) Obs.
Panel A: Demographics						
Black African	1.00	1.00	1.00	1.00	0.00	278
Male	0.33	0.00	0.00	1.00	0.47	278
Age	26.41	26.00	18.00	36.00	4.04	278
Completed secondary education only	0.69	1.00	0.00	1.00	0.46	278
University degree / diploma	0.09	0.00	0.00	1.00	0.28	278
Other post-secondary education	0.14	0.00	0.00	1.00	0.35	278
Panel B: Labor market background						
Any work in the last 7 days	0.33	0.00	0.00	1.00	0.47	278
Has worked in permanent wage job before	0.25	0.00	0.00	1.00	0.43	278
Earnings in USD (last 7 days, winsorized)	44.95	0.00	0.00	702.75	102.07	277
Written contract	0.13	0.00	0.00	1.00	0.33	278
Panel C: Search behavior						
Any job search in last 30 days	0.96	1.00	0.00	1.00	0.20	278
Applications (last 7 days, winsorized)	10.00	5.00	0.00	100.00	14.93	278
Search expenditure in USD (last 7 days, winsorized)	22.72	14.00	0.00	126.00	23.72	278
Hours spent searching (last 7 days, winsorized)	13.82	9.00	0.00	72.00	15.00	278
Job offers (last 30 days, winsorized)	0.17	0.00	0.00	3.00	0.52	278

Tight experiment sample is slightly older, more experienced & less educated, matching patterns in provincial survey data.

back

Employer Evaluations Rise With Skill Alignment

	Mean			Difference			Obs.
	(1) Aligned	(2) Non-aligned	(3) SD	(4) Δ	(5) Δ/SD	(6) p($\Delta = 0$)	(7)
Panel A: Skill levels							
Skill (1-5)	2.93	2.79	0.66	0.15	0.22	0.01	277
Panel B: Job-related evaluation							
Overall score (1-5)	3.00	2.84	0.86	0.16	0.18	0.05	277
Interview invitation (dummy)	0.43	0.34	0.49	0.09	0.18	0.07	277

Employers recognize average comparative advantage in skill and rate people as more suitable for jobs that align with their comparative advantage.

back

Framework Extension

jobseekers face a budget constraints $A = Y - P_S \cdot E_C - P_S \cdot E_N$.

The jobseekers' problem then becomes:

$$max_{E_C, E_N} U(V_C(S_C, S_N, E_C), V_N(S_C, S_N, E_N), Y - P_S \cdot E_C - P_S \cdot E_N)$$

All other assumptions remain the same.

The key result is unchanged: search effort is directed towards the skill domain with comparative advantage.

This framework also yields predictions for search effort responses.

details

back

Search effort prediction

If jobseekers' comparative advantage belief is accurate but their belief about skill levels is inaccurate, their total search effort will be distorted.

A rise in the believed level of communication skill S_C raises the believed marginal product of search for communication jobs $\frac{\partial V_C}{\partial E_C}$. This has two effects.

1. **Substitution effect**: the jobseeker to substitute toward search for communication jobs and away from both search for numeracy jobs and alternative activities.
2. **Income effect**: it raises the expected outcome from any given level of search effort, allowing the worker to allocate more money to alternative uses.

$\Rightarrow$ The prediction for total search effort is ambiguous.

$\Rightarrow$ This is parallel to the standard model of labor supply.

back

Mixed Search Effort Results

- **There is no significant overall change in search effort.** big exp. tight exp. tight exp. (platform)

  → Neither has heterogeneity by confidence levels.

- Also, no heterogeneity by confidence levels for labor market effects. results

⇒ Changes in overall **levels of skill beliefs** and total **search effort** do **not** seem to **explain the labor market impacts.**

back

Treatment Does not Reduce Search Effort (Tight Experiment)

	Index		Planned apps (w)		Time spent drafting (w)		SMS click rate		Observed apps (w)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	-0.076	-0.101	-3.854	-3.574	-0.530	-0.377	0.003	-0.055	-1.408	-2.043
	(0.103)	(0.145)	(2.555)	(4.124)	(0.591)	(0.925)	(0.032)	(0.053)	(1.551)	(2.379)
Treatment × Average confidence (bl)		0.019		-0.429		-0.205		0.062		0.617
		(0.111)		(2.936)		(0.771)		(0.045)		(2.068)
Average confidence (bl)		0.196		4.032		1.280		-0.059		1.233
		(0.124)		(2.675)		(0.900)		(0.046)		(1.912)
Control mean	0.000	0.000	37.878	37.878	8.828	8.828	0.635	0.635	15.187	15.187
Observations	278	278	278	278	267	267	278	278	278	278

Average confidence is defined as average believed skill quintile minus average measured skill quintile standardized to have standard deviation one.

→ Positive values indicate overconfidence.

back

Treatment Effects on Platform Search Effort (Tight Experiment)

	Platform search effort index		Days active		Adverts clicked (w)		Observed apps (w)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-0.101	-0.238	-0.723	-1.451**	-0.206	-2.906	-1.463	-2.058
	(0.092)	(0.156)	(0.477)	(0.598)	(1.519)	(3.119)	(1.553)	(2.385)
Treatment × Average confidence (bl)		0.142		0.759		2.848		0.576
		(0.121)		(0.449)		(2.580)		(2.073)
Average confidence (bl)		-0.066		-0.278		-2.303		1.239
		(0.111)		(0.530)		(2.279)		(1.918)
Control mean	-0.000	-0.000	6.014	6.014	9.058	9.058	15.216	15.216
Observations	278	278	278	278	278	278	278	278

Average confidence is defined as average believed skill quintile minus average measured skill quintile standardized to have standard deviation one.

