Recognition Thresholds and the Gender Gap in Depression[*]

Catalina Franco[†] Akshay Moorthy[‡] Sara Abrahamsson[§]

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Abstract

Worldwide, depression is more common among women than men, but it is unclear whether this reflects differences in distress or in who is recorded as depressed. We find that the gap shrinks when symptoms are measured in representative surveys rather than epidemiological data, consistent with selection into measurement. We then conduct a pre-registered vignette experiment isolating how individuals interpret symptoms and decide whether to seek help. Men are less likely than women to recognize depression and to seek help. These results indicate a higher self-classification threshold for men, implying that measured prevalence partly reflects behavior rather than underlying mental health.

JEL codes: I12, I14, I18, J16, C91
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[†] Center for Applied Research (SNF) and FAIR at NHH – Norwegian School of Economics.

[‡] Faculty of Business and Economics, University of Lausanne.

[§] Division of Health Services at the Norwegian Institute of Public Health in Oslo, Norway.

1 Introduction

Mental health disorders are a leading cause of disability worldwide, affecting over one billion people and costing about USD 5 trillion annually (Rehm and Shield, 2019; Arias et al., 2022). One of the most persistent empirical patterns in mental health is the gender gap in depression: women are diagnosed at roughly twice the rate of men, a disparity documented since the 1970s and consistently observed across settings (Weissman and Klerman, 1977; Hyde et al., 2008; Van de Velde et al., 2010). This gap matters economically because mental health conditions affect labor supply, absenteeism, and earnings (Goodman et al., 2011; Ridley et al., 2020; Biasi et al., 2021; Currie, 2024; Carvalho et al., 2026), potentially contributing to gender gaps in labor market outcomes. However, the diagnostic gap is difficult to interpret because it may reflect differences in mental health as well as in the recognition and measurement of depression.

In this paper, we hypothesize that the gender gap partly arises from differences in the threshold at which symptoms are interpreted as depression. Before entering healthcare data, individuals must recognize their symptoms as indicative of depression and act upon that interpretation. If men require a higher threshold—more severe symptoms—to classify their distress as depression, they will be systematically underrepresented in diagnosed cases even when symptom levels are comparable. Measured prevalence would therefore combine true illness with selection into measurement.

Empirically testing this mechanism is challenging because standard data observe individuals only after recognition and healthcare contact. However, entry into screening is non-random and affected by healthcare utilization[1], insurance coverage, social norms, perceived stigma (Roth et al., 2024a) and perceptions about treatment effectiveness (Roth et al., 2024b). As a result, prevalence measurements conflate individuals' underlying symptoms with their willingness and ability to interpret and report them as depression.

To address this challenge, we first examine whether the gender gap varies with the degree of selection into measurement by comparing prevalence ratios across sources that

[1] For example, if women are more likely to visit physicians or be screened (Corredor-Waldron and Currie, 2024), observed gender differences in diagnoses partly reflect differential entry into measurement rather than true prevalence differences.

differ in how cases are recorded—after healthcare contact versus population screening. We then implement a pre-registered online experiment to test whether men and women differ in the symptom severity required to recognize depression and seek help. Our main contribution is to provide evidence that part of the gender gap arises because men are less likely to appear in depression statistics, with the experimental results pointing to lower recognition and help-seeking among men as a plausible mechanism.

We compare female-to-male prevalence ratios in the United States from the Global Burden of Disease Collaborative Network (2025), which synthesize epidemiological and clinical data, to equivalent ratios constructed from population screening data in the National Health and Nutrition Examination Survey (CDC and NCHS, 2024) and an online screening U.S. sample from Prolific (Roth et al., 2024a,b). Under our hypothesis, the gender gap should be smaller in screening samples because they capture symptoms directly rather than relying on downstream processes requiring individuals to recognize their symptoms as depression and make healthcare contact.

Our first finding is that the female-to-male depression prevalence ratio declines substantially when measured using survey data rather than aggregated epidemiological and clinical data. The ratio decreases from 1.7 in the Global Burden of Disease data to 1.4 in the NHANES sample and 1.3 in the Prolific sample. This pattern is consistent with lower selection into measurement in survey samples because: (i) individuals are sampled independently of their mental health concerns, and (ii) responses carry no clinical consequences, so reporting does not require recognizing the condition as depression or seeking care. This finding suggests that a nontrivial share of men experiencing depressive symptoms may not appear in recorded prevalence statistics.

Next, we propose an experimental design to bypass underrecognition and underreporting present in real-life depression cases. We use hypothetical depression scenarios in a pre-registered experiment with a representative sample of U.S. Prolific workers. In the experiment, participants review hypothetical scenarios in two treatment blocks: *Self* (where they imagine experiencing the symptoms themselves) and *Other* (where the subject is a hypothetical male or female individual). Each scenario is defined by a randomly selected PHQ-9 score and a corresponding set of symptoms and frequencies randomly drawn to match that score.[2] After reviewing each scenario, participants assess whether the symptoms indicate depression (*recognition*), its perceived *severity* and the likelihood of *seeking help*.

Our second main finding is that men face a "double whammy" in mental health: they are less likely than women to recognize depression, especially at milder severity levels, and less willing to seek help. In all our hypothetical scenarios, each depicting varying degrees of depression, more than 85% of women classify the symptoms as depression, whereas men are 5.3 percentage points (pp) less likely to do so overall and 14.5 pp less likely in mild cases. Consistent with different classification thresholds, women are more likely to rate scenarios as more severe than implied by the PHQ scale, indicating overestimation of symptom severity. Men are also less likely to seek help from specialist sources (6.1 pp overall and 10.6 pp in mild scenarios), and this gap persists even at higher severity levels.[3]

Our third finding is that, psychic costs, the emotional and mental burden associated with admitting a mental health issue, appears to be the main underlying driver of the "double-whammy" of mental health for men. When evaluating scenarios about themselves, men are 4.2 pp less likely than women to report willingness to seek help, whereas no gender difference arises when the scenario concerns others, indicating that men view treatment as appropriate but are less willing to apply it to themselves. The recognition gap is concentrated among older men, while willingness to seek help shows little age variation, implying that the friction operates primarily at the stage of acknowledging symptoms. This pattern is consistent with evidence that older generations—particularly men—exhibit lower mental-health literacy and greater stigma toward depression, which may increase the psychological cost of self-classification (Farrer et al., 2008; Möller-Leimkühler, 2002).

Our paper contributes to a long-standing literature documenting gender differences in depression as one of the most robust findings in psychopathology research (Hyde et al.,

[2] The PHQ-9 (Patient Health Questionnaire-9) is a nine-item depression assessment tool widely used in clinical screening and self-assessment (Kroenke et al., 2001). Its score helps determine the severity of depressive symptoms.

[3] In general, men are less than or equally likely than women to seek help from different specialist and non-specialist sources, with the exception of AI-enabled mental health chatbots, where men report a greater willingness to seek help from that source than women, which is consistent with previously documented gender gaps in AI adoption and use (Carvajal et al., 2024; Chatterji et al., 2025).

2008). Prior work attributes the gap to biological, psychological, and environmental factors (Hyde et al., 2008; Girgus and Yang, 2015; Call and Shafer, 2018).[4] Although this literature has considered the possibility that women are more willing to recognize and report depressive symptoms, it has largely concluded that such "artefactual" explanations do not account for the observed disparity (Girgus and Yang, 2015). We revisit this question using evidence that varies selection into measurement and experimentally isolates recognition and help-seeking decisions. We show that lower selection environments exhibit smaller gender gaps and that, conditional on identical symptoms, men are less likely to recognize depression and seek help. Our findings therefore contribute to the understanding of gender gaps in mental health by highlighting the role of behavioral factors in the demand for mental health treatment, an explanation that has largely been dismissed in previous work. Importantly, our findings point to new and actionable levers for public health policy.

To the best of our knowledge, no prior work in economics has directly examined behavioral drivers of *gender gaps* in mental health. Much of the literature studies the effectiveness of treatment (e.g., Baranov et al., 2020; Ridley et al., 2020; Angelucci and Bennett, 2024), which by design presumes that screening or diagnosis has already occurred. More recent work considers how misinformation, perceived treatment effectiveness, and stigma affect treatment demand (Acampora et al., 2022; Roth et al., 2024b,a). Our paper complements this research by identifying two behavioral barriers—recognition and self-directed help-seeking—and showing that they differ systematically by gender. The results imply that measured prevalence and treatment uptake depend on how individuals interpret symptoms, highlighting a behavioral margin and a gender angle relevant for both clinical and informational interventions.

2 Selection in the Measurement of Depression Gender Gaps

Our premise is that recorded depression prevalence depends not only on underlying symptoms but also on how individuals enter measurement. Some data sources record cases only

[4] These include biological differences (such as hormonal variation and genetic predisposition), coping mechanisms (e.g., rumination and need for approval), gendered manifestation of symptoms, and differential exposure to stressors (e.g., sexual abuse and social image concerns).

after individuals interpret their symptoms as depression and seek care, while others measure symptoms directly through population screening. We refer to these differences in entry into measurement as selection into measurement.

To assess whether selection contributes to the gender gap in depression, we compare female-to-male prevalence ratios across sources that differ along this dimension. Aggregated epidemiological estimates rely more heavily on recognized cases, whereas screening surveys capture symptoms regardless of prior recognition. If men require more severe symptoms to classify distress as depression, the observed gender gap should be larger in data sources that depend more heavily on self-recognition.

We use estimates provided by the Global Burden of Disease Collaborative Network (2025), which synthesizes epidemiological and clinical information,[5] and survey data from the 2021-2023 National Health and Nutrition Examination Survey (CDC and NCHS, 2024), which administers standardized screening instruments to a representative U.S. sample (N=6,337), and a large online screening sample collected on Prolific in 2022 (N=18,982) for the research reported in Roth et al. (2024a) and Roth et al. (2024b).[6] These sources differ in the extent to which individuals must recognize and report their condition prior to measurement, with screening in representative surveys presumably involving the least selection.

Figure 1a presents the fraction of individuals classified as depressed by the NHANES 2021-2023 by age and gender. Two main patterns emerge: the prevalence for women is higher than for men across all ages, and there is a sharp decline by age in the fraction of men and women who would be classified as depressed based on their PHQ-9 score. The mean depression prevalence among women is 13.39% relative to 9.34% for men, which translates into a female-to-male prevalence ratio of 1.4.

Figure 1b plots female-to-male depression prevalence ratios across data sources and definitions of depression. Using GBD estimates, prevalence equals 6.53% for women and 3.90% for men, equivalent to a ratio of 1.7, consistent with long-standing epidemiological

[5] The GBD database collects data through various sources, including official statistical systems (population censuses, vital statistics, and civil registration), health surveys (national health surveys and disease-specific surveys), medical records (hospital statistics, disease surveillance reports, and insurance claims), scientific research (epidemiological studies and clinical trials), and environmental monitoring (satellite imagery and air quality measurements), and other sources (Zhao et al., 2025).

[6] We thank the authors for their generosity in sharing their dataset.

evidence and depression rates based on administrative data on diagnoses.[7] Using symptom-based screening with the standard PHQ-9 threshold for major depression (score ≥ 10), the ratio falls to 1.4 in NHANES and 1.3 in Prolific. Expanding the definition to include mild symptoms (PHQ-9 ≥ 4) further reduces the ratio to 1.3 in NHANES and 1.1 in Prolific, bringing the ratio close to gender parity in Prolific. This pattern is consistent with men being less likely to appear in recorded prevalence when identification requires recognizing symptoms or seeking care.[8] We test this interpretation directly in the experimental design.

3 Experimental Design

Motivated by these patterns, we design an experiment to identify whether men and women differ in how they evaluate and respond when faced with the same set of depressive symptoms. To this end, we implement a within-subjects online experiment in which all participants evaluate four hypothetical scenarios. While responses to hypothetical scenarios may be subject to biases (Loomis, 2011), they sidestep many confounding factors such as selection into measurement and diagnosis, financial or other material constraints, and differential reporting of one's own symptoms. Crucially, this approach standardizes the stimulus: each respondent is exposed to identical symptom profiles and contextual information, so gender differences in responses can be attributed to recognition, interpretation, and intended behavior rather than heterogeneity in underlying distress. Moreover, by varying features of the vignettes across scenarios, we can characterize gender differences in classification thresholds and assess the role of contextual cues and behavioral mechanisms in recognition and help-seeking. This approach overcomes a key limitation of observational data, where men and women may report different symptoms or the distribution of experienced PHQ-9 scores may differ by gender, preventing recognition comparisons.

The scenarios are based on the PHQ-9 instrument (Kroenke et al., 2001), a widely-used

[7] Specifically, we have access to administrative data on depression diagnoses in Norway. In 2021, the depression rates were xx% for women and xx% for men, which give a ratio of XX.

[8] The prevalence rates by gender from NHANES and Prolific are reported in Appendix D. As expected, they are higher than the GBD estimates because these surveys capture symptoms in the general population rather than only among individuals who seek care or screening. We focus on prevalence ratios to isolate relative gender differences rather than variation in overall prevalence.

diagnostic tool for depression and mental health. The PHQ-9 consists of 9 depression symptoms and their occurrence frequencies over a two-week period. The assessment results in a score (ranging from 0 to 21), which indicates the severity of depression and whether further action is required. The PHQ-9 instrument is widely used in both clinical screenings and self-assessments, and is recommended by national public health agencies in many countries as an initial step in evaluating the need for further care. However, access to this instrument and its recommendations requires a degree of recognition that depression may exist – i.e. selecting into screening.

We randomly generate depression scenarios, each of which represents a (randomly drawn) target PHQ-9 score, ranging from 4 to 21.[9] The scenarios consist of a set of depression symptoms and the frequency with which these symptoms occurred over a two-week period. The scenarios are constructed by a randomization procedure that selects symptom items and frequencies to match a randomly selected "target" PHQ-9 score between 4 (minimal depression) and 21 (severe depression).[10] This provides quantitative variation in the severity of the scenario because of differences in the PHQ-9 scores, and qualitative variation based on differences in the chosen symptoms and severity levels.

Participants see four scenarios across two randomized treatment blocks: *Self* and *Other*. The two treatment blocks differ only in the subject of the hypothetical scenario. In *Self*, the subject of the hypothetical scenario is the participant themselves. In *Other*, the subject of the scenario is a hypothetical individual who is either male or female, randomized between-subjects. Specifically, we provide a name that clearly signals the gender of the individual, along with basic background information which is the same in both treatments. The symptoms displayed in the second scenario of the *Other* block are the same for all participants, and is always shown at the end of the survey.

[9] We exclude the extreme ends of the scale to focus statistical power on scenarios that are more ambiguous.

[10] See Appendix Section C for the complete symptom list and severity classification and Appendix Section G for the randomization procedure.

3.1 Main outcomes

After reviewing each hypothetical scenario, participants make three evaluations. First, they state whether they think that the subject of the scenario is suffering from depression on a 4-point scale ranging from "Definitely yes" to "Definitely no" (no neutral option). We construct an indicator variable, *Recognition*, which is equal to 1 if the participant states that the symptoms indicate depression, and is 0 if not.

Second, participants provide an evaluation of the severity level of the depression symptoms presented in the scenario by choosing one of five options—None or minimal, mild, moderate, moderately severe, or severe. These levels correspond to the diagnostic categories of the PHQ-9 instrument. We use responses to this question to construct an indicator variable, *Accuracy*, which is equal to 1 if the participant's assessment is equal to the PHQ-9 assessment.

Finally, we elicit participants' assessments of the likelihood that the subject of the scenario would seek help from each of six different sources.[11] These assessments are aggregated into an indicator variable, *Seek help* which is equal to 1 if the participant thinks that the subject of the scenario would seek help from at least one of the six sources.

Together, these main outcomes provide a comprehensive overview of the different stages of recognition and help-seeking behavior that may drive reported instances of depression. We complement these main outcomes with additional survey questions to study whether psychic costs, perceptions, or norms affect these outcomes. The survey questions used to study these are described in Section 5.

3.2 Study procedures and sample descriptives

The experiment was conducted with a sample of 401 U.S. participants recruited through the online survey platform Prolific. Participants evaluated four different scenarios for a total sample size of 1,604 scenarios. The sample is representative of the U.S. population along gender, age, and ethnicity. The experiments were built using OTree (Chen et al., 2016). The survey was conducted in October 2024, and we pre-specified the design and hypotheses

[11] The sources consist of both specialist and non-specialist options.

(AEARCTR-0014621) before data collection. The study was reviewed and approved by the IRB at the Norwegian School of Economics. The analysis follows the pre-analysis plan for the most part (see Appendix I), and any deviations or exploratory analyses are clearly identified in the text.

We collected participants' background characteristics and their prior experience with mental health screening tools. Of the 1,604 scenario evaluations we analyze,[12] 820 (51.1 percent) were completed by women. The mean age for women (men) in the sample is 46 (45) years old, 43% of women (34.7% of men) have less than a bachelor's degree, 59.5% of women (75% of men) are employed, 53.2% of women (62.8% of men) have an annual household income at or above US $50,000, and 21% of women (40% of men) were not familiar with depression screening tools at the moment they answered the survey.

Appendix Figure A.3 shows a histogram of the PHQ-9 scores of the 1,604 scenarios displayed to participants. A quarter of the scenarios have a score of 4, which corresponds to the scenario that is presented to all participants. The distribution of scenarios is relatively uniform between scores of 5 and 21, as expected given the randomization of target PHQ-9 scores.

4 Analysis Of Gender Differences

We first analyze the raw data at the scenario level by plotting the three main outcome variables (depression recognition, accurate severity and help seeking) against the PHQ-9 score of the scenario, separately by the gender of the respondent. We use binned scatter plots, controlling for the treatment assignment (*Self* vs. Other), whether the subject in the *Other* scenario is a male or a female, and the order in which the scenarios were presented.[13]

Second, we conduct a regression analysis of the three main outcomes on a gender indicator (*Male* $= 1$ if the participant is male) (see Equation 3), and *Male* together with indicators for severity levels of the scenario (Mild, Moderate and Moderately severe, with excluded indicator Minimal) and the interactions between Male and the severity levels (see Equation

[12] We exclude 44 evaluations from 11 individuals who reported non-binary gender.

[13] The fourth scenario was fixed so instead of controlling for the numerical order of the scenario, we control for whether *Self* or *Other* was presented first.

4).[14] All regressions include demographic controls (participant age, education, employment, income level, and familiarity with depression screening tools), treatment and order controls. Standard errors are heteroscedasticity robust and clustered at the participant level.

$$y_i = \alpha_0 + \alpha_1 \text{Male}_i + \gamma' X_i + \varepsilon_i \tag{1}$$

$$\begin{aligned} y_i = &\beta_0 + \beta_1 \text{Male}_i + \beta_2 \text{Mild}_i + \beta_3 \text{Male}_i \times \text{Mild}_i + \beta_4 \text{Moderate}_i + \\ &\beta_5 \text{Male}_i \times \text{Moderate}_i + \beta_6 \text{Modsevere}_i + \beta_7 \text{Male}_i \times \text{Modsevere}_i + \gamma' X_i + \varepsilon_i \end{aligned} \tag{2}$$

4.1 Depression recognition

Our first main finding is that women are more likely than men to recognize depression. Figure 2a shows binned scatterplots of depression recognition by PHQ-9 score, separately by gender. We make two observations from Figure 2a. First, recognition is generally high, as expected given that all scenarios depict depression: over 90% of women and 70% of men correctly identify it. Second, for both genders, recognition increases with the severity of the depression symptoms presented in the scenario, but the gradient is steeper for men. At moderate to severe levels (PHQ-9 scores of 15–21), nearly all respondents, regardless of gender, recognize depression. At minimal to mild levels (PHQ-9 scores of 4–10), however, a pronounced gender gap emerges, with women significantly more likely to recognize depression than men.

We quantify gender differences in depression recognition in Table 1. Column (1) shows an overall gender gap of 5.3 pp, from a base of 95% of women recognizing depression. The gap is substantially larger (14.5 pp, or 17%) at minimal depression levels, where 87% of women identify the scenario as depression (Col. (2)). Recognition rates increase sharply with severity for both genders, reaching near-universal recognition at moderate, and moderately severe levels. Men show a larger increase in recognition across these categories, as reflected in the positive interaction terms between male and depression severity. Exploratory

[14] In the PAP, we intended to use indicators for Moderate, Moderately severe and Severe, with excluded indicator Mild. However, since we also have a scenario that depicts minimal depression (PHQ-9 score equal to 4) that all participants evaluated, we decided to include it in the analysis and changed the omitted category to Mild. We also combined the categories Moderately severe and Severe because there did not seem to be any difference between these two by looking at the scatterplots.

analyses show that the gender gap in recognition exhibits a pronounced age gradient, with men below 30 years old having similar recognition rates as women, but much lower rates at older ages (Figure 2b).

In sum, we find a sizable gender gap in depression recognition, with women having a lower threshold to recognize depression symptoms than men. This pattern is driven by men being less likely than women to recognize depression at milder severity levels, but not at the more severe levels.

4.2 Accuracy in recognizing depression severity

Our second pre-registered outcome captures whether individuals accurately classify the severity of depression indicated by the symptoms in a given scenario. Misclassifications add an additional layer to recognition failures, as systematically underestimating symptom severity may reduce the likelihood of seeking help. Conversely, overestimating severity could lead to overdiagnosis or excessive concern.

Figure 3 presents binned scatter plots of severity classification accuracy by PHQ-9 score. Panel 3a shows that accurate classification is generally low, particularly at lower severity levels: fewer than 20% of participant assessments correctly classify severity for scenarios with PHQ-9 scores up to 10 (minimal or mild depression). Accuracy improves with severity but remains low with only about 50% of assessments being correct even at the highest scores. Panels 3b and 3c decompose these inaccuracies into over- and underestimation. Most errors stem from overestimating severity, especially at the lower end of the PHQ-9 scale, although this pattern persists across the full support of the PHQ-9 score.

A second key pattern is that men are statistically significantly more accurate than women in classifying severity across all levels. Overall, men are 6.8 pp more accurate in their depression severity assessments than women, a 40% difference off a base of 18% of accurate assessments among women (Table 1, Col. (3)). This gender gap in severity classification persists across the full range of PHQ-9 scores (Table 1, Col. (4)). There is no age gradient in accuracy, but rather men are consistently more accurate than women across all ages (Figure A.4a).

4.3 Willingness to seek help

Our third pre-specified outcome captures participants' willingness to seek help after viewing the list of symptoms. This question was asked regardless of whether respondents correctly recognized the symptoms as depression, since individuals may be inclined to seek help even without labeling the condition. Participants considered six possible sources of help, which we classify as either specialist or non-specialist. Help-seeking behavior is central to understanding gender gaps in diagnosed depression rates, as these rates often reflect contact with healthcare providers, whether through routine screenings or active help-seeking. Our measure focuses on the latter.

Figure 4 presents binned scatterplots of willingness to seek help as a function of PHQ-9 scores combining both specialist and non-specialist sources in Panel 4a, and shown separately in Panels 4b and 4c.[15] Overall, participants report being likely or very likely to seek help in over 90% of the scenarios, with little variation across the severity spectrum. Men and women exhibit similar patterns, though men report slightly lower average willingness to seek help. However, confidence intervals for the two groups overlap at several points across the PHQ-9 distribution (Panel 4a). Columns (5) and (6) in Table 1 show that the point estimates are negative but only significant at the 10% level, consistent with no overall gender differences in reported help-seeking behavior.

While overall help-seeking does not differ by gender, the sources to which men and women turn for help do. First, as shown in Panels 4b and 4c, reported willingness to seek help differs substantially between specialist and non-specialist sources, particularly for women. Both men and women express high willingness to seek help from non-specialist sources—such as counselors, friends, or AI-enabled mental health chatbots—in approximately 80–85% of scenarios. Willingness to seek help from specialist sources—such as general practitioners or therapists—is higher overall for both genders. Second, striking gender differences appear in the willingness to seek help from specialist sources. Women report being willing to seek specialist help in 95% of scenarios, regardless of depression severity. In contrast, men's

[15] Each participant evaluates four scenarios in which the subject is either themselves ("Self") or someone else ("Other"). In these plots, we pool across both conditions; the *Self* vs. *Other* treatment assignment is analyzed in Section 5.

willingness starts at around 80% for mild depression and increases with severity, reaching parity with women only at the most severe levels. Among non-specialist sources, the only source where men would be more eager than women to seek help from is AI-enabled mental health chatbots (see Figure A.5). There is no age gradient in seeking help (Figure A.4b).

The gender difference in seeking help from specialist sources is quantified in Table B.1. Column (1) shows that the overall gender gap is 6.1 pp or 6.4% relative to a base of 95% of women reporting that the subject of the scenario would/should seek help. In Column (2), we see that the gender gap in seeking help from specialist sources is driven by the mild scenarios, where men are 10.6 pp or 11% less likely than women to report seeking help from specialist sources in scenarios with PHQ-9 scores between 5 and 10. However, the large and positive interaction coefficient on Male and Moderately severe scenario indicates that the gender gap in seeking help from specialist sources would close when depression is severe enough. There are no significant coefficients on Columns (3) and (4) corresponding to seeking help from non-specialist sources.

Our findings suggest that while overall willingness to seek help is high, important gender differences emerge in the type of help sought. In particular, men are less likely than women to seek help from specialist providers, especially at lower levels of depression severity. This gap may contribute to underdiagnosis among men, as specialist contact is often required for formal diagnosis and treatment.

4.4 Robustness checks

To allay concerns that factors such as survey fatigue, overattention to certain symptoms and failure to recognize depression might affect participant responses, we conduct three robustness exercises. The first includes observations only from the first two scenarios that participants evaluate, which avoids both considerations related to survey fatigue and concerns that responses might be influenced by exposure to earlier scenarios. The second exercise uses all four scenarios but excludes those in which the suicidal ideation item (Q9) was listed among the symptoms, to ensure that recognition is not mechanically driven by this particularly salient indicator of depression. The last exercise excludes scenarios in which participants do not recognize that the scenario corresponds to depression, which intends to ensure that subsequent responses are not contaminated by a basic failure to identify the condition in the first place. We briefly discuss concerns related to social desirability bias in Subsection H.1.

The results of these analyses are in Appendix Tables B.4 - B.6 and show that our results presented in Table 1 are robust to these potential concerns. Two points are worth mentioning. First, when we use only the first two scenarios seen by participants in Table B.4, the common scenario with a PHQ-9 score of 4 is excluded. Hence, there is no Mild indicator in the regression, and the mean recognition rate for women is 98%, since only scenarios with a score of at least 5 are included. The gender gap remains at 8.8 pp (9%), smaller than the 16.6% gap observed when the Mild scenario is included. Second, the gender gaps in recognition (accuracy) across severity levels increase (decrease) slightly when scenarios including Q9 on suicidal ideation are removed (Table B.5). This suggests that men are more likely to struggle with recognizing depression, or with accurately assessing its severity, when unambiguous symptoms are absent.

5 Factors underlying gender differences in depression recognition and seeking help

We complement the main analysis with a pre-registered investigation of three plausible mechanisms related to the recognition and response to mental health symptoms: perceptions, gender or masculinity norms, and psychic costs.

5.1 Psychic costs of recognition and help-seeking

Recognizing one's own mental health problems and seeking treatment can impose substantial psychic costs (Cronin et al., 2024), driven by emotions such as shame, guilt, fear, or denial and amplified by social image concerns (Chandrasekhar et al., 2018; Smith, 2023). We hypothesize these costs are higher when evaluating oneself than an unknown other, and that they differ by gender. We use within-subject variation between *Self* and *Other* scenarios, defining an indicator for the *Other* condition. This lets us test whether gender gaps in recognition reflect men identifying depression more readily in others than in themselves, consistent with psychic costs impeding self-attribution of depressive symptoms.

We assess these patterns using graphical evidence and regression analysis, modifying Equation 3 to include an indicator for the *Other* treatment and its interaction with the Male indicator when analyzing perceptions. To examine whether the gender of the scenario subject influences responses, we restrict the sample to *Other* scenarios and estimate a similar specification using an indicator for whether the subject of the scenario is male. This allows us to test whether participants respond differently based on the gender of the hypothetical individual experiencing symptoms.

Columns (1), (3), and (5) of Appendix Table B.2 present estimates from regressions of the three main outcomes on indicators for Male and Other, and their interaction. Men are 3.5 pp less likely than women to recognize depression (Column (1)), and the Male × Other interaction, while imprecisely estimated, qualitatively suggests that the gender gap in recognition is larger in *Other* scenarios. Column (3) shows that men estimate the severity of a scenario more accurately than women regardless of whether the scenario concerns oneself or another. Taken together, we do not find strong evidence that psychic costs explain the gender gap in recognition.

For help-seeking, a different pattern emerges: In *Self* scenarios, men are 4.2 pp less likely than women to report they would seek help, while in the *Other* scenarios the interaction offsets this gap, implying no gender difference in recommending help-seeking for others. Additional analyses (Appendix Table B.3) show that this divergence may be driven by a difference in the type of sources that men seek help from: men appear to be more likely to seek help from specialist than from non-specialist sources.

These findings are unlikely to be driven by social desirability bias; if this were the case, women would have to systematically overstate depression recognition at mild severity and men systematically understate it, with both groups then shifting behavior at higher-severity scenarios in ways that cancel out the bias. Likewise, men would need to underreport willingness to seek help for themselves while simultaneously overstating it for others. This set of coordinated reporting patterns seems implausible, and the heterogeneity we observe across *Self* and *Other* scenarios is inconsistent with uniform social desirability bias.

Our key takeaway from the *Self* vs. *Other* analysis is that men may be facing a "double whammy" when it concerns mental health: not only are they less likely than women to recognize depression in themselves and in others, but are also less likely to seek help when the symptoms concern themselves.

5.2 Norms

We hypothesize that gender and masculinity norms shape men's recognition of depression and willingness to seek help by raising the perceived cost of acknowledging weakness or vulnerability. Norms that emphasize toughness, self-reliance, and emotional restraint may therefore discourage men from labeling symptoms as depression or endorsing treatment-seeking (De Haas et al., 2024).

We test the role of norms in two ways. First, we examine whether responses to *Other* vignettes vary with the gender of the vignette subject (male vs. female), holding symptoms constant, which captures differential evaluation of identical symptoms across gendered targets. Second, we elicit second-order beliefs about whether other participants would classify each vignette as depression, which provides a measure of perceived social expectations within the study sample.

In Appendix Table B.2, we report regression results on our three main outcomes using the *Other* scenarios only in Columns (2), (4), and (6). The main regressors are indicators for the gender of the participant, the gender of the evaluated scenario's subject, and their interaction. If norms drive men's lower recognition, we should see lower recognition when the subject in *Other* is also male, suggesting that normative expectations about how men should feel or behave influence how male respondents interpret symptoms in others of the same gender.

Column (2) of Table B.2 shows that in *Other* scenarios where the subject is a woman, the gender gap in recognition is 10.3 pp. However, the interaction coefficient is 11.1 pp, implying that when the subject is a man, the gender gap effectively disappears. The results suggest that men perceive the same set of symptoms differently when the gender of the subject varies – they are more likely to recognize depression, less accurate, and more likely to seek help when the scenario subject is a man than when it is a woman.

The second test uses an incentivized second-order belief question, which asks participants to guess what fraction of Americans (specifically, participants in a previous study we conducted) believed that the symptoms described in a given scenario corresponded to depression.[16] The scenario was held constant across all participants; only the gender of the subject in the vignette was randomized. If perceived social expectations are an important driver of men's lower recognition of depression, we would expect male participants to estimate a lower fraction of Americans recognizing the symptoms as depression compared to female participants.

Figure A.6 presents the empirical cumulative distribution functions (CDFs) of male and female participants' guesses about the share of Americans who recognized the scenario as depression. The two CDFs are very similar (KS test: $p = 0.27$, indicating no meaningful difference in second-order beliefs across gender.

To summarize, while we do not find any evidence of a difference in social expectations between men and women, we do find suggestive evidence of a difference in how men and evaluate scenarios with different subject genders. This suggests that gender norms may play a role, but not because of systematic gender differences in social expectations.

5.3 Perceptions

The third set of mechanisms that we investigate aexplore whether men and women may differ in their perceptions of (i) the consequences of depressive symptoms, (ii) social image concerns or stigma, or (iii) the effectiveness of treatment options and their side effects. We examine whether there are gender differences in these perceptions using responses to survey questions which were presented to participants in each of the first three scenarios

[16] The scenario corresponds to a PHQ-9 score of 4 (mild depression) and includes questions 1 and 2. Details on the second-order belief question and incentivization are provided in Appendix F. We deviated from our pre-registration where we stated that this scenario would have a PHQ-9 score of 11.

(see Appendix F). Using Q4 in the survey,[17] we generate binary outcomes for each of the sub-questions, which take the value of 1 when the respondent somewhat or strongly agrees with the statement. We then investigate the gender difference in responses to these questions using an index, and separately for each of the sub-questions.

We do not find any evidence of gender differences in perceptions about the scenario. Both visual evidence from scatterplots (presented in Figure A.7) and regression estimates (using Equation 3, presented in Figure A.8) fail to find any statistically significant differences. Although gender differences in perceptions are largely absent, the overall levels of agreement with the statements reveal striking patterns. Nearly half of the participants believed that the issues would resolve on their own, a third view them as not requiring treatment, and large majorities express concern about stigma, self-reliance, treatment effectiveness, and medication side effects. These patterns reflect results in recent work on these issues (Acampora et al., 2022; Roth et al., 2024b; Cronin et al., 2024). We discuss these patterns in more detail in Appendix H.

6 Conclusion

Gender differences in depression diagnoses are well documented, but little is known about whether behavioral mechanisms may contribute to these gaps. Behavioral barriers may be more amenable to change than deeper-rooted causes of gender differences in depression, such as differential exposure to stressors or variations in coping mechanisms. As such, they represent a promising target for public health interventions.

In this paper, we showed that men face a “double whammy” in mental health. Using hypothetically generated depression scenarios to circumvent the very issue we aim to study—underrecognition and underreporting of mental health symptoms among men—we first document that men are less likely than women to recognize depression, especially when symptoms are not severe. Second, while we did not find substantial gender differences in overall willingness to seek help (though men were less likely to report that they would seek

[17] Q4 reads: Based on the hypothetical issues and their frequencies experienced by [you/NAME], please indicate the extent to which you agree or disagree with the following statements. *[Strongly disagree, Somewhat disagree, Somewhat agree, Strongly agree]*.

help from specialists), a key difference emerges when participants evaluate symptoms about themselves: men are less likely than women to seek help when the scenario concerns their own symptoms, yet believe that others should seek help in equivalent situations. These findings are important because early recognition is critical for timely intervention, potentially preventing symptoms from escalating into more severe forms of depression. Moreover, they offer guidance on the types of content that could be prioritized in public health policies, such as messaging focused on reducing self-stigma and promoting early engagement with mental health services.

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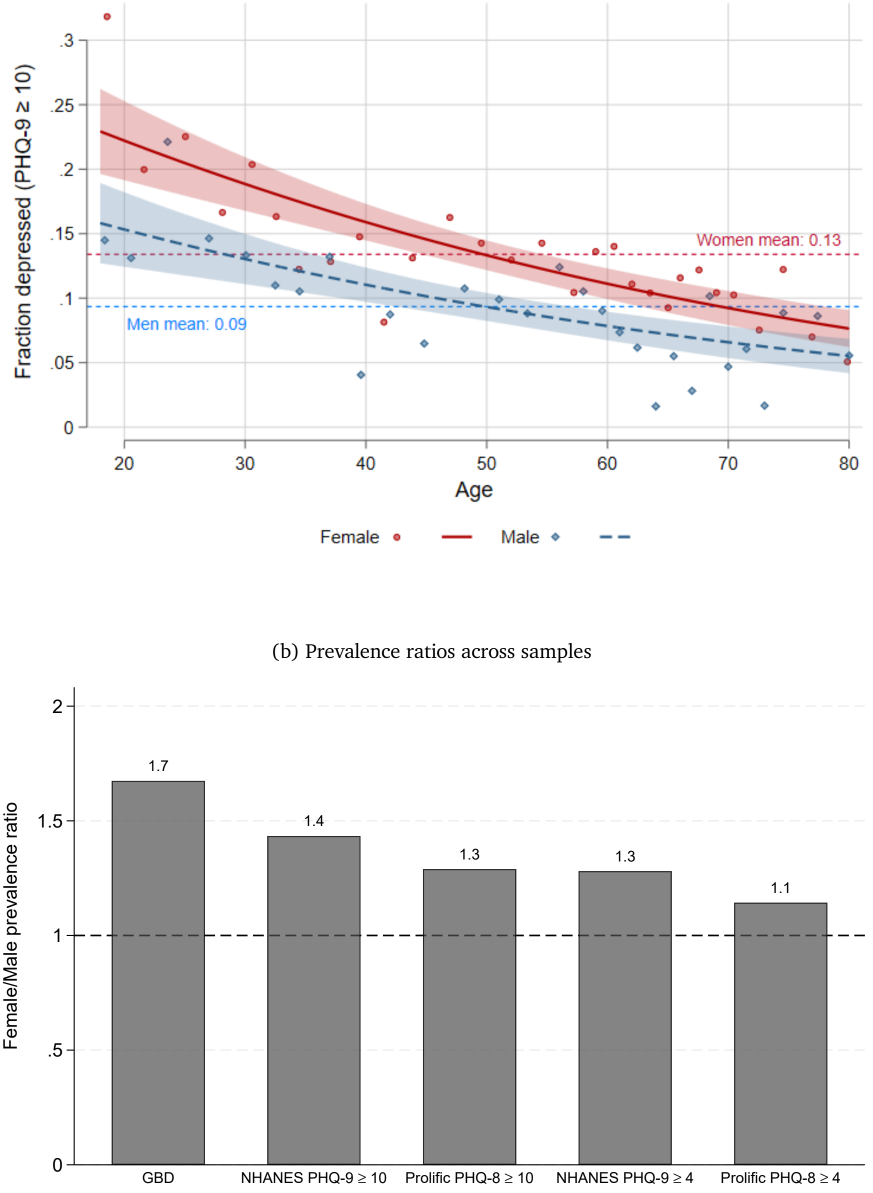
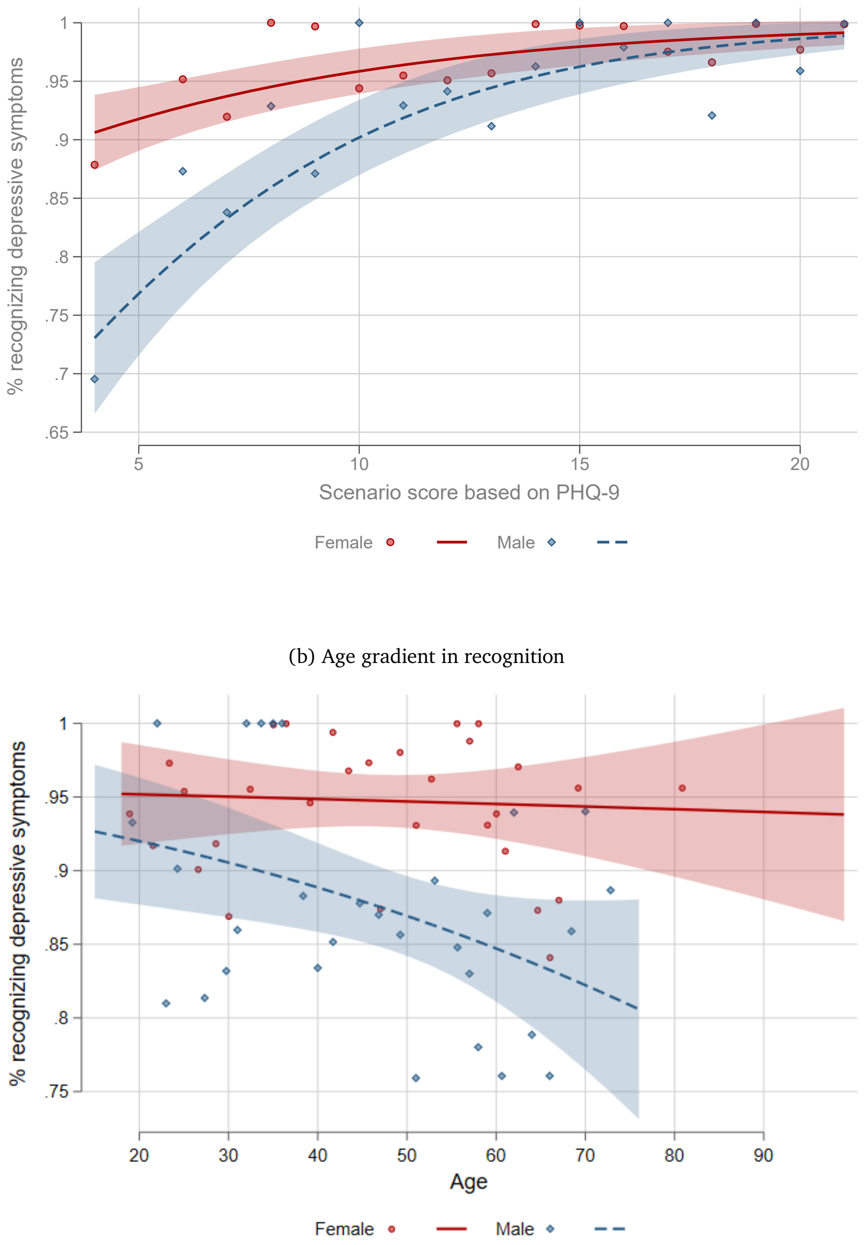
7 Figures


(a) Depression prevalence in NHANES

(b) Prevalence ratios across samples

Figure 1: Depression prevalence by age and gender and female/male prevalence ratio from different sources

Notes. Panel A plots the prevalence of depressive symptoms by age and gender in the National Health and Nutrition Examination Survey (NHANES 2021–2023, N=6,337). Depression is measured using the PHQ-9 two-week symptom scale. Points denote binned scatterplot means and vertical bars indicate 95% confidence intervals. Panel B reports the female-to-male prevalence ratio across three data sources: (i) Global Burden of Disease estimates commonly used in cross-country comparisons (Dattani et al., 2023); (ii) NHANES 2021–2023 (N=6,337); and (iii) a screened online sample from Prolific used in Roth et al. (2024a,b) (N=18,982). Ratios above one indicate higher prevalence among women. For NHANES and the Prolific sample, prevalence is constructed using two PHQ-9 cutoffs: ≥ 10 (standard clinical threshold for major depression) and ≥ (including mild symptoms).

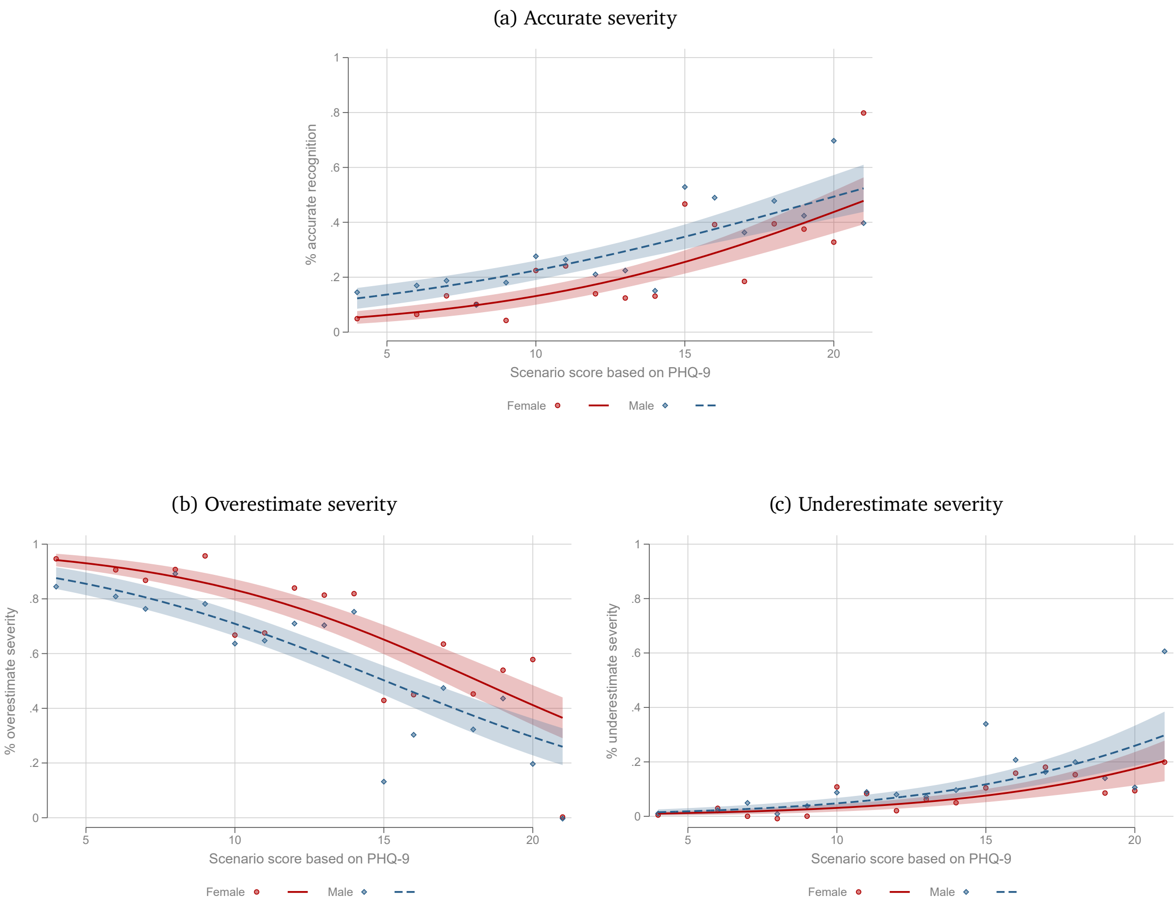


(a) Recognition gap

(b) Age gradient in recognition

Figure 2: Gender differences in depression recognition

Notes. Panel A plots a binned scatterplot of depression recognition and the severity (PHQ-9) score of the hypothetical scenario, shown separately for male and female participants. Panel B plots the recognition measure by gender and age. The recognition of depressive symptoms binary variable is based on the question: Suppose that [you/NAME] were/was experiencing the hypothetical issues at the frequencies listed above, do you think [you/NAME] would have depression? *[Definitely yes, probably yes, probably no, definitely no]*. Each point in the plots represents the regression coefficient from a regression of recognition on the scenario severity, controlling for treatment assignment (self vs. other), whether the subject in the "other" scenario is a male or a female and the order in which the scenarios were presented. The bands show 95% confidence intervals, with standard errors clustered by participant.

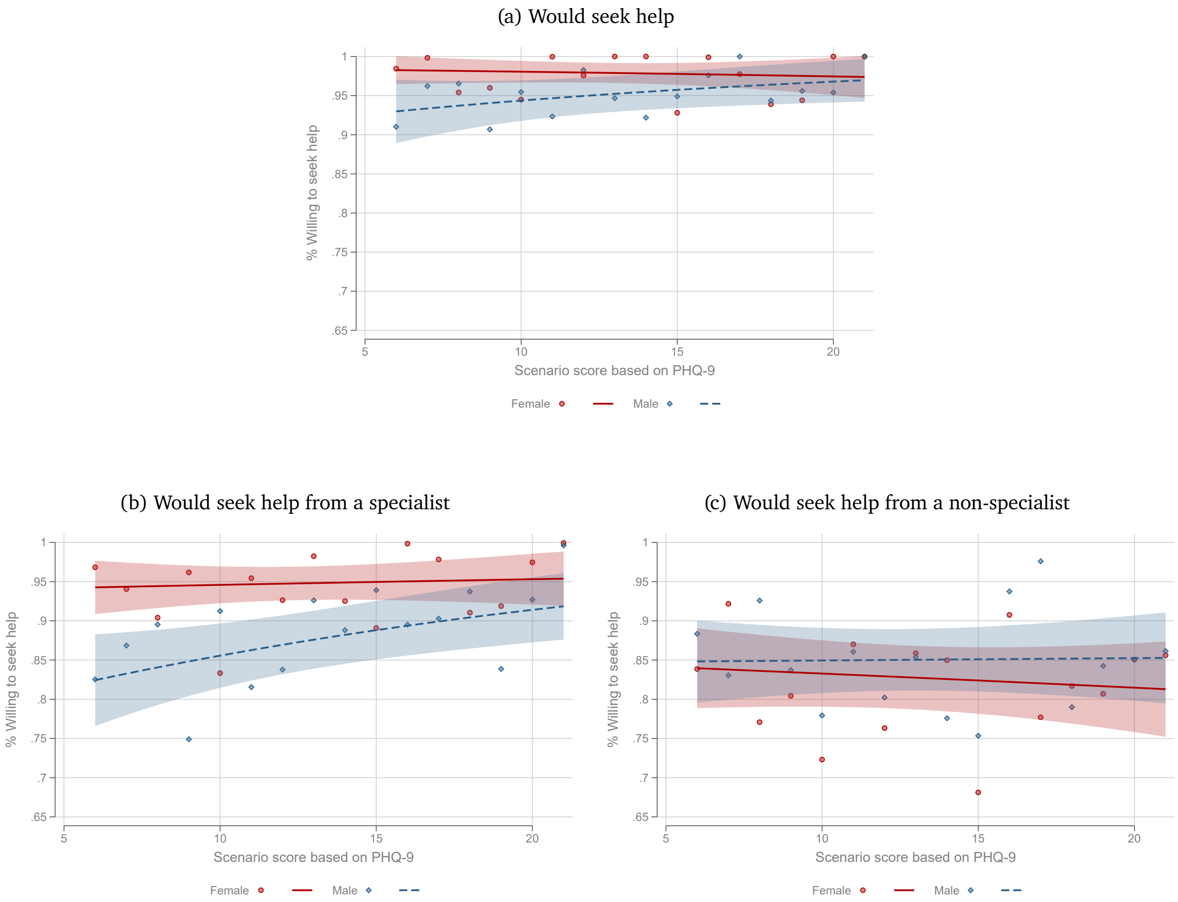

(a) Accurate severity

(b) Overestimate severity

(c) Underestimate severity

Figure 3: Gender differences in identifying the severity of depressive symptoms

Notes. Binned scatter plot of accuracy in recognizing the severity of depression and the severity (PHQ-9) score of the hypothetical scenario, shown separately for male and female participants. The binary variables are created based on the question: How severe do you think the depression would be if [you/NAME] were experiencing these issues in real life? *[None or minimal, Mild, Moderate, Moderately Severe, Severe]*. Over-(Under-)estimate is defined as classifying the symptoms in a more (less) severe category than they actually belong to. Each point in the plot represents the regression coefficient from a regression of recognition on the scenario severity, controlling for treatment assignment (self vs. other), whether the subject in the "other" scenario is a male or a female and the order in which the scenarios were presented. The bands show 95% confidence intervals, with standard errors clustered by participant.


(a) Would seek help

(b) Would seek help from a specialist

(c) Would seek help from a non-specialist

Figure 4: Gender differences in willingness to seek help

Notes. Binned scatter plot of willingness to seek help and the severity (PHQ-9) score of the hypothetical scenario, shown separately for male and female participants. The binary variables are created based on the question: If [you/NAME] were experiencing these hypothetical issues, how likely do you think it is that [you/she,he] will seek help from the following sources? For these questions, imagine that there are no constraints on the time or money that has to be spent, and no problems relating to health insurance coverage for these options. *[Very unlikely, Somewhat unlikely, Somewhat likely, Very likely]*. Seeking help from a specialist includes answering somewhat likely or very likely to any of the following: General Practitioner solely for this purpose, a GP during a visit for another purpose or a psychologist or a therapist. Seeking help from a non-specialist includes answering somewhat likely or very likely to any of the following: a counselor at your workplace or university, a close friend or relative or an AI-enabled mental health chatbot. Each point in the plot represents the regression coefficient from a regression of the outcomes on the scenario severity, controlling for treatment assignment (self vs. other), whether the subject in the “other” scenario is a male or a female and the order in which the scenarios were presented. The bands show 95% confidence intervals, with standard errors clustered by participant.

8 Tables

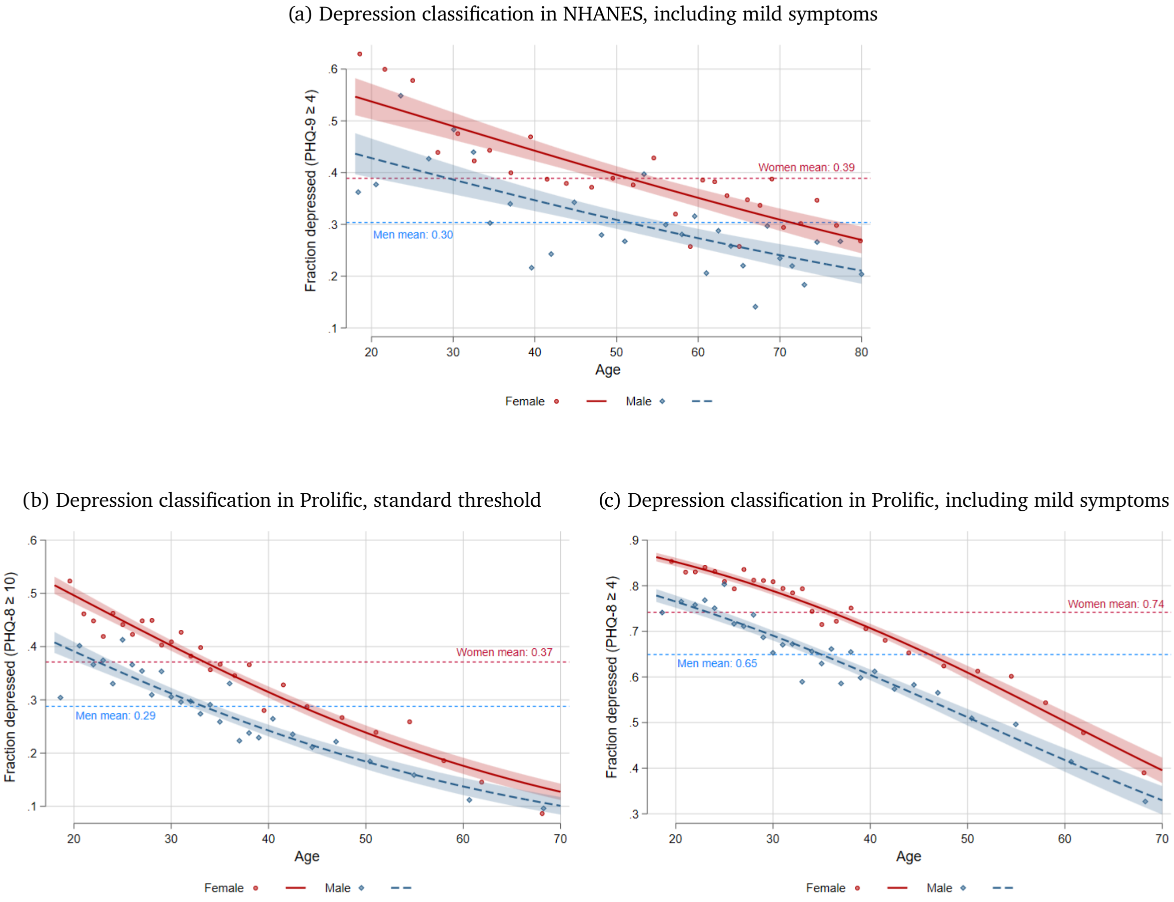
Table 1: Gender differences in depression recognition, accuracy and willingness to seek help

	Recognition		Accurate severity		Seek help	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.053***	-0.145***	0.068***	0.074**	-0.026*	-0.041*
	(0.018)	(0.040)	(0.022)	(0.030)	(0.014)	(0.022)
Mild	0.127***	0.095***	0.029	0.031	0.000	0.000
	(0.023)	(0.027)	(0.024)	(0.027)	(.)	(.)
Moderate	0.162***	0.095***	0.101***	0.119***	0.011	0.012
	(0.021)	(0.026)	(0.029)	(0.033)	(0.012)	(0.013)
Moderately Severe	0.191***	0.119***	0.329***	0.323***	0.010	-0.010
	(0.021)	(0.024)	(0.032)	(0.039)	(0.012)	(0.014)
Male × Mild		0.068		-0.004		0.000
		(0.047)		(0.039)		(.)
Male × Moderate		0.138***		-0.034		0.000
		(0.042)		(0.050)		(0.024)
Male × Moderately Severe		0.153***		0.014		0.042*
		(0.041)		(0.057)		(0.025)
Constant	0.774***	0.818***	-0.128	-0.129	0.974***	0.983***
	(0.065)	(0.064)	(0.085)	(0.085)	(0.047)	(0.048)
Demog. controls	Yes	Yes	Yes	Yes	Yes	Yes
Treat/Order FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean women	0.95	0.87	0.18	0.05	0.98	0.98
Observations	1604	1604	1604	1604	1203	1203

*Notes.*OLS regressions of depression recognition (Col. (1)–(2)), severity accuracy (Col. (3)–(4)) and willingness to seek help (Col. (5)–(6)) on a male indicator, and interactions with the severity category of the hypothetical scenario. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The mean of women at the bottom of the table corresponds to the mean outcome for women across all severity levels in Col. (1), (3) and (5) and the mean for women in the minimal severity level in Col. (2), (4) and (6). The seeking help question was not asked in the minimal depression scenarios so the constant and Male coefficient correspond to the Mild severity scenario. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

ONLINE APPENDIX

A Additional Figures



(a) Depression classification in NHANES, including mild symptoms

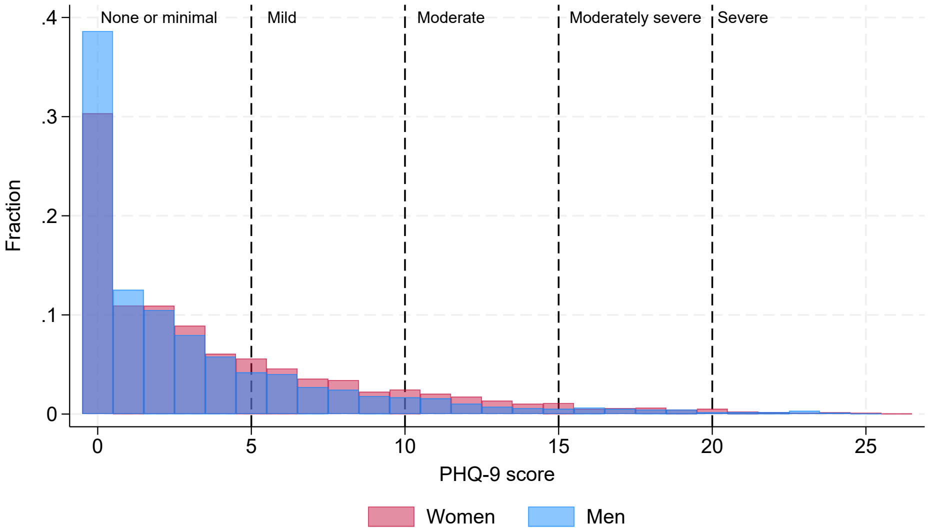
(b) Depression classification in Prolific, standard threshold

(c) Depression classification in Prolific, including mild symptoms

Figure A.1: Fraction classified as depressed by gender and age, across surveys

Notes. Panel A plots binned scatterplots of the prevalence of depressive symptoms by age and gender in the National Health and Nutrition Examination Survey (NHANES 2021–2023, N=6,337). Depression is measured using the PHQ-9 two-week symptom scale with the threshold of 10 points. Panels B and C plot binned scatterplots using the Prolific sample (N=18,982), prevalence is constructed using two PHQ-9 cutoffs: ≥ 10 (standard clinical threshold for major depression in panel B) and ≥ (including mild symptoms in Panel C). Points denote binