Discrimination and the Stigma of Mental Illness*

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Abstract

People with depression and anxiety, the most common mental illnesses, often keep their condition secret at work, which may contribute to negative stereotypes and low rates of treatment-seeking. This is often attributed to discrimination or other negative reactions to revealing. But we know little about the actual causal effects of revealing mental illness or what does drive the decision to hide it. Using an online experiment with a simple communication-based navigation task, I find evidence for substantial non-statistical discrimination against depressed or anxious coworkers: people pay up to 40% of their task earnings to avoid them, despite doing no worse when exogenously paired with such workers. However, there are offsetting benefits to revealing: revealing the most severe symptoms induces in-task reactions from the coworker that raise the team’s productivity. In other words, people appear to help mental illness sufferers when they have to but will avoid having to do so. In spite of a net benefit or low net cost to revealing in my setting, depressed or anxious people pay large amounts to stop others from being shown their symptoms. This preference persists even when others cannot use the information to discriminate, suggesting a stigma that runs deeper than fear of discrimination.

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1 Introduction

As many as 4 in 10 Americans will experience depression or anxiety—the most common types of mental illness—in their lifetime, with large penalties to earnings and productivity (Biasi et al., 2019; Kessler et al., 2012; Greenberg et al., 2015). While there is a growing body of evidence of a causal relationship between mental and economic well-being, the precise underlying mechanisms remain poorly understood (Ridley et al., 2020). A major issue may be the fact that people often keep these disorders secret, which can inhibit treatment seeking, make it hard to provide accommodations at work, and perpetuate negative stereotypes. This secrecy is often attributed to a fear of discrimination or other negative attributes. The general public often misunderstand depression and anxiety (Jorm, 2000, 2012) and managers, for instance, prefer not to hire or interact with affected individuals (Brohan et al., 2012; Mendel et al., 2015). People with these conditions perceive discrimination too: 45% of depressed people in high-income countries, per one survey, as compared with 18% of African Americans who report experiencing race-based discrimination in the workplace (Lloyd, 2021).1

However, there is little quantitative evidence on the causal effects of revealing depression or anxiety to others at work, or on how this relates to the preference to hide depression and anxiety symptoms from others. While existing survey evidence has examined the qualitative preference to have hypothetical depressed coworkers, and the experience of depressed or anxious workers whose condition may be endogenously revealed or hidden, there is little evidence on what the causal effect of a person revealing their mental illness to coworkers could be. Similarly, there is little evidence quantifying the preference to hide mental illness—what cost would people pay?—or measuring this in the same setting as the effect of revealing mental illness.

To investigate these issues, I conduct an online experiment in which people collaborate on a simple communication task and see information about their coworker. In this setting, I ask two sets of research questions: Firstly, how does revealing a person’s symptoms of depression or anxiety affect the demand to work with them and behavior when working with them, and why? Secondly, how much will people pay to keep symptoms hidden from coworkers, how does this correspond to the cost of revealing them, and is it explained by fear of discrimination?

The work task is done in pairs, in which one person guides another who has been virtually ‘dropped’ in New York to a nearby destination for a joint reward. The task is intended to capture features important in many jobs without requiring special skills: participants need to communicate clearly and employ reasoning, teamwork and perseverance to succeed. Participants are recruited on and do the task on Amazon Mechanical Turk, a ‘gig economy’ site on which many people work as a full-time job or as an important supplement to other income. The task requires a significant investment of time relative to other tasks on the site, with

performance-based pay as a significant component of compensation: thus, there is a strong incentive to treat it as ‘real work’ and care about your coworker.

To study the demand for depressed or anxious coworkers, I provide one participant in each pair with a (truthful) ‘profile’ of their assigned coworker, derived from a survey conducted up to one week prior to the task.\(^2\) I then vary whether this profile reveals information about the coworker’s mental health. The information revealed constitutes either the coworker’s recent symptoms of depression or their recent symptoms of anxiety, in the form of their answers to one of two two-question surveys, the PHQ-2 and GAD-2. These are validated and commonly self-administered survey instruments which ask in plain English about the most common symptoms of major depressive disorder and generalized anxiety disorder respectively (Kroenke et al., 2003, 2007).\(^3\) Embedding this information in a larger profile mitigates potential experimenter demand effects from making these unusually salient: the mental health symptoms are revealed as part of an apparently arbitrary selection of baseline survey answers that includes answers on personality and political party, among others. Using an incentive-compatible BDM mechanism (Becker et al., 1964), I then elicit willingness to pay to work with the coworker whose profile was shown, compared to being randomly rematched to the next available coworker.

Demand for depressed or anxious coworkers is significantly lower than for workers with no revealed symptoms. All else equal, participants pay 40\% of average task earnings \((p < 0.01)\) to avoid coworkers with severe symptoms and 33\% \((p < 0.01)\) to avoid coworkers with moderate symptoms of either disorder, where moderate symptoms or worse indicates a likely clinical diagnosis (Kroenke and Spitzer, 2002). This holds both conditional and unconditional on the other profile information. Participants do not respond significantly to more mild symptoms, and treat an absence of mental health information the same as revealing an absence of symptoms.

The discrimination against depression or anxiety symptoms is sizeable compared to the effect of revealing other information on willingness to pay. It is larger than the 28\% of earnings that participants will pay for college-educated coworkers, and the 20\% that participants will pay to avoid someone who agrees that they ‘find fault with others’, a perhaps more relevant and obviously negative personality trait. Meanwhile, participants care significantly more about the coworker’s depression or anxiety than their age, imagination, or political party, none of which have a significant effect on willingness to pay.

This preference does not appear to constitute statistical discrimination: people with moderate or severe symptoms are not actually less productive coworkers. Using exogenous variation in pair assignment, I find that depression or anxiety symptoms do not predict a measure of production.

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\(^2\)The survey was conducted one to seven days before, depending on the person in question.

\(^3\)The PHQ-2 asks how often in the past two weeks the respondent ‘felt little interest or pleasure in doing things’ or felt ‘down, depressed or hopeless’; the GAD-2 how often they ‘felt nervous, anxious or on-edge’ or were not ‘able to stop or control worrying’. The surveys were designed to be administered by lay people or self-administered.
‘productivity’ I construct—task earnings minus the opportunity cost (at MTurk wages) of time spent—intended to reflect how much an earnings-maximizing MTurker would pay for a given coworker. The gap between effects on demand and productivity is much larger for depression and anxiety than for most other characteristics.

In contrast to this discrimination prior to starting the task, participants appear to take actions during the task which benefit their coworkers with severe symptoms. Conditional on a coworker having severe symptoms, revealing these significantly increases productivity in the task itself ($p = 0.02$), which counteracts a negative correlation with productivity when the symptoms are not revealed. There is no effect of revealing mild or moderate symptoms. This positive ‘in-task discrimination’ does not come from greater effort as measured by time spent or messages sent; I speculate that participants may positively change how they talk to their coworker.

In light of these effects, I investigate the willingness to hide depression or anxiety symptoms from others. After participants have played two rounds of the task, I elicit each person’s willingness to pay to include or exclude different pieces of information from their profile if it is shown. Among these pieces of information are either their depression symptoms, or their anxiety symptoms (the other being not shown if the choices are implemented). Participants’ choices are incentivized using a Becker-deGroot-Marschak mechanism which they know will be implemented whenever the other coworker’s willingness to pay mechanism is also implemented. Thus, they make these choices knowing they could affect whether others choose to work with them.

I find a sizable willingness to pay to hide any symptoms of depression or anxiety – even mild ones – from potential coworkers. On average, participants will forego a bonus of 40% of average task earnings to hide the fact that they have experienced any symptoms at all in the past two weeks. They will pay almost 50% to reveal the other possibility, that they experienced no symptoms at all. This stands in stark contrast to participants’ attitudes to other information, where they are mostly happy to reveal it even when it may lead to discrimination. Participants were also asked about their willingness to reveal their age bracket, experience on MTurk, political affiliation, and two aspects of their personality: how much they find fault with others, and whether they have an active imagination. In general, participants have a positive willingness to pay to reveal all of this information, with the exception of the fact that they find fault with others, though the willingness to pay to hide this is significantly lower – less than half as much – than for depression and anxiety symptoms ($p < 0.01$).

Fear of discrimination does not appear to explain the willingness to hide depression or anxiety symptoms. Participants pay just as much ($p = 0.46$) to hide symptoms in a subsequent round where this decision could not affect discrimination by coworkers. This round was done by a subsample of participants after the rest of the experiment; it was the same as previous rounds except that the elicitation mechanism for what to reveal was implemented only when
the other person’s choice-of-coworker mechanism was not, and there was also no bonus for success. Furthermore, participants’ willingness to pay to hide is not consistent with the overall expected costs or benefits of revealing mental illness symptoms in my setting. Taking all effects into account, I estimate approximately a zero effect on expected earnings of revealing mild or moderate symptoms (as most coworkers are rematched if rejected). I estimate a positive effect of revealing severe symptoms on expected earnings, of about $0.51 or 25% of average in-task earnings, due to the positive in-task effects on productivity of revealing this.

I can also investigate the mechanisms behind the discrimination in my experiment. I find some evidence that preferences, i.e. the taste for interacting with depressed or anxious people, may be more important than beliefs about their ability. In a survey after the first two rounds, I directly elicit (incentivized) subjective beliefs about the performance of workers with different profiles. People expect those with moderate or severe depression/anxiety symptoms to be somewhat less likely to find the location, translating into 8% lower expected earnings, but this effect is small and not significantly different from the actual earnings correlation. Meanwhile, in a follow-up round with no financial reward for success (such that beliefs about coworker ability would matter less), participants have a similar willingness to pay to avoid depressed or anxious people as in earlier rounds. Two important caveats, however, are that I do not measure beliefs before the first two rounds when most discrimination takes place, and the no-reward results have low statistical power.

Finally, my results contain some signs that mental health discrimination is not a deeply ingrained preference. Discrimination against those with moderate symptoms decreases significantly with experience in the task ($p < 0.01$), though I cannot rule out economically significant discrimination persisting throughout. This is more to do with beliefs about the task than depressed or anxious people specifically, as the decrease is not mediated by actually working with a (revealed) depressed or anxious worker in earlier rounds. Participants are not just deciding that their coworker does not matter: other discriminatory preferences not backed up by productivity persist, such as a preference in favor of the college-educated. Overall, this suggests that such prejudice as may exist against depressed or anxious people is more malleable and less deep-seated than other preferences over who one interacts with.

Overall, my results suggest that discrimination against those with symptoms of depression or anxiety may happen, and this is to some extent ‘non-statistical’, imposing efficiency costs. But there is also an intrinsic preference to hide mental health symptoms from a coworker irrespective of expected discrimination, that may be more costly. This preference is all the more striking given that in my setting, participants only interact anonymously with the coworker for 20 to 40 minutes—and they were willing to reveal the very same symptoms to the experimenter in the baseline survey. For policy, my results suggest that reducing mental health discrimination in work environments could be good for economic efficiency, but also that it may not be sufficient to achieve openness about mental illness in workplaces.
My work contributes to three strands of literature. First, it adds to work seeking to understand the relationship between mental health and economic outcomes (Ridley et al., 2020; Lund et al., 2019; Angelucci and Bennett, 2021). I build on a small amount of previous work taking an ‘economic’ approach to investigating discrimination (Baldwin and Marcus, 2011; Deuchert et al., 2013), by constructing a setting in which I can experimentally separate the effect of mental illness on demand for a coworker from other factors and measure productivity precisely. I show that people pay not to work together with depressed or anxious people on a relatively short, uncomplicated work task at which they do no worse. This suggests, for those who cannot or choose not to hide symptoms at work, discrimination may independently worsen economic outcomes above and beyond direct effects of these disorders.

Secondly, I contribute to the economic literature on discrimination by extending it to a domain—mental health—that economists have little studied previously. I find evidence that in this domain, as in many others, discrimination is not purely statistical. I also contribute to the nascent literature on discrimination when characteristics may be concealed (Alston, 2019).