→ Positive values indicate overconfidence.

back

No Treatment Effects on Search Effort (Big Field Experiment)

	Index		Applications (w)		Hours spent searching (w)		Search expenditure (w)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.003	-0.018	0.056	0.010	-0.321	-0.601	0.243	-0.077
	(0.032)	(0.038)	(0.488)	(0.572)	(0.318)	(0.498)	(0.818)	(0.855)
Treatment × Average confidence (bl)		0.030		0.141		0.355		0.493
		(0.036)		(0.464)		(0.490)		(0.675)
Average confidence (bl)		-0.034		-0.073		-0.604		-0.416
		(0.049)		(0.679)		(0.657)		(0.807)
Control mean	-0.000	-0.000	11.716	11.716	11.083	11.083	20.878	20.878
Observations	4205	4131	4184	4111	4198	4124	4196	4122

back

Treatment Effects on Labor Market Outcomes by Confidence Levels

	Work quantity					Work quality			
	(1) Index	(2) Job offers (ihs)	(3) Worked month 1	(4) Worked month 2	(5) Worked last 7 days	(6) Index	(7) Earnings (ihs)	(8) Hourly wage (ihs)	(9) Written contract
Treatment	0.067*	0.022	0.022	0.015	0.009	0.068*	0.137	0.085	0.019
	(0.038)	(0.016)	(0.019)	(0.018)	(0.015)	(0.035)	(0.099)	(0.058)	(0.012)
Treatment × Average confidence	-0.031	-0.016	0.001	-0.006	-0.006	-0.025	-0.007	-0.004	-0.010
	(0.035)	(0.017)	(0.019)	(0.017)	(0.016)	(0.036)	(0.097)	(0.055)	(0.012)
Average confidence	0.013	0.014	0.004	0.031**	-0.025**	-0.022	-0.143*	-0.055	-0.020**
	(0.027)	(0.015)	(0.014)	(0.013)	(0.011)	(0.023)	(0.075)	(0.046)	(0.009)
Control mean	0.000	0.182	0.465	0.437	0.309	0.000	155.163	8.731	0.120
Observations	4190	4179	4186	4189	4189	4191	4179	4168	4169

Suggestive evidence that treatment effects are stronger for people with initially non-aligned comparative advantage beliefs.

back

No significant impact on either self-esteem or skill investments

	Self-esteem				Education Investment		
	(1) SMS (z)	(2) SMS above med.	(3) Endline (z)	(4) Endline above med.	(5) Any	(6) Apprenticeship	(7) Formal
Treatment	0.003	0.012	0.007	0.012	0.017	0.006	0.014
	(0.009)	(0.015)	(0.022)	(0.015)	(0.012)	(0.005)	(0.011)
Observations	-0.000	0.483	0.000	0.471	0.224	0.036	0.185
Control mean	3334	3334	4206	4206	4205	4205	4205

Average treatment effects are all close to zero.

back

Treatment Effects by whether jobseekers used report with application

	Work quantity					Work quality			
	(1) Index	(2) Job offers (w)	(3) Worked month 1	(4) Worked month 2	(5) Worked last 7 days	(6) Index	(7) Earnings (w)	(8) Hourly wage (w)	(9) Written contract
Treatment	0.068*	0.040	0.033**	0.018	0.014	0.110***	8.572***	0.359**	0.023**
	(0.039)	(0.027)	(0.016)	(0.018)	(0.016)	(0.039)	(3.020)	(0.143)	(0.011)
Treatment × Attached report w. application	-0.066	-0.038	-0.021	-0.039	-0.013	-0.071	-5.108	-0.179	-0.019
	(0.049)	(0.038)	(0.022)	(0.024)	(0.024)	(0.058)	(4.229)	(0.211)	(0.017)
Observations	-0.000	0.195	0.465	0.437	0.309	0.000	25.424	1.267	0.120
Number of clusters	3992	3933	3988	3991	3991	3993	3983	3971	3971

Treatment effects on labor market outcomes are not driven by report use.

back

There are limited impacts on willingness to pay for skill investments

	Numeracy materials						Communication materials					
	(1) Pooled	(2) Pooled	(3) Num. CA	(4) Num. CA	(5) Comm. CA	(6) Comm. CA	(7) Pooled	(8) Pooled	(9) Num. CA	(10) Num. CA	(11) Comm. CA	(12) Comm. CA
Treatment	-13.410***	-15.309**	-14.527*	-20.583**	-10.046**	-3.217	-0.822	-0.247	5.252	-2.571	-3.821	3.862
	(3.539)	(6.775)	(8.049)	(8.944)	(3.898)	(11.201)	(3.790)	(6.747)	(9.785)	(12.162)	(5.882)	(11.719)
Treatment × Aligned comp adv belief (bl)		5.019		36.732**		-9.825		-0.847		45.821**		-11.987
		(11.915)		(15.806)		(16.400)		(10.474)		(21.394)		(14.833)
Aligned comp adv belief (bl)		-14.744		-38.444***		-4.144		-3.753		-43.991***		7.831
		(8.948)		(11.399)		(11.074)		(9.163)		(11.637)		(10.853)
Treatment effect: Aligned comp adv belief (bl)		-10.290		16.149		-13.042*		-1.094		43.251**		-8.125
		(7.268)		(14.781)		(7.247)		(6.130)		(16.512)		(7.682)
Control mean	54.964	54.964	55.408	55.408	54.722	54.722	48.327	48.327	49.184	49.184	47.861	47.861
Observations	277	277	105	105	172	172	277	277	105	105	172	172

Some evidence of a *reduction* of investments in numeracy skills.

Back