Thirdly, I contribute to the literature on stigma and the revelation of mental health status. Many organizations and policymakers regard increasing openness about mental health as an important goal in itself, particularly as it may help to dispel myths and lead more people to get treatment. I provide (perhaps dispiriting) evidence on the depth of the stigma that would need to be overcome: people hide mental health even in short, anonymous interactions for the purpose of completing a work task. Moreover, this stigma is not just explained by a fear of discrimination.

I also contribute to the economic understanding of stigma by providing evidence on the selection into revealing: willingness to pay to hide symptoms is largely not correlated with their severity or one’s ability. This evidence on selection (or the lack of it) could be useful to understanding how beliefs about mental health are formed and how this might change if more people are induced to reveal mental health. Finally, my result that people will incur costs to keep mental health secret raises the question of whether they might do the same in other settings, for instance, enduring the psychological cost of ‘lying’, or not applying for jobs requiring medical evaluations.

2 Experimental Design

Figure 1 shows the complete timeline of the experiment. The experiment involves four rounds of an online, collaborative communication task, in which one coworker must get information from another and guide them virtually to a destination on a streetview-like interface.

When two participants are paired, one participant sees a profile of their potential coworker containing information from a previous survey. They then report their (positive or negative) willingness to pay to work with this person rather than be rematched to the next available
person. With 80% chance, their choices are not implemented and they work with this person regardless, so that I can investigate productivity correlations uncontaminated by selection bias. To measure willingness to reveal mental health, between rounds of the task, I elicit the willingness to pay to add or remove information about oneself from the profile that will be shown to potential coworkers (and that they may use to discriminate).

Each element of the timeline was posted as a separate HIT (“Human Intelligence Task”) on MTurk. After taking the baseline survey, participants first have the task explained to them and practice an individual version. Second, they do two rounds of the task. Thirdly, participants answer a survey in which they report willingness to pay to hide or reveal information to potential future coworkers and report beliefs about the performance of other participants. Finally, they do two more rounds of the task.4

2.1 Baseline Survey: Measuring mental health and worker characteristics

All information on participants’ mental health and other characteristics was elicited in a baseline survey that participants answered before enrollment in the experiment. I measured mental health with two questionnaires, the PHQ-2 and GAD-2 (Kroenke et al., 2003, 2007). The PHQ-2 was designed to ask respondents about the two most diagnostic symptoms of major depressive disorder. It asks two questions: how often in the past two weeks the respondent has felt ‘down, depressed or hopeless’, and how often in the past two weeks they felt ‘little interest or pleasure in doing things’. The GAD-2 measures anxiety and similarly asks how often in the past two weeks they felt ‘nervous, anxious or on edge’ or were unable ‘to stop or control worrying’. Each question in each survey has four possible answers: ‘not at all’, ‘several days’, ‘more than half the days’, and ‘nearly every day’.

Respondents to the PHQ-2 and GAD-2 are typically assigned a score based on their answers, with higher scores denoting worse symptoms. Each answer of ‘not at all’ scores 0, ‘several days’ scores 1, ‘more than half the days’ scores 2 and ‘nearly every day’ scores 3. This means that participants’ scores on each survey range from 0 to 6. A score of 3 or above is typically used as the cutoff point for concluding that major depressive disorder (for the PHQ) or generalized anxiety disorder (for the GAD) is likely.

I define mild, moderate and severe symptoms based on participants’ PHQ-2 and GAD-2 scores. For a given survey (PHQ-2 or GAD-2), I define ‘no symptoms’ to mean a score of 0, ‘mild symptoms’ to mean a score of 1 or 2, ‘moderate symptoms’ to mean 3 or 4, and ‘severe symptoms’ to mean 5 or 6. I use these definitions throughout the paper. This is not intended to follow clinical practice, though the clinical cutoff for likely diagnosis (3) lines up with ‘moderate or severe’ symptoms; instead, it straightforwardly condenses a large number of possible combinations of answers.

4The baseline survey was implemented in Qualtrics and posted on MTurk using CloudResearch (Litman et al., 2017). The other surveys were implemented using oTree (Chen et al., 2016).
The baseline survey also contained a large number of other questions which enabled me both to construct the rest of coworkers’ profiles and conceal the purpose of the baseline survey. Beyond basic demographics (gender and age), I asked about respondents’ personality using the ten-question ‘Big Five Inventory’ (Rammstedt and John, 2007), their past experience on MTurk (approximate number of HITs completed), physical health (how often they exercise, their height and weight), their political party and their moral values (Graham et al., 2009).

I took several steps in the survey design to address the concern that participants might lie in the baseline survey in order to improve their chances of being selected for the main experiment. The baseline survey was posted as a separate HIT, and the HITs that form the subsequent experiment are only visible to participants who have completed the survey. Participants taking the survey are told nothing about the subsequent experiment, except that the consent form mentions that the survey is ‘Part 1’ of a study and future parts may use the information collected.\(^5\) Finally, the writing task included to test English skills also mitigates this concern as it appeared directly relevant to the subsequent experiment. The task was to give directions between two points on a map. If participants knew about the study that the baseline survey might qualify them for, a natural conclusion would be that qualification was on the basis of this writing question, which might lead them to think they had less reason to lie elsewhere.\(^6\)

I also directly confirm with a separate survey that participants did not on average inflate or conceal their depression or anxiety to improve their chance of being selected. I ran this survey during the same time period with a separate sample, using the same eligibility criteria as the baseline survey. I told respondents to this survey (truthfully) that there would be no subsequent HITs available for them and their answers would not be used except as context for ‘another study’. I find almost identical rates of depression and anxiety (moderate or severe symptoms) in this supplemental sample as I do in the main sample (29.9% in the supplemental survey vs 30.0% in the main sample, \(p = 0.97\)).

### 2.2 Experimental task

The work task is borrowed with some modifications from de Vries et al. (2018), who also ran this task on MTurk. The task is implemented using the ParlAI software package (Miller et al., 2017). Participants complete a communication task in pairs, which involves navigating virtually to a location in New York City. One coworker in each pair plays the role of a ‘tourist’, while the other plays a ‘guide’.

Figures 1(a) and 1(b) show what the task looks like to each coworker. At the start of the work task, participants are told:

\(^5\)I feared that participants would regard it as dishonest if I did not at least say this. Participants went through a further informed consent procedure for the subsequent experiment before beginning it.

\(^6\)I did clarify that the task was only to test English fluency, but nonetheless most people put effort into giving good directions.
task, the coworker playing the tourist sees a picture of a real corner of an intersection in New York. They can move around from this spot between the different corners of four intersections, arranged in a 2x2 grid (hence 16 different locations in all). In a chat window on the right, they can talk to their guide. The guide has a simplified map of the four intersections, with a destination marked at one corner (that only they see). The common goal is to get the tourist to the destination on the guide’s map.

To complete the task and earn a joint payoff, the guide must click a button to confirm the tourist’s arrival. The guide has three chances to check if the tourist has arrived. If they arrive on the first try, both coworkers earn $2; if they arrive on the second try, they each earn $1.20, and on the third try they each earn $0.40. After three unsuccessful attempts, the round ends. There are two other ways the round can end. Firstly, if the guide and tourist have tried for 10 minutes or more without success, a ‘give up’ button will appear which either can press at any time to end the round. In this case both coworkers continue on the next round. Secondly, as is unavoidable with any online task, either player can disconnect from the task, by choosing to ‘return’ the HIT on MTurk or simply ending their browser session. In this case the person who disconnects forfeits any earnings from that HIT.\textsuperscript{7}

The task requires clear communication for success. The challenge is that the tourist cannot see the map and does not know the destination, while the guide cannot see where the tourist is at any time. The harder part of the task is usually figuring out where the tourist is and which direction they are facing; once this is clear, navigating to the destination is simpler as it can only be a maximum of two intersections away. Typically the tourist must move around to find recognizable landmarks (such as restaurants with visible names) that are on the guide’s map and orient themselves with respect to these. This can require educated guesswork as the images are not always clear. Then, the guide must give the tourist directions to the destination and check they have arrived before clicking the button.

\subsection*{2.3 Coworker assignment and balance}

Participants do two HITs involving the task above (HITs 3 and 5 in Figure 1), each containing two rounds of the task. When a participant starts each HIT, they first read through a set of instructions reminding them about the task. They then enter a waiting pool and are paired up on a first-come-first-serve basis with the next person to enter. Participants are sorted into guide and tourist roles after being paired together. They then do up to two rounds with this same coworker.

To ensure that assignment was quasi-random under this scheme (and to reduce waiting times), participants completed the HITs in batches: the HITs were posted at specific times and advertised in advance so that several people showed up together. Typically, 10 to 30 people

\textsuperscript{7}The other person either gets re-matched to the next available coworker or finishes the HIT and gets their participation fee, depending on how long they have spent.
showed up to a given posting. Thus, differences of a few minutes or seconds would determine who was matched together within a batch. If a participant’s willingness to pay decision was implemented and this resulted in rejecting a potential coworker, they were matched to the next available potential coworker and willingness to pay was elicited again.

2.4 Revealing mental health information in worker ‘profiles’

When two participants are first assigned into a pair, the participant who will be the guide is shown a profile of their newly assigned coworker (their prospective tourist). For a random 50% of pairs, this profile includes either the coworker’s PHQ-2 answers (depression) or their GAD-2 answers (anxiety). Otherwise it includes no mental health information. If participants show moderate or severe symptoms in one set of answers but not the other (e.g. in the PHQ-2 but not the GAD-2), I reveal that set of answers when one is shown. Otherwise I choose which set randomly. This was to improve statistical power by increasing the proportion of profiles that revealed moderate or severe symptoms.

The profile remains on screen while participants report their willingness to pay and throughout the task, as shown in Figure 1(b). The other participant – the prospective tourist – does not see a profile of the guide who is choosing them. They also do not know what information has been included in their profile which the guide is seeing.

Figure A.2 shows examples of profiles with and without mental health information. Profiles always include the coworker’s gender and education. Each profile also includes 0 to 5 other characteristics, randomly chosen from: age bracket, experience on MTurk (number of HITs), political affiliation, and two personality questions. The personality questions ask whether the person agrees that they ‘tend to find fault with others’ and whether they agree that they ‘have an active imagination’. Each of these questions had 5 possible answers ranging from ‘strongly disagree’ to ‘strongly agree’. This was chosen to be a deliberately slightly eclectic list of characteristics so that mental health would not stick out too much to participants.

To aid interpretation of my estimates, the depression or anxiety information does not replace other characteristics on average but is added as ‘extra’ information on top. In other words, the amount of other information in the profile has the same distribution for profiles that reveal mental health information as for profiles that do not. I randomize the order in which the characteristics appear in the profile.

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8Note that I directly show both questions and the coworker’s answers to them, not the score or any summary of the symptoms, so it is up to the participant how to interpret these answers.

9This change to the design was implemented after a small number of observations had already been collected. Before that, the choice was always random.
2.5 Eliciting willingness to pay for coworkers

Participants assigned to be guides report their willingness to pay to work with their assigned coworker rather than be rematched. Being rematched means returning to the pool of participants waiting for coworkers and getting the next available one.

To elicit willingness to pay I first ask the prospective guide which option they would prefer (work with this coworker, or be rematched) and then ask how much they are willing to pay for this option. More precisely, I use the two-step process shown in Figure A.3. Step 1 gives the prospective guide a direct choice: work with this tourist, or be rematched. Step 2 then asks them for the minimum bonus payment that would induce them to take the other option. They can report any (positive) number up to $2.50. In this second step, I (re-)explain the elicitation mechanism and how their choice will be used.\(^\text{10}\)

This procedure generates a willingness to pay (WTP) for the assigned coworker between -$2.50 and $2.50. The WTP is negative when the participant preferred to get someone else in step 1. For instance, if the participant said they would prefer this coworker and a bonus of $1 or more would change their mind, I code their willingness to pay as $1; if they would prefer to be rematched and a bonus of $1 would change their mind I code willingness to pay as -$1.

To ensure incentive compatibility, participants’ choices are implemented with 20% probability using the following mechanism. At random, the computer selects one option—either ‘work with this coworker’ or ‘be rematched’. It also selects a random bonus between $0 and $2.50. If the selected option is what the participant preferred in step 1, they get the selected option plus the bonus. If the selected option is not what the participant preferred, I compare the bonus to their step 2 answer: the minimum bonus that would make them switch. If the bonus is less than their answer, they keep their preferred option but forego the bonus. If the bonus is greater than their answer, they get the computer’s selected option (i.e., the one they did not prefer) and the bonus.

It is intuitive that this procedure is incentive-compatible, which I formally show in Appendix A.3. Conditional on reporting truthfully in step 1, participants have no incentive to lie about their willingness to pay in step 2: this could only mean that they get a bonus when they would rather stick with their preferred option or vice-versa. Reporting truthfully in step 1 is also incentive compatible. If a participant lies in stage 1, they are worse off when the computer selects the option they actually don’t prefer, because they are obliged to accept it even when the bonus is below their WTP, and they are no better off when the computer picks the option they actually do prefer because by reporting truthfully they would still have got this option plus any bonus attached to it.\(^\text{11}\)

\(^{10}\)In the task instructions that preceded this, the two-step procedure was outlined and I emphasized to participants that they should take all choices seriously, to avoid the danger that the first step might be seen as hypothetical.

\(^{11}\)Another way to see incentive compatibility is to note that the procedure simulates a two-sided multiple
After doing one round of the task, participants again reported their willingness to pay to keep working with the coworker. I do not focus on this outcome in my results. When I drop pairs in which the WTP mechanism was implemented (e.g. in looking at in-task outcomes such as productivity), this includes dropping pairs for whom the ‘after’ WTP mechanism was implemented as well as the ‘before’.

2.6 Eliciting willingness to pay to reveal mental health

In a survey between the first two and last two rounds of the task, I ask participants their willingness to pay to add or remove different pieces of information about themselves from their profile, in the case it is shown in subsequent rounds. I ask each participant their willingness to pay to reveal either their depression or anxiety information as well as three other characteristics.

Willingness to pay to reveal is elicited using a similar two-step procedure to the coworker choice in section 2.5. Figure A.4 shows what the two steps look like to participants. First, they are asked directly whether they would prefer to reveal each piece of information or not; then they are asked the minimum bonus that would make them accept the other option. If participants’ decisions are implemented, then for a random three out of four characteristics their direct step-1 choice is used; for the remaining characteristic, exactly the same mechanism as in section 2.5 is used with the computer choosing a random option (hide or reveal) and a bonus attached to it.

Participants’ revelation choices are implemented in the subsequent rounds at the point they are paired up, if and only if the WTP choice of their coworker (who is choosing whether to work with them) is also implemented (otherwise, I decide randomly what to reveal). This is explained to participants in the survey. This means that when making the choices of what to hide or reveal, participants should act as if there were a 100% chance that someone could reject them (by selecting a low WTP) on the basis of these choices.

3 Setting, recruitment and sample

3.1 Setting

My experiment was conducted on Amazon’s Mechanical Turk (MTurk), a platform run by Amazon on which anyone can post tasks to be completed by workers (‘MTurkers’) on the site. MTurk has a significant history of use for research, including research in economics (DellaVigna and Pope, 2017). For MTurkers, however, the site is in general a ‘job’ and a way price list, with binary choices ranging from ‘Stick with this coworker and get $2.50 OR Be rematched’ through to ‘Stick with this coworker OR Be rematched and get $2.50’. The WTP I elicit then just gives the participant’s switching point in the list.
to earn or supplement one’s primary source of income. Individual tasks posted on the site are referred to as HITs (Human Intelligence Tasks); a typical HIT is a few minutes long and could encompass a wide variety of tasks, from taking surveys to image recognition to data entry to rating comments to searching the web for specific information. The communication task in my experiment fits into this mix as a task which relies on image recognition and communicating well but does not require any specialist skills.

3.2 Recruitment

I posted the baseline survey as a freely available standalone HIT on MTurk, and then recruited participants for the experiment from among those who answered the survey. This procedure served two purposes. First, it allowed me to screen participants on their baseline survey answers as I describe below. Second, it reduced the chance that participants would alter their survey answers to affect their experience in the experiment. MTurkers consented to and completed the baseline survey without committing to the experiment itself and without being aware of what the experiment would involve. In addition, so that answering the survey questions (e.g. on mental health) would not ‘prime’ participants to behave a certain way in the experiment, I left a gap of at least one day between a participant’s completion of the survey and their invitation to join the experiment. The typical gap was 2-3 days.

The baseline survey could be taken by any MTurker who was in the US, had completed at least 1000 HITs and had at least a 95% approval rating on past work. These requirements are relatively lenient relative to many HITs on MTurk. Participants selected for the experiment had to receive an MTurk ‘qualification’ to take part. They received this qualification together with an email inviting them to take part in the first HIT (informed consent was taken when they clicked on this HIT). The experiment itself was a sequence of four HITs, with completion of each one granting the qualification to do the next.12

Participants were recruited and did the study on a rolling basis from February 26 to April 28, 2021. During this period, I posted the baseline survey and recruited participants for the experiment at regular intervals. The experimental HITs were available daily, with the two-person task posted in batches at specific times twice per day. Those who had been selected to participate could do the experiment on any day.

Screening participants. In recruiting for my main experiment, I screened people on their baseline survey answers in two ways. Firstly, survey respondents had to pass several attention checks as well as a test of basic English. 89% of participants passed these tests and were eligible to take part.

Secondly, to improve statistical power, I oversampled survey respondents who showed significant symptoms of depression or anxiety. The mental health surveys I use, the PHQ-

12Those unqualified for a given HIT were in general unable to see it on the website.
2 and GAD-2, are typically scored on a scale of 0 to 6 with higher scores indicating worse symptoms (section 2.1 provides more detail). 30% of eligible respondents scored 3 or higher on either survey, and I invited all of these to complete the experiment. Out of the rest, I invited about 64% (at random), so that 40% of all those recruited were depressed or anxious had scored 3 or higher. Depressed or anxious people were very slightly less likely to take up the invite, so 37% of those in my experimental sample score 3 or higher.

I recruited participants in such a way as to keep the proportion of depressed or anxious workers in the experiment roughly balanced over time. Specifically, I assigned the MTurk ‘qualification’ to do the experiment to new participants in regular batches. Each batch consisted of 40% of people who had scored 3 or higher as described above. Once qualified, people could choose when to do each part of the experiment, but I confirm that in practice the fraction depressed or anxious participating varied little over time.

### 3.3 Sample

**Sample characteristics.** Table 1 shows characteristics of my sample. In total, 910 people participated in my experiment, out of 2,875 MTurkers who took my baseline survey and passed the attention checks. 34% of my experimental participants have at most mild symptoms of either depression or anxiety, as defined in section 2.1. 23% have at most moderate symptoms and 14% at most severe symptoms. This is in line with the fact that 40% of participants recruited had moderate or severe symptoms (suggesting that selection into showing up is not strongly correlated with symptom severity).

Relative to the general population, my sample is female, young, educated and politically liberal. 55% are female while 59% have a college degree; 65% are under 45, and about half identify as Democrats and a further quarter as independents. There is a relatively wide distribution of past experience on MTurk. All this reflects the characteristics of those who answered the baseline survey: there is little selection on demographics into the experiment.

Table 1 also shows that depressed and anxious participants (i.e., those with moderate or severe symptoms) are for the most part not highly selected on other characteristics. They are similarly likely to be female and college-educated and somewhat more likely to be young. Furthermore, there is significant overlap between the depressed and the anxious. Two-thirds of those with depression also have anxiety while 55% of those with anxiety have depression. This is in line with prior evidence on the correlation of these two disorders and motivates my consideration of them jointly.

**Estimation sample.** Of the 910 people who participated in some of my experiment, 834 completed the survey at the midpoint of the experiment and 806 completed the full experiment. I explain how I address attrition concerns with identification in section 4.

In estimation, I drop 62 individual pairings of participants, or 5.8% of my sample, that
appeared to suffer from technical problems. I identified technical errors by reading participants' conversations and their answers to a debriefing question which asked if they had technical problems. I read these answers and categorized them according to whether they constituted evidence of a genuine bug. By far the most typical technical error was that the interface was unresponsive for at least one participant making it slow or impossible for them to send messages or (if they were the tourist) move around.\textsuperscript{13}

4 Empirical Framework

In this section I describe the regressions that estimate discrimination against depressed or anxious coworkers. I first describe my main regression of willingness to pay (i.e., demand) for a coworker on the information indicated in their profile. I then explain my productivity measure and how I use it to test for statistical discrimination, followed by the slightly modified specification I use to compare the effects of mental health (on demand and productivity) to the effects of other characteristics. Finally, I describe the regression I use to estimate the

4.1 Estimating effect of symptoms on demand for coworkers

I estimate the effect of revealed symptoms on willingness to pay using a simple regression analysis, controlling for the other information revealed in the profile:

\[
WTP_i = \alpha + \beta_0 \text{NoSymptoms}_i + \beta_1 \text{Mild}_i + \beta_2 \text{Moderate}_i + \beta_3 \text{Severe}_i + \delta'X_i + \epsilon_i \tag{1}
\]

where \(i\) indexes pairings of workers, \(\text{NoSymptoms}_i\) indicates that the profile reveals no symptoms for the two questions shown (i.e., a score of 0), \(\text{Mild}_i\) indicates that the profile reveals mild symptoms of either depression or anxiety (i.e., a score of 1 or 2), \(\text{Moderate}_i\) indicates moderate symptoms (a score of 3 or 4) are revealed and \(\text{Severe}_i\) indicates severe symptoms are revealed (a score of 5 or 6). The omitted category is mental health information being completely absent from the profile. Thus, the coefficients \(\beta_1, \beta_2\) and \(\beta_3\) represent the effect of revealing mild, moderate or severe symptoms relative to revealing nothing about mental health.\textsuperscript{14} \(X_i\) is a vector of indicator variables that controls for all other information present in the profile. Each indicator variable corresponds to a particular fact (e.g., ‘Age: 18-24’) and equals one when this fact appears in the profile, and zero when it does not. (I drop a base level for gender and education because these are always shown). I cluster standard errors at the level of the participant choosing the coworker.

\textsuperscript{13}Appendix table A.3 considers the robustness of my results to adding back in observations with technical issues; my results do not change substantially.

\textsuperscript{14}In practice, I estimate \(\beta_0\) as near zero so this is similar to the effect of revealing symptoms relative to revealing a lack of symptoms.
The outcome $WTP_i$ is censored because participants could not report a willingness to pay above $2.50 or less than -$2.50. 31.8% of participants reported either the maximum or minimum willingness to pay possible. To account for this censoring, I estimate equation 1 using a censored regression model with a Normal likelihood function (Wooldridge, 2015). For robustness I also estimate the model with OLS, which produces similar results.

**Identification.** The key assumption for identification in equation (1) is that $\epsilon_i$ is uncorrelated with the profile characteristics. $\epsilon_i$ here reflects the general preference for sticking with any coworker, as I control for everything the participant knows about their coworker when making their decision. This assumption is satisfied if participants are paired up (quasi-)randomly. As discussed in section 2.3, participants joined the task in batches and were assigned in pairs on a first-come-first-serve basis, so within a batch assignment is highly likely to be quasi-random. A possible remaining concern is that participants could choose which batch to show up to and this choice could hypothetically correlate with both $\epsilon_i$ and profile characteristics. However, appendix table A.3 shows that including controls for batch day of the week and time makes little difference to my estimates.

### 4.2 Estimating effect of symptoms on productivity

To test for statistical discrimination, I estimate a parallel version of equation (1) with a measure of productivity on the left-hand side. This productivity measure is intended to reflect what an earnings-maximizing participant would be willing to pay for a given coworker. I then estimate how depression or anxiety information in the profile predicts this measure of productivity and compare the effects to those on willingness to pay.

**Measuring productivity.** The measure of productivity I construct is the earnings in the task minus the opportunity cost of the time taken to complete it. For a given pair $i$ productivity is $\text{Prod}_i := E_i - \bar{w} t_i$, where $E_i$ is the reward earned by finding the location if they did (which goes to each person in the pair and does not depend on time taken), $t_i$ is the time taken in hours and $\bar{w}$ is an estimate of the average hourly wage on MTurk. For $\bar{w}$, I use a value of $3$/hr for US MTurkers estimated by Hara et al. (2019).\(^\text{15}\)

The purpose of this measure of productivity is to facilitate a comparison of participants’ WTP choices with the benchmark case of an earnings-maximizing participant. Under the assumption that participants continue to work on MTurk at the average wage after finishing my study, they maximize their total MTurk earnings when the difference in willingness to pay for two coworkers equals the difference in this measure of productivity. For example, suppose that two coworkers could both find the location on the first try, but it would take 10 minutes with one and 20 minutes with the other. Then the faster coworker frees up 10 minutes to do

\(^{15}\text{This includes time spent searching for new HITs. The hourly rate my own task offers is substantially higher, in part due to participation fees. These are not included in my productivity measure; including them would simply shift everyone's productivity upward by the same amount and so make no difference to my estimates.}\)
other tasks on MTurk, earning on average $0.50 at $3 per hour. So an earnings-maximizing participant would pay up to $0.50 more to keep them.

**Estimating equation.** My estimating equation is then exactly the same as equation 1 but with productivity on the left-hand side instead of willingness to pay:

\[
Prod_i = \alpha + \beta_0 \text{NoSympt}_i + \beta_1 \text{Mild}_i + \beta_2 \text{Moderate}_i + \beta_3 \text{Severe}_i + \gamma \text{MHInfoAbsent}_i + \delta' X_i + \epsilon_i
\] (2)

Crucially, the sample for this regression includes only the 80% of observations for which participants had to work with their assigned coworker, because the WTP elicitation mechanism was not implemented. This means the regression is free of selection bias.

The coefficients on profile characteristics in this regression are not intended to have a causal interpretation. Instead, as OLS coefficients they give the predictive effect of each characteristic appearing in the profile on ex-post productivity. This is exactly what should matter to an earnings-maximizer when choosing a coworker: how much they can now expect to earn conditional on what they saw.

**Identification.** As with equation (1), identification of equation (2) relies on \( \epsilon_i \) being uncorrelated with the profile characteristics. For the same reasons discussed previously, the way in which participants were assigned is balanced and unlikely to include bias. A potential other concern with equation (2) is differential attrition, i.e. if participants dropped out during the task based on the profile they saw.\(^{16}\) I address this by including all attempted rounds in the sample, even those in which one person disconnected from the task. My productivity measure extends entirely naturally to these cases (it is negative, as they earn nothing but I subtract the opportunity cost of their time).

**Testing for statistical discrimination.** I test the hypothesis that the coefficients on depression or anxiety symptoms in equations (1) and (2) are equal and interpret a rejection of this hypothesis as evidence for non-statistical discrimination. Under the assumption described above, the coefficients from the two regressions should be equal if participants are earnings-maximizing and correctly anticipate how they will perform with a given person. A rejection of equality then implies there is some direct preference towards depressed or anxious people (‘taste-based’ discrimination) or beliefs that are inaccurate on average.

### 4.3 Comparing depression/anxiety with other characteristics

I also estimate a restricted version of (1) and (2) when comparing the response to depression or anxiety symptoms with the response to other profile information. This is necessary because most profile questions had several possible answers and appeared less often, so the estimated

\(^{16}\)This is not a concern with equation (1) because participants were asked their willingness to pay almost immediately after seeing the profile. Only 5 participants failed to submit a willingness to pay after the profile was shown.
coefficients on the control variables for individual answers in equation (1) are noisy.

In the restricted version of (1), the categorical variables representing coworkers’ answers to other questions in the profile enter linearly. I also, for a more straightforward comparison combine the depression or anxiety information into a single indicator for whether the profile reveals moderate or severe symptoms. To preview my results briefly, these are the symptoms which significantly affect demand for the coworker. Specifically, I estimate:

\[
WTP_i = \alpha + \beta_1 \text{DepAnx}_i + \beta_2 \text{Female}_i + \beta_3 \text{College}_i + \beta_4 \text{Age}_i + \beta_5 \text{Fault}_i + \beta_6 \text{Imag}_i + \beta_7 \text{HITs}_i + \beta_8 \text{SameParty}_i + \gamma' \text{Absent}_i + \epsilon_i \tag{3}
\]

I also estimate the same equation with productivity on the left-hand side for comparison:

\[
\text{Prod}_i = \alpha + \beta_1 \text{DepAnx}_i + \beta_2 \text{Female}_i + \beta_3 \text{College}_i + \beta_4 \text{Age}_i + \beta_5 \text{Fault}_i + \beta_6 \text{Imag}_i + \beta_7 \text{HITs}_i + \beta_8 \text{SameParty}_i + \gamma' \text{Absent}_i + \epsilon_i \tag{4}
\]

In these equations, \(\text{DepAnx}_i\) is an indicator variable for moderate or severe symptoms being revealed in the profile, \(\text{Age}_i\) is the midpoint of the coworker’s age bracket, \(\text{Fault}_i\) is the coworker’s answer to whether they ‘find fault with others’, on a scale from 1 to 5 where 1 is ‘disagree strongly’ and 5 is ‘agree strongly’, \(\text{Imag}_i\) is their answer to whether they have an active imagination, coded similarly, \(\text{HITs}_i\) is the approximate number of HITs (tasks) the coworker reports having done on MTurk (a measure of experience) and \(\text{SameParty}_i\) is an indicator for the profile revealing the coworker has the same political affiliation (Democrat, Republican, or Independent) as the participant choosing them. I set each of the aforementioned variables to zero when they are not in the profile and include a vector of indicators for each piece of information being absent from the profile (\(\text{Absent}_i\)). Finally, to aid interpretation, I standardize the reported coefficients by dividing by the standard deviation of the right-hand side variable in question.

4.4 Estimating in-task discrimination

To estimate whether there is discrimination ‘in-task’, I leverage the randomization of whether or not depression and anxiety answers are included in the profile, as described in section 2.4. I compare in-task outcomes such as productivity for coworkers who had a given set of symptoms and whose profile revealed it, with coworkers who had the same symptom severity but whose profile (at random) did not reveal it. Because coworkers do not know what was revealed about themselves, the causal effect of revealing must ultimately come from the other person’s (the guide’s) response to seeing such information.\(^{17}\) I label this ‘in-task
discrimination’.

Specifically, I estimate the following regression for each pairing $i$:

$$Y_i = \alpha + \beta_0 \text{NoneRevealed}_i + \beta_1 \text{MildRevealed}_i + \beta_2 \text{ModerateRevealed}_i + \beta_3 \text{SevereRevealed}_i + \gamma_1' \text{DepSymptoms}_i + \gamma_2' \text{AnxSymptoms}_i + \delta' X_i \epsilon_i \quad (5)$$

where $\text{MildRevealed}_i$ indicates that mild symptoms of either depression or anxiety were revealed in the profile, and analogously for $\text{ModerateRevealed}_i$ and $\text{SevereRevealed}_i$. Again, the sample is the 80% of pairs that were exogenously assigned to work together. $\text{DepSymptoms}_i$ is a vector of controls for whether the coworker actually has mild, moderate or severe symptoms of depression, and $\text{AnxSymptoms}_i$ is a vector of controls for whether the coworker actually has mild, moderate or severe symptoms of anxiety. Conditional on these controls, $\text{MildRevealed}_i$, $\text{ModerateRevealed}_i$ and $\text{SevereRevealed}_i$ are randomly assigned as the revelation of symptoms is random as explained in section 2.4. They are thus orthogonal to any features of the coworker (revealed or not) which might affect their performance. Finally, $X_i$ is an additional vector of controls for characteristics of the coworker and the number of rounds attempted together. These are not necessary for identification but are included to improve statistical power.

I estimate this equation for several different dependent variables $Y_i$, including productivity as defined above, the components of productivity (earnings and time taken) and measures of effort: the number of messages sent to the coworker and the number of questions asked. The sample for this regression excludes pairings in which the willingness to pay for coworker mechanism was implemented, to avoid selection bias. I also exclude repeat attempts by the coworker for other reasons (such as disconnects) in case these were caused by the information revealed.\(^{18}\)

### 4.5 Repeat takers and attrition

As some participants dropped out during my experiment, I consider and take steps to mitigate potential bias from attrition in my estimation. In addition to the issues addressed above, a more subtle bias from attrition is possible: if participants drop out non-randomly between stages of the experiment, the average profile characteristics of coworkers and participants’ willingness to pay behavior could change together over time, creating a spurious correlation. To address any potential bias from this, I include in my sample all participants who did at least one round and control in all regressions for the number of times the participant choosing the coworker has previously appeared in my data (including those in which they rejected the potential coworker and were rematched). This also absorbs any potential variation arising

\(^{18}\)These restrictions also ensure that the number of rounds done by the pair is exogenous.
from the fact that different participants could appear different numbers of times depending on whether a rejection of a coworker is implemented.

An alternative approach to attrition would be to only include complete cases, that is, those who completed the entire experiment. However, this has the potential to introduce bias if, for instance, participants dropped out after the first two rounds in response to the profiles they had seen already (so that, conditional on completing the whole experiment, observed profile characteristics in the first two rounds are exogenous). As a robustness check, however, in Appendix table A.3 I report results including complete cases only as well as considering other ways to control for past experience in the experiment.

5 Results – Discrimination

5.1 Effect of symptoms on demand for coworkers

Non-parametric demand curves. I provide a straightforward non-parametric illustration of the demand for coworkers by the depression or anxiety symptoms revealed in their profile. As I elicit each person’s precise willingness to pay for their assigned coworker, I can directly observe the demand curve for a given group of coworkers. I define this demand curve as one minus the cumulative distribution function of willingness to pay for coworkers in that group. In other words, for each possible ‘price’ it gives the fraction of participants assigned to such a coworker who were willing to pay at least that price to keep them.

Figure 2 plots these demand curves for coworkers whose profiles did not reveal mental health information, those whose profiles revealed an absence of symptoms, and those whose profiles revealed mild, moderate or severe symptoms as defined in section 2.1. The demand curve for coworkers whose profiles reveal no symptoms is roughly the same as when no mental health information is revealed. However, demand is somewhat lower when mild symptoms are revealed: in particular, about 5 to 10% more people will pay some amount to get a new coworker. Demand is lower still when moderate or severe symptoms are revealed: in the latter case, the demand curve is shifted in substantially across its entire length.

While illustrative, the demand curves above do not establish statistical significance. Also, while the revelation of mental health information is random, conditional on revelation the symptoms revealed could correlate with other profile information. I therefore turn to the estimation of equation (1).

Regression estimates. Figure 3 shows estimates of the average effect of revealing symptoms on willingness to pay controlling for all other information in the profile. Relative to profiles containing no mental health information, revealing no symptoms (i.e., a score of 0 as defined in section 2.1), has no effect on willingness to pay for the coworker. This suggests, given the discrimination against more severe symptoms reported below, that participants see-
ing a profile with no mental health information did not consider the possibility that the person in fact had moderate or severe symptoms. While some people may have misinterpreted the absence of mental health information as implying a lack of symptoms, this could also suggest a tendency to underestimate the prevalence of mental illness or not to think about it unless it is revealed. Revealing mild symptoms (a score of 1 or 2) has a small insignificant effect ($p = 0.22$).

In contrast, revealing moderate mental health symptoms (a score of 3 or 4) or severe symptoms (a score of 5 or 6) starkly lowers workers willingness to pay to work with a given coworker. Workers are willing to pay $0.67$ ($p < 0.01$) to avoid working with someone with moderate symptoms and even $0.80$ ($p < 0.01$) to avoid working with someone with severe symptoms. These magnitudes are economically significant, corresponding to 33% and 40% respectively of the average amount earned in-task by a given pair, and 17% and 20% of the maximum possible stakes of the coworker decision ($4$, as they play up to two rounds and earn at most $2$ in each round).

5.2 Comparing demand with productivity

Does depression or anxiety symptoms in the profile predict lower productivity to the same extent that they lower willingness to pay? Figure 4 shows in light blue estimated coefficients from equation 2 which regresses eventual productivity in the task, as defined in section 4.2, on the profile information for pairs that are exogenously assigned. I reproduce the willingness-to-pay coefficients from Figure 3 in dark blue, for comparison.

Strikingly, depression or anxiety symptoms in the profile do not predict lower productivity. Instead it is marginally significantly higher for those with moderate or severe symptoms. As a result, these coefficients are significantly different to the willingness to pay coefficients for moderate and severe symptoms ($p < 0.01$). I can thus reject the hypothesis that participants statistically discriminate against depressed or anxious coworkers, in the sense of basing willingness to pay on a correct prediction of productivity.

An interesting question in itself is why depression or anxiety symptoms do not predict lower productivity in this context. The observed effects are a combination of any direct association of having symptoms and performance in the task, and in-task discrimination: i.e., any effect of revealing these symptoms on the other participant’s behavior that affects productivity. Below I show that the second effect is in fact positive for severe symptoms. The positive in-task discrimination in fact cancels out a small negative correlation between severe symptoms and productivity when the symptoms are not revealed.

$^{19}$Though by later rounds, many people would have seen a profile that explicitly indicated no symptoms.
5.3 Comparing effects of depression/anxiety to other characteristics

To provide context for my estimated effects, I compare them to the estimated effects of revealing other types of information on willingness to pay. Figure 5 displays the coefficients from estimating equations (3) and (4). The coefficient on moderate or severe depression or anxiety symptoms is large in magnitude relative to those on most other characteristics. Willingness to pay for a coworker is affected significantly more by these symptoms than by the coworker’s gender, their political party or by a one-standard deviation change in their age bracket, experience bracket or self-reported imagination. Participants respond similarly to a coworker having a college degree and a little less to a one-standard deviation rise in the coworker’s tendency to ‘find fault with others’.

The gap between the willingness to pay and productivity effects is also much larger for depression and anxiety than for other characteristics. The difference between the two is significant for depression and anxiety but insignificant for most others. In other words, while participants’ willingness to pay far from perfectly anticipates productivity effects across the board, the discrepancy is particularly large for depression and anxiety.

These comparisons also help to address the concern that my experiment induces a response by making depression or anxiety unusually ‘salient’. All the information in the profile is equally salient to participants, and yet they respond more strongly to depression or anxiety symptoms than to most other pieces of information.

5.4 In-task discrimination

Do participants change their in-task behavior in response to information about their coworker’s symptoms, and does this affect productivity? Figure 6 shows the results from estimating equation (5). I find significant evidence of ‘discrimination’ in favor of those with mental illness: conditional on a coworker having severe symptoms, revealing these to their guide increases productivity by $0.75 (p = 0.016). There is no effect of revealing no, mild or moderate symptoms.

Figure 7 considers possible mechanisms behind this finding, by estimating equation (5) with different dependent variables. The increase in productivity is driven by an increase in earnings (i.e., chance of finding the location) without an increase in time spent. There appears to be no effect on effort as measured by the number of messages the participant sent to their coworker or the number of questions. I speculate that participants may have changed the content of their messages – perhaps to be more encouraging or polite – in a way that helped the coworker perform better.
5.5 Mechanisms behind discrimination

What mechanisms drive my discrimination result? If people do not avoid depressed or anxious coworkers out of an accurate belief that they are less productive, what can explain their discrimination? I consider two categories of explanation: incorrect beliefs (Bohren et al., 2019), and an inherent preference not to interact with depressed or anxious people (taste-based discrimination).

Beliefs. In the survey between rounds 2 and 3 of the task, I elicit participants’ beliefs about how other participants performed in the task. Precisely, I show each participant the profile of three other people who previously did at least one round of the task. For one of these rounds, randomly selected, I ask the participant to give their subjective probability that each person, with their partner (of unknown profile), found the location in one, two, or three tries, or not at all. These subjective probabilities were incentivized by a log scoring rule; appendix A.4 gives more detail on how the belief elicitation was implemented and explained to participants. The profiles of other participants shown were exactly analogous to the coworker profiles shown at the beginning of rounds of the task. I can thus estimate the effect of including depression or anxiety symptoms in these profiles on the belief about how they performed.

Table 3 shows the results. Participants expected people who had moderate or severe symptoms to have a 5% lower chance of finding the location on the first try, with no change to their chance on the second and third try. Under the payment scheme this translates into $0.10 lower subjective expected earnings, or 8% of the average subjective expected earnings.

How do these beliefs compare to the actual predictive effect of depression or anxiety symptoms on earnings? In column 5 of Table 3, I regress average earnings per round on all participant characteristics that could appear in the profile, irrespective of whether they did. This is different to equation (2) above for two reasons. Firstly, I look at earnings rather than productivity as I did not elicit beliefs about time taken. Secondly, the profiles about which participants reported beliefs were not necessarily the same profiles which had been actually shown to the guide in the prior round in question. Therefore, the right comparison is the effect of symptoms unconditional on whether this appeared in the profile during the task. I estimate this regression both for the full sample (column 5) and using only the first two rounds of the task (column 6), as participants were asked their beliefs about one of these two rounds.

Beliefs about earnings are slightly pessimistic, but close to accurate. When compared to the true earnings effect of depression or anxiety symptoms in the whole sample, the effect of depression or anxiety symptoms on beliefs is marginally significantly lower ($−0.097$ vs. $−0.007$, $p = 0.068$). However, when compared to the earnings effect in the first two rounds, i.e., before the point at which beliefs were elicited, the difference is insignificant ($−0.097$ vs $−0.066$, $p = 0.616$).

Preferences. I can test for taste-based discrimination using the follow-up round of my
experiment, in which participants received no reward for success; instead they just received a flat fee for participation provided they spent at least 7.5 minutes on the task. Figure A.7 shows the results from estimating equation (3) in this follow-up round.

There is still a significant negative effect (-$1.26) of revealing moderate or severe symptoms on willingness to pay for a coworker. This is larger than the effect in my main sample ($p = 0.19$). In other words, this figure suggests there exists a preference to avoid interacting with people with depression or anxiety symptoms even when no money is at stake. One caveat is that the results are noisy: the regression only has a sample size $n = 89$ and the 95% confidence interval on moderate/severe symptoms stretches from -$0.20$ to -$2.33$. Nonetheless, this is consistent with my results above on beliefs insofar as it implies that the discrimination I observe is mostly taste-based.

**Experience.** I also consider how discrimination varies across the different rounds of the task. In Appendix Figures A.5(a) and A.5(b), I estimate equations 1 and 2 separately for the first two rounds and last two rounds of the task. The results show less discrimination in the last two rounds of the task: in particular, the coefficients on moderate and severe symptoms are no longer significant. The difference between the first and last two rounds is significant for moderate symptoms ($p < 0.01$), but not for severe symptoms ($p = 0.28$).

The reduction in discrimination in later rounds is not driven by exposure to depressed or anxious coworkers. In Appendix Table A.1, I use a difference-in-difference specification to estimate how working previously with someone revealed to be depressed or anxious changes current discrimination. Specifically, in column 1 I regress willingness to pay in rounds 3 and 4 on indicators for mild, moderate or severe symptoms in the current profile; an indicator for whether the participant previously worked with a coworker with moderate or severe symptoms in their profile, and the interaction of this with the current profile symptoms. I also include the same control variables for other profile information as in equation 1. The interaction coefficients are negative and insignificant, although noisy. In other words, previous exposure to a coworker that the participant knew to be depressed or anxious does not significantly affect how much they subsequently discriminate against other coworkers with these symptoms. Null results also obtain when I instead include interactions of the current profile’s symptoms with whether the participant previously saw any information about depression or anxiety in a previous profile (that is, test whether the chance to learn anything about a coworker’s symptoms – even that they don’t have any – affects subsequent preferences).

I can also ask how previously having a depressed or anxious coworker affects the beliefs discussed above. Table A.2 shows these results. The effect of symptoms on beliefs (subjective expected earnings) is marginally significantly different for participants who previously had a revealed depressed or anxious coworker ($p = 0.06$).

The reduction in discrimination is not because participants stop caring about worker characteristics across the board, nor because they start matching willingness to pay with pro-
ductivity effects. Instead, as Appendix Figures 6(a) and 6(b) show, they continue to (non-statistically) discriminate against coworkers based on college education and whether they find fault with others. The fact that mental health discrimination goes away in later rounds while other types of discrimination persist suggest that the taste for avoiding a depressed or anxious person may be in some sense less deeply ingrained than other tastes, such as that for having a congenial coworker unlikely to find fault with you.

These results also complicate my results above on beliefs, which were elicited between rounds 2 and 3. Because there is little discrimination after round 2, I cannot reject that the effect of moderate/severe symptoms on willingness to pay after round 2 equals the effect of these symptoms on beliefs (subjective expected earnings). It is possible that participants had more negative beliefs in the first two rounds which may in fact have explained some of the discrimination effect.

An important caveat for these results on experience is that participants also took a survey between rounds 2 and 3, in which they gave their beliefs as described above and their willingness to pay to reveal information as described in section 2.6. I cannot rule out that some effect of taking these surveys may in fact explain the difference.

6 Results - Stigma

6.1 Willingness to pay to hide mental health

I first show participants’ average willingness to pay to reveal information about their mental health. Each participant was asked their willingness to pay to reveal either their depression answers or their anxiety answers. As with my discrimination analysis, I pool depression and anxiety and calculate mean willingness to pay to reveal no symptoms, and symptoms of different severity (mild, moderate and severe).

Figure 8 shows the results. While participants will pay $0.97 to reveal that they have no symptoms, willingness to pay to reveal any symptoms is strongly negative. Participants will pay $0.76 to hide that they have mild symptoms \(p < 0.001\), $0.82 to hide moderate symptoms \(p < 0.001\) and $0.87 to hide severe symptoms \(p < 0.001\). The differences between these three amounts are not significant. It is notable that participants pay just as much to hide mild symptoms, even though these symptoms are little discriminated against as shown in section 5.1.

Participants are much more willing to reveal most other information. Figure 9 compares the willingness to pay to reveal any mental health symptoms with the willingness to pay to reveal other information about oneself. Participants pay a positive amount to reveal any

\(^{20}\)Column 1 of table 4 shows the numbers from this figure and their standard errors.

\(^{21}\)Here I group participants’ answers for each trait into natural categories: e.g., I plot average willingness to reveal age for those under and over 45. The qualitative conclusions hold when looking at each possible answer.
other trait, with only two exceptions: agreeing that they ‘find fault with others’ (which they pay $0.45 to hide, $p < 0.001) and being politically Republican (which they pay $0.08 to hide, $p = 0.65).

6.2 Comparison to effects of revealing

How much should participants be willing to pay to hide mental health information, given the effects of revealing? In this section I show that overall, the expected monetary value of revealing mental health is positive for severe symptoms (i.e., participants should be willing to pay to reveal) and that while it is negative for mild or moderate, the cost is far lower than what participants pay to hide it. While participants’ willingness to hide could be justified by risk- or (more likely) loss-aversion, this finding is instructive insofar as it demonstrates a productive efficiency cost of the willingness to keep mental health secret: participants lose money on average due to their preference to keep mental health secret.

Revealing mental illness could have two types of effect for the revealer in my setting. Firstly, it could affect a person’s willingness to pay for you as a coworker and therefore the chance you get rematched. Here I consider the cost if the willingness to pay decisions were always implemented, because the coworker-choice mechanism is implemented whenever the revelation-choice mechanism is (as explained in section 2.6). As the mechanism picks a random price uniformly from -$2.50 to $2.50, a reduction in the coworker’s willingness to pay of $1 implies a 20% higher chance of being rematched. Thus, the WTP coefficients from Figure 3 imply that the chance of being rematched is 5.5% higher for those with revealed mild symptoms, 13.4% higher with moderate symptoms and 15.9% higher with severe symptoms. The average cost of being rematched to participants can then be computed with a relatively simple back-of-the-envelope calculation. Empirically, participants who are rematched find a new partner (either then or later) 86% of the time, and when they do find a new partner they wait an average of 2.2 minutes. At the average MTurk wage these 2.2 minutes cost $0.11, while if a participant does not get a new partner and hence fails to complete that HIT, they miss out on a total average payment of $6.60 including participation fees. Putting this together, the expected loss from being rematched comes to $1.28. Multiplied by the increased chance of being rematched, the expected cost of revealing mental health via its ‘discrimination’ effects is $0.07 for mild symptoms, $0.17 for moderate symptoms and $0.20 for severe symptoms in my setting.

Secondly, revealing mental illness could change your coworker’s behavior in the task itself and therefore your earnings. As the results in section 5.4 show, this effect is a benefit, not a cost of revealing. Revealing mild symptoms increases in-task productivity by $0.02, revealing moderate symptoms raises it by $0.16, and revealing severe symptoms raises it by $0.76. Factoring in these benefits conditional on completing the task, the overall estimated expected to each question individually.
cost of revealing is $0.05 for mild symptoms and $0.02 for moderate symptoms, and there is an expected benefit of $0.51 from revealing severe symptoms.

6.3 Mechanisms: Fear of discrimination

Do participants hide their mental health because they expect discrimination? This could still be the case even when willingness to pay to hide exceeds the actual costs of revealing, if participants have incorrect beliefs about these costs.

To directly test whether discrimination explains hiding mental illness, I conduct a follow-up survey and round where participants again choose what to reveal, but there is much less scope for this choice to cause discrimination. Recall that, when two coworkers are matched, the potential tourist’s WTP to reveal mechanism is implemented (i.e., I use their answers randomly with 20% chance, and otherwise I choose the profile at random. Similarly, the potential guide’s WTP for coworker mechanism is implemented (i.e., their choice of who to work with is used) randomly with 20% chance and otherwise they are obliged to keep their assigned coworker. In the follow-up round, I implement the first mechanism only when I do not implement the second. This is explained to participants when choosing what to reveal. Therefore, a participant deciding their WTP to reveal knows that whenever their answers will be used, the participant they are matched to will be obliged to work with them. Thus the choice of what to reveal cannot affect whether they are rejected. In addition, there is no bonus for success: participants simply receive a flat fee so long as they spend a minimum amount of time on the task (7.5 minutes). I call this round the 'no (coworker) choice or incentives' treatment.

The combined effect of these changes is to greatly reduce the potential for discrimination when depression or anxiety is revealed. Revealing symptoms cannot affect the chance you are rejected as a coworker nor your earnings in the task. As guides still (of course) see the information when a choice to reveal is implemented, they could still change behavior in the task in response, but there is no longer a financial incentive for them to do so.

The follow-up survey and round were done by participants after completing the rest of the experiment. I introduced these near the completion of data collection for my main experiment; 110 participants took part.

In spite of the reduced potential for discrimination, I find a similar willingness to pay to hide mental health symptoms in the follow-up. Figure 10 shows the willingness to pay to reveal mental health information in this follow-up, in light blue, with the main experiment results from figure 8 in dark blue for comparison. Willingness to pay to reveal is not significantly different for mild symptoms \((p = 0.16)\), moderate symptoms \((p = 0.17)\) or severe symptoms \((p = 0.69)\) across the two condition. Participants in the follow-up pay $0.83 \((p < 0.001)\) and $0.87 \((p = 0.026)\) to hide moderate and severe symptoms respectively, while willingness to
pay to reveal mild symptoms is still negative but no longer significant. Overall, participants pay $0.65 in the follow-up ($p < 0.01$) to conceal any symptoms greater than none. This is not significantly different to the willingness to pay in the main experiment sample ($p = 0.46$).

6.4 Who reveals their mental health?

An important question in studying the stigma of mental health is what the selection into revealing one’s mental health is. For instance, one hypothesis is that people with lower socioeconomic status or people with lower ability are less likely to keep their mental illness hidden (perhaps because in some sense they have ‘less to lose’). If so, this may exacerbate negative stereotypes as most people observe a non-random, negatively selected sample of those with mental illness.

I can investigate the selection into revealing in my data by asking how participants’ characteristics predict willingness to pay to reveal their symptoms. I find little evidence that those more willing to reveal are negatively or positively selected. First, Figure A.8 shows the correlation of willingness to pay to reveal different symptoms with average productivity in the task. The correlations are all around zero, implying that higher productivity people are not more or less likely to reveal symptoms (whether these are mild or severe). Figure A.9 shows the correlation with education (whether or not someone has a four-year college degree). People with a college degree are somewhat more willing to pay to reveal severe symptoms ($p = 0.032$) but otherwise there is no significant difference.

7 Discussion and conclusion

In a short, anonymous communication task, I find that participants on MTurk pay not to have depressed or anxious coworkers, a preference which is not explained by productivity. People also pay not to reveal their depression or anxiety symptoms to coworkers, but this does not seem to be driven by fear of the aforementioned discrimination. This preference to not tell a short-term, anonymous collaborator about one’s mental illness is all the more striking given that the same people were willing to reveal their symptoms to the experimenter in the survey before the task.

The response to revealing mental illness is not negative in every way. Revealing a coworker’s severe symptoms to their co-participant improves productivity relative to keeping these hidden, and discrimination in the choice of coworker also appears to decrease with experience in the task. On what does explain the negative discrimination I find, tentative evidence suggests that preferences rather than beliefs about ability may be more important.

These results suggest several avenues for future work. Testing whether the results hold in settings with other tasks requiring different skills, especially face-to-face setting, would be
valuable, as would digging deeper into the multidimensional beliefs that people in fact hold about those with depression or anxiety. Another important avenue is the fact that in many environments (though not always), some people may choose to reveal their mental illness and the knowledge that they made this choice may itself affect how others update beliefs about them. It would be valuable to know whether my results persist when those choosing a coworker know that this person opted in to revealing their mental illness, rather than it being exogenously shown.

References


Angelucci, Manuela and Daniel Bennett, “The Economic Impact of Depression Treatment in India,” May 2021.


Figure 1: Experiment Timeline

<table>
<thead>
<tr>
<th>Sections (HITs)</th>
<th>Outcomes measured</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline Survey</strong></td>
<td>Mental health and demographics</td>
</tr>
<tr>
<td></td>
<td>Gap: 1 – 7 days</td>
</tr>
<tr>
<td><strong>Sign-up</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2 rounds of task</strong></td>
<td>WTP for coworker, Productivity</td>
</tr>
<tr>
<td><strong>Survey</strong></td>
<td>Beliefs about others’ performance, WTP to supply info to guide</td>
</tr>
<tr>
<td><strong>2 rounds of task</strong></td>
<td>WTP for coworker, Productivity</td>
</tr>
</tbody>
</table>
Figure 2: Demand Curves by Depression/Anxiety Symptoms Revealed

Notes: This figure plots demand curves, that is, for a group of coworkers, the proportion of participants matched to such a coworker who were willing to pay a given price for them. Demand curves are shown for five groups: coworkers without mental health information in the profile, and those whose profiles revealed answers implying no symptoms (total score of 0), mild symptoms (total score 1 or 2), moderate symptoms (3 or 4) and severe symptoms (5 or 6). See section 2.1 for how the ‘score’ is defined.
Figure 3: Effect of Revealing Depression/Anxiety Symptoms on WTP for Coworkers
Figure 4: Comparison of effects on demand and productivity.

Notes: This figure plots the estimated effect of revealing information about either a coworker’s depression (answers to the PHQ-2 survey) or their anxiety (answers to the GAD-2 survey) to a participant who chooses whether to work with them. In dark blue are the coefficients from estimating equation 1 which regresses demand for the coworker (willingness to pay to work with them rather than be re-matched) on the symptoms revealed. In light blue are the coefficients from estimating equation 2 which regresses productivity in the task (for pairs obliged to work together) on the symptoms revealed. The four coefficients shown are the effect of revealing answers which imply no symptoms (total score of 0), mild symptoms (total score 1 or 2), moderate symptoms (3 or 4) or severe symptoms (5 or 6), relative to the control case in which no mental health information is revealed. See section 2.1 for how the ‘score’ is defined. Both regressions control for all other information revealed in the coworker’s profile. Equation 1 is estimated using interval regression to account for the censoring above and below of willingness to pay at $2.50 and -$2.50; equation 2 is estimated using OLS. Vertical lines show 95% confidence intervals.
Figure 5: Comparing effects of depression/anxiety with other traits.

Notes: This figure plots the estimated coefficients from equation 3 (in dark blue) and equation 4 (in light blue). “Finds Fault” refers to $\text{Fault}_i$, or the coworker’s answer to the question ‘Do you tend to find fault with others?’ on a scale from 1 to 5. “Imaginative” refers to $\text{Imag}_i$, or the coworker’s answer to the question ‘Do you have an active imagination?’ on a scale from 1 to 5.
Figure 6: In-task discrimination: effect of revealing symptoms on productivity (conditional on actual symptoms).

Notes: This figure shows results from estimating equation 5 with productivity (as defined in section 4.2) as the dependent variable. Shown are the coefficients on \( \text{NoneRevealed}_i \), \( \text{MildRevealed}_i \), \( \text{ModerateRevealed}_i \), and \( \text{SevereRevealed}_i \) from that regression. Vertical lines show 95% confidence intervals.
Figure 7: Effect of revealing symptoms on earnings, time and effort.

Notes: This figure shows results from estimating equation 5 with four different dependent variables: in-task earnings (payment for finding the location), time taken, number of messages sent to the coworker whose information was revealed, and total number of question asked. Earnings are measured in dollars; all other variables are standardized so that the effect shown is in standard deviation units. Shown are the coefficients on $\text{NoneRevealed}_i$, $\text{MildRevealed}_i$, $\text{ModerateRevealed}_i$ and $\text{SevereRevealed}_i$. Vertical lines show 95% confidence intervals.
Figure 8: Willingness to pay to reveal depression or anxiety symptoms to potential coworkers.

Notes: This figure shows the average willingness to pay to reveal mental health information about yourself, by the severity of the symptoms that would be revealed. Specifically, participants were choosing whether to reveal either their depression symptoms (PHQ-2 answers) or anxiety symptoms (GAD-2 answers). ‘Mild’, ‘moderate’ and ‘severe’ symptoms are defined in the same way as in previous figures above. Vertical lines show 95% confidence intervals.
Figure 9: Willingness to pay to reveal depression or anxiety symptoms compared to other information.

Notes: This figure shows the average willingness to pay to reveal various pieces of information about yourself. The willingness to pay is grouped by the question or trait that would be revealed, e.g. age (precisely, age bracket) or political party, and within that by the answer that would be revealed (e.g. an age bracket under 45). Different answers are grouped together for the sake of statistical power. ‘HITs’ refers to the participant’s past experience on MTurk as measured by the number of previous tasks (called ‘HITs’ completed). ‘Finds fault’ refers to their answer to the question ‘Do you tend to find fault with others?’ which had five possible answers: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree). The first three are grouped together as ‘disagree/neutral’ and the other two as ‘agree’. ‘Imaginative’ refers to their answer to the question ‘Do you have an active imagination?’ which had the same five possible answers, grouped here in the same way. Vertical lines show 95% confidence intervals.
Figure 10: Effect of potential for discrimination on the willingness to pay to reveal symptoms.

Notes: This figure shows the same results as in figure 8, in dark blue, compared to the equivalent results from the follow-up sample in which participants also reported willingness to pay to reveal but this could not affect others’ choice of them as a coworker, and there was only one round and no financial reward for success. This is the same follow-up sample as in figure A.7. Vertical lines show 95% confidence intervals.
<table>
<thead>
<tr>
<th></th>
<th><strong>Experiment</strong></th>
<th></th>
<th><strong>Baseline Survey</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate/Severe:</td>
<td></td>
<td>Moderate/Severe:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All Depression</td>
<td>Anxiety</td>
<td>All Depression</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Moderate/Severe:</td>
<td>Depression</td>
<td>0.24</td>
<td>0.19</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>0.29</td>
<td>0.23</td>
<td>1.00</td>
</tr>
<tr>
<td>Max. symptoms (dep. or anx.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>Depression</td>
<td>0.34</td>
<td>0.38</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>0.23</td>
<td>0.19</td>
<td>0.54</td>
</tr>
<tr>
<td>Moderate</td>
<td>Depression</td>
<td>0.14</td>
<td>0.11</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>0.49</td>
<td>0.46</td>
<td>0.42</td>
</tr>
<tr>
<td>Severe</td>
<td>Depression</td>
<td>0.14</td>
<td>0.11</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>0.49</td>
<td>0.46</td>
<td>0.42</td>
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<td>Female</td>
<td>Depression</td>
<td>0.55</td>
<td>0.54</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
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<td>0.56</td>
<td>0.61</td>
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<tr>
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<td>0.10</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>College grad</td>
<td>0.59</td>
<td>0.57</td>
<td>0.50</td>
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<tr>
<td>Age</td>
<td>&lt; 45</td>
<td>0.65</td>
<td>0.62</td>
<td>0.72</td>
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<td></td>
<td>&gt; 45</td>
<td>0.35</td>
<td>0.38</td>
<td>0.28</td>
</tr>
<tr>
<td>Tasks on MTurk</td>
<td>&lt; 5,000</td>
<td>0.52</td>
<td>0.55</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>&gt; 5,000</td>
<td>0.48</td>
<td>0.45</td>
<td>0.41</td>
</tr>
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<td>Democrat</td>
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<td>0.46</td>
<td>0.49</td>
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<tr>
<td></td>
<td>Independent</td>
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<td>0.29</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>Republican</td>
<td>0.23</td>
<td>0.25</td>
<td>0.20</td>
</tr>
<tr>
<td>N</td>
<td>910</td>
<td>215</td>
<td>262</td>
<td>2875</td>
</tr>
</tbody>
</table>

**Notes:** “Moderate/severe” depression or anxiety refers to participants who scored at least 3 out of 6 on the PHQ-2 survey or GAD-2 survey respectively. “Max. symptoms (dep. or anx.)” refers to the worst of the participant’s depression or anxiety symptoms, i.e. the maximum of their PHQ-2 score and GAD-2 score. “Mild” means this is 1 or 2, “moderate” means 3 or 4, and “severe” means 5 or 6.
Table 2: Effect of revealing depression/anxiety symptoms on demand (WTP) and productivity.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>WTP (1) Interval reg.</th>
<th>WTP (2) OLS</th>
<th>Productivity (3) OLS</th>
<th>Earnings (4) OLS</th>
<th>Time (min.) (5) OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>No symptoms</td>
<td>-0.0789 (0.191)</td>
<td>-0.0591 (0.133)</td>
<td>0.0276 (0.182)</td>
<td>0.0810 (0.183)</td>
<td>1.068 (1.432)</td>
</tr>
<tr>
<td>Mild symptoms</td>
<td>-0.277 (0.228)</td>
<td>-0.271 (0.164)</td>
<td>0.115 (0.213)</td>
<td>0.153 (0.198)</td>
<td>0.761 (1.630)</td>
</tr>
<tr>
<td>Moderate symptoms</td>
<td>-0.670** (0.206)</td>
<td>-0.449** (0.151)</td>
<td>0.332 (0.171)</td>
<td>0.309 (0.168)</td>
<td>-0.460 (1.126)</td>
</tr>
<tr>
<td>Severe symptoms</td>
<td>-0.797** (0.267)</td>
<td>-0.637** (0.198)</td>
<td>0.533* (0.211)</td>
<td>0.489* (0.221)</td>
<td>-0.887 (1.572)</td>
</tr>
</tbody>
</table>

N 1007 1007 663 663 663

Standard errors in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001

Notes: This table shows the regression coefficients displayed in Figure 3 (column 1) and Figure 4 (columns 1 and 3). In addition, it shows results from an OLS estimation of equation 1 (which more conservatively assumes that true willingness to pay does not exceed $2.50 or go below -$2.50). It also shows estimated effects on earnings and time, the two components that make up productivity.
Table 3: Effect of depression/anxiety symptoms on beliefs about worker performance

<table>
<thead>
<tr>
<th></th>
<th>Beliefs</th>
<th>Actual earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st try</td>
<td>2nd try</td>
</tr>
<tr>
<td>Moderate or severe dep./anx.</td>
<td>-5.210**</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>(1.607)</td>
<td>(0.877)</td>
</tr>
<tr>
<td>Dep./Anx. not in profile</td>
<td>-0.309</td>
<td>-0.775</td>
</tr>
<tr>
<td></td>
<td>(1.179)</td>
<td>(0.607)</td>
</tr>
<tr>
<td>N</td>
<td>2532</td>
<td>2532</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Notes: This table shows results from a regression of participants’ beliefs about the performance of a worker with a given profile on the information in that profile. Each participant saw three profiles; the unit of observation in this regression is the profile but standard errors are clustered at the participant level. Column headings show the dependent variable in columns 1 to 4 and the sample in columns 5 and 6 (for which the dependent variable is actual earnings per round). “1st try” refers to the reported subjective probability in percentage points that a person with a given profile found the location on the first try; similarly for “2nd try” and “3rd try”. “Exp. earnings” means the subjective expected earnings which are calculated directly from the subjective probabilities and the fixed payments for finding the location ($2 on the first try, $1.20 on the second try and $0.40 on the third try). Full controls for the other possible answers in the profile, as in equation 1, were also included but are not reported here.
Table 4: Willingness to pay to reveal dep./anx. symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Sample</td>
<td>No choice or incentives</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0.968*** (0.0747)</td>
<td>1.098*** (0.206)</td>
</tr>
<tr>
<td>Mild</td>
<td>-0.762*** (0.0917)</td>
<td>-0.318 (0.305)</td>
</tr>
<tr>
<td>Moderate</td>
<td>-0.830*** (0.119)</td>
<td>-1.232*** (0.270)</td>
</tr>
<tr>
<td>Severe</td>
<td>-0.869*** (0.172)</td>
<td>-0.724* (0.321)</td>
</tr>
</tbody>
</table>

N = 842 110

Standard errors in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Notes: This table shows the estimated means that appear in Figures 8 and 10 along with standard errors in brackets.
A Appendix

A.1 Supplementary Figures
Figure A.1: Task interfaces

Panel A: ‘Tourist’ Interface

Panel B: ‘Guide’ Interface
Figure A.2: Example profiles

Gender: Female
Education: Some college
Age: 35-44
Has an active imagination?: Disagree a little

Gender: Female
Education: Some college
Felt down, depressed or hopeless?: Not at all in last two weeks
Completed HITs: 10,000+
Felt little interest or pleasure in doing things?: Not at all in last two weeks
Age: 35-44

Gender: Female
Education: Some college
Felt down, depressed or hopeless?: Nearly every day in last two weeks
Completed HITs: 10,000+
Felt little interest or pleasure in doing things?: More than half the days in last two weeks
Age: 35-44
Figure A.3: WTP for coworker elicitation procedure

Step 1

**Information about this tourist:**

*Gender:* **Female**  
*Education:* **Some college**  
*Completed HITs:* **10,000+**  
*Age:* **35-44**

Which option would you prefer?

- Work with this tourist  
- Get a random new tourist

Submit

Step 2

Thanks! Now we want to know how strongly you’d prefer this tourist. If you’re in the choice group, the computer will make you one of these offers, picked at random. **Which offers would you accept?**

<table>
<thead>
<tr>
<th>Offer</th>
<th></th>
<th>Offer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$0.00</td>
<td>2</td>
<td>$0.01</td>
</tr>
<tr>
<td>100</td>
<td>$2.49</td>
<td>101</td>
<td>$2.50</td>
</tr>
<tr>
<td>102</td>
<td>$0.00</td>
<td>103</td>
<td>$0.01</td>
</tr>
</tbody>
</table>

We assume you’d accept a bonus to work with this tourist, because you prefer that anyway. So just tell us what bonus would make you accept a new tourist. Then we can reject or accept the offer for you.

If you answer a higher bonus, you’re more likely to get this tourist. But you’re also more likely to miss out on a bonus for working with a new tourist.

Your answer: I would only accept working with a new tourist if I get at least a $... bonus for doing so.

Submit
Figure A.4: WTP to reveal elicitation procedure

**Step 1**

For each piece of information about you below, choose whether you would like it to be revealed to your guide, if you’re a tourist in the choice group.

We will always reveal these facts about you: Gender: Female and Education: Some college.

**Information about you**

<table>
<thead>
<tr>
<th>Age: 18-24</th>
<th>Yes, I would be happy for my guide to see this</th>
<th>No, I would NOT like my guide to see this</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has an active imagination?: Neither agree nor disagree</td>
<td>Yes, I would be happy for my guide to see this</td>
<td>No, I would NOT like my guide to see this</td>
</tr>
<tr>
<td>Tends to find fault with others?: Agree a little</td>
<td>Yes, I would be happy for my guide to see this</td>
<td>No, I would NOT like my guide to see this</td>
</tr>
<tr>
<td>Felt little interest or pleasure in doing things?: More than half the days in last two weeks</td>
<td>Yes, I would be happy for my guide to see this</td>
<td>No, I would NOT like my guide to see this</td>
</tr>
<tr>
<td>Felt down, depressed, or hopeless?: Nearly every day in last two weeks</td>
<td>Yes, I would be happy for my guide to see this</td>
<td>No, I would NOT like my guide to see this</td>
</tr>
</tbody>
</table>

**Step 2**

Now choose what bonus would change your mind. Move the sliders to make your choice.

If no bonus would change your mind, select $2.50.

<table>
<thead>
<tr>
<th>Age: 18-24</th>
<th>I chose to REVEAL this information to my guide.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I would only agree to not reveal this information if I got a bonus of $1.4 or more for doing so.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Has an active imagination?: Neither agree nor disagree</td>
<td>I chose to NOT REVEAL this information to my guide.</td>
</tr>
<tr>
<td>Tends to find fault with others?: Agree a little</td>
<td>I chose to REVEAL this information to my guide.</td>
</tr>
<tr>
<td>Felt little interest or pleasure in doing things?: More than half the days in last two weeks</td>
<td>I chose to NOT REVEAL this information to my guide.</td>
</tr>
<tr>
<td>Felt down, depressed, or hopeless?: Nearly every day in last two weeks</td>
<td>I would only agree to reveal this information if I got a bonus of $1.5 or more for doing so.</td>
</tr>
</tbody>
</table>
Figure A.5: Effects of experience on discrimination.

Panel A: Effect of revealing symptoms in rounds 1 and 2

Panel B: Effect of revealing symptoms in rounds 3 and 4

Notes: This figure shows the results from figure 4 split up into early (rounds 1 and 2) and late (rounds 3 and 4) rounds of the task. Vertical lines show 95% confidence intervals.
Figure A.6: Effects of experience on discrimination: comparison with other traits.

Panel A: Effects of different traits in rounds 1 and 2

Panel B: Effects of different traits in rounds 3 and 4

Notes: This figure shows the results from figure 5 split up into early (rounds 1 and 2) and late (rounds 3 and 4) rounds of the task. Vertical lines show 95% confidence intervals.
Notes: This figure shows results from the same equation as the WTP results in figure 5, but estimated on the follow-up sample in which there was only one round and no financial reward for success. \( n = 89 \) for this sample. Vertical lines show 95% confidence intervals.
Figure A.8: Association of productivity with willingness to reveal symptoms.

Notes: This figure shows the slope coefficient from a regression of willingness to pay to reveal symptoms on average productivity, for each category of symptoms. Vertical lines show 95% confidence intervals.
Figure A.9: Association of education with willingness to reveal symptoms.

Notes: This figure shows the mean willingness to pay to reveal symptoms for those without a four-year college degree (light blue) and those with a four-year or postgraduate degree (dark blue). Vertical lines show 95% confidence intervals.
## A.2 Supplementary Tables

Table A.1: Effect of previously working with a depressed or anxious coworker on discrimination.

<table>
<thead>
<tr>
<th>Model</th>
<th>(1) WTP</th>
<th>(2) WTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Symptoms X Previous dep./anx. coworker</td>
<td>0.777</td>
<td>(0.617)</td>
</tr>
<tr>
<td>Moderate Symptoms X Previous dep./anx. coworker</td>
<td>0.730</td>
<td>(0.669)</td>
</tr>
<tr>
<td>Severe Symptoms X Previous dep./anx. coworker</td>
<td>-2.125</td>
<td>(1.138)</td>
</tr>
<tr>
<td>Mild Symptoms X Previously saw symptom info</td>
<td>0.361</td>
<td>(0.613)</td>
</tr>
<tr>
<td>Moderate Symptoms X Previously saw symptom info</td>
<td>0.406</td>
<td>(0.521)</td>
</tr>
<tr>
<td>Severe Symptoms X Previously saw symptom info</td>
<td>-0.903</td>
<td>(0.859)</td>
</tr>
</tbody>
</table>

N 458 458

Standard errors in parentheses

* p < 0.05, ** p < 0.01, *** p < 0.001

Notes: This table shows results from estimation of equation 1, augmented with interaction terms between the symptom variables and two variables measuring the participant’s previous exposure to a revealed depressed or anxious coworker. The sample is rounds 3 and 4 only. In column 1, symptoms are interacted with whether the participant choosing previously had a coworker with revealed moderate or severe symptoms in round 1 or 2. In column 2, symptoms are interacted with whether the participant choosing previously had a coworker with mental health information in their profile in round 1 or 2. I also include main effects for these variables and all the other control variables as in equation 1. Only the interaction terms are reported.
<table>
<thead>
<tr>
<th></th>
<th>(1) 1st try</th>
<th>(2) 2nd try</th>
<th>(3) 3rd try</th>
<th>(4) Exp. Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate or severe dep./anx.</td>
<td>-6.680***</td>
<td>1.163</td>
<td>-0.0976</td>
<td>-0.120***</td>
</tr>
<tr>
<td></td>
<td>(1.719)</td>
<td>(0.953)</td>
<td>(0.888)</td>
<td>(0.0284)</td>
</tr>
<tr>
<td>Previous dep./anx. coworker</td>
<td>-1.115</td>
<td>-0.00291</td>
<td>-0.782</td>
<td>-0.0255</td>
</tr>
<tr>
<td></td>
<td>(3.473)</td>
<td>(1.816)</td>
<td>(1.582)</td>
<td>(0.0544)</td>
</tr>
<tr>
<td>Moderate or Severe dep./anx. X Previous dep./anx. coworker</td>
<td>8.768</td>
<td>-3.545</td>
<td>1.374</td>
<td>0.138</td>
</tr>
<tr>
<td></td>
<td>(4.606)</td>
<td>(2.428)</td>
<td>(2.148)</td>
<td>(0.0743)</td>
</tr>
<tr>
<td>N</td>
<td>2508</td>
<td>2508</td>
<td>2508</td>
<td>2508</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* *p < 0.05, ** *p < 0.01, *** *p < 0.001

Notes: This table shows results from estimation of the same regression as in table 3, augmented with interaction terms between moderate/severe symptoms and whether the participant reporting beliefs previously had a coworker with revealed moderate or severe symptoms. I show the main effects for each of these variables plus the interaction term; a full set of controls for other profile information as in equation 1 was also included.
Table A.3: Robustness checks for the effect of revealing depression/anxiety symptoms on demand (WTP) and productivity

<table>
<thead>
<tr>
<th></th>
<th>(1) WTP</th>
<th>(2) Prod.</th>
<th>(3) WTP</th>
<th>(4) Prod.</th>
<th>(5) WTP</th>
<th>(6) Prod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No symptoms</td>
<td>-0.0653</td>
<td>0.0495</td>
<td>-0.0498</td>
<td>0.0495</td>
<td>0.138</td>
<td>0.00479</td>
</tr>
<tr>
<td></td>
<td>(0.192)</td>
<td>(0.181)</td>
<td>(0.188)</td>
<td>(0.181)</td>
<td>(0.177)</td>
<td>(0.166)</td>
</tr>
<tr>
<td>Mild symptoms</td>
<td>-0.271</td>
<td>0.0746</td>
<td>-0.362</td>
<td>0.0746</td>
<td>-0.0448</td>
<td>0.0764</td>
</tr>
<tr>
<td></td>
<td>(0.227)</td>
<td>(0.211)</td>
<td>(0.227)</td>
<td>(0.211)</td>
<td>(0.215)</td>
<td>(0.190)</td>
</tr>
<tr>
<td>Moderate symptoms</td>
<td>-0.665**</td>
<td>0.285</td>
<td>-0.672**</td>
<td>0.285</td>
<td>-0.560**</td>
<td>0.353*</td>
</tr>
<tr>
<td></td>
<td>(0.206)</td>
<td>(0.173)</td>
<td>(0.206)</td>
<td>(0.173)</td>
<td>(0.193)</td>
<td>(0.162)</td>
</tr>
<tr>
<td>Severe symptoms</td>
<td>-0.812**</td>
<td>0.556**</td>
<td>-0.713**</td>
<td>0.556**</td>
<td>-0.734**</td>
<td>0.518**</td>
</tr>
<tr>
<td></td>
<td>(0.265)</td>
<td>(0.212)</td>
<td>(0.274)</td>
<td>(0.212)</td>
<td>(0.246)</td>
<td>(0.188)</td>
</tr>
</tbody>
</table>

Controls for day and time | Y | Y | Y | Y | Y | Y
Drop attriters | | | | | | |
Don’t drop technical errors | | | | | | |

Notes: This table shows three different robustness checks (modification to the main specification) for the regressions in columns 1 (WTP) and 3 (productivity) of table 2. In columns 1 and 2, I add controls for indicator variables for the day of the week and hour of the day at which participants did the task. This addresses concerns that participants may have chosen when to show up in a way that was correlated with both profile characteristics and unobservable determinants of WTP or productivity. In columns 3 and 4 I drop observations with participants who did not complete the experiment. In columns 5 and 6 I add back observations that were dropped because of a probable technical error when completing the round. In all cases the results are similar to those in table 2.
A.3 Incentive-compatibility of WTP elicitation mechanism

When matched to a potential coworker, participants are asked to choose between two options: work with this coworker, which I denote $W$, or be re-matched to a new person, which I denote $R$.

Let the participant have utility function $u(C,x) = v(C) + x$ where $C \in \{W,R\}$ is the option they get and $x$ is money. Assume that they have expected utility preferences.

Let $N(C)$ denote the complement of the option $C$ in $\{W,R\}$, i.e. $N(C) = W$ if $C = R$ and $N(C) = R$ if $C = W$.

Define $C^* = \arg \max_C u(C,0)$, the preferred option.

Define the participant’s willingness to pay to work with the coworker as the amount $P$ such that $u(W,0) = u(R,P)$. $P$ is positive if $C^* = W$ and negative if $C^* = R$.

I will prove that the elicitation procedure described in section 2.5 is incentive-compatible for eliciting $P$ when $P \in [-$2.50, $2.50]$. This procedure is as follows:

1. The participant reports which option they prefer, $\tilde{C} \in \{W,R\}$.
2. The participant reports an amount $\tilde{P} \in [0,$2.50$]$. 
3. A random pair of option and bonus $(c,p)$ is chosen, where $c \in \{W,R\}$ and $p \in [0,$2.50$]$. 
   Then:
   (a) The participant receives $(c,p)$ if $c = \tilde{C}$ or $p > \tilde{P}$.
   (b) The participant receives $(N(c),0)$ otherwise.

Proof. We want to show that reporting $\tilde{C} = C^*$ and $\tilde{P} = |P|$ is a dominant strategy when $|P| < $2.50. If so, the true WTP $P$ can be easily recovered as $-\tilde{P}$ when $\tilde{C} = R$ and $\tilde{P}$ when $\tilde{C} = W$.

First observe that the highest possible utility the participant could obtain from any strategy is $U^\text{max} = E_{c,p} \max\{u(c,p),u(N(c),0)\}$, because the participant always receives either $(c,p)$ or $(N(c),0)$.

Then, we just need to show that the participant can obtain $U^\text{max}$ by reporting $\tilde{C} = C^*$ and $\tilde{P} = |P|$.

First consider the offers $(c,p)$ such that $c = C^*$. We have $u(c,p) > u(N(c),0)$. If the participant reports $\tilde{C} = C^*$, they will receive $(c,p)$ by step 3.i above. So they receive the maximum utility in this case.

Then consider the offers $(c,p)$ such that $c = N(C^*)$. Here we have $u(c,p) \geq u(N(c),0)$ if and only if $p > |P|$. So by reporting $\tilde{P} = |P|$ the participant can ensure they receive the higher-utility option.

A.4 Belief Elicitation

I elicited each participant’s beliefs about the performance of three other randomly-selected participants (in a randomly-selected round) in the task, based on profiles of these people. Participants reported their subjective probability that each person had (together with their coworker) found the location in one, two or three tries or not at all.

Elicitation was by a log scoring rule calibrated so that participants received $0.50 if they put a probability of 1 on the true outcome and $0 if they put a probability of 0 on the true
outcome. The elicitation mechanism was implemented for one of the three profiles, selected at random. It was explained to participants that “you can expect to earn the most money by saying what you really think”.

Figure A.10 below shows how the elicitation looked for participants in the task.
Figure A.10: Belief elicitation as presented to participants

### Guess how these 3 people performed

<table>
<thead>
<tr>
<th>Person 1</th>
<th>What is the probability that this person found the location?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>4 year+ degree</td>
</tr>
<tr>
<td><strong>Tends to find fault with others?</strong></td>
<td>Agree strongly</td>
</tr>
<tr>
<td><strong>Political party</strong></td>
<td>Democrat</td>
</tr>
<tr>
<td><strong>Move the sliders</strong> to make your guesses.</td>
<td></td>
</tr>
<tr>
<td>Your answer: the chance is...</td>
<td></td>
</tr>
<tr>
<td><strong>27</strong> % they found it on their first try. (You get $0.36 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>23</strong> % they found it on their second try. (You get $0.34 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they found it on their third try. (You get $0.35 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they failed or gave up. (You get $0.35 if they did)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person 2</th>
<th>What is the probability that this person found the location?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Female</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>Some college</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>35-44</td>
</tr>
<tr>
<td><strong>Completed HITs</strong></td>
<td>5,000-10,000</td>
</tr>
<tr>
<td><strong>Move the sliders</strong> to make your guesses.</td>
<td></td>
</tr>
<tr>
<td>Your answer: the chance is...</td>
<td></td>
</tr>
<tr>
<td><strong>27</strong> % they found it on their first try. (You get $0.36 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>23</strong> % they found it on their second try. (You get $0.34 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they found it on their third try. (You get $0.35 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they failed or gave up. (You get $0.35 if they did)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person 3</th>
<th>What is the probability that this person found the location?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>4 year+ degree</td>
</tr>
<tr>
<td><strong>Has an active imagination?</strong></td>
<td>Agree strongly</td>
</tr>
<tr>
<td><strong>Political party</strong></td>
<td>Democrat</td>
</tr>
<tr>
<td><strong>Move the sliders</strong> to make your guesses.</td>
<td></td>
</tr>
<tr>
<td>Your answer: the chance is...</td>
<td></td>
</tr>
<tr>
<td><strong>28</strong> % they found it on their first try. (You get $0.36 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>22</strong> % they found it on their second try. (You get $0.34 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they found it on their third try. (You get $0.35 if they did)</td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> % they failed or gave up. (You get $0.35 if they did)</td>
<td></td>
</tr>
</tbody>
</table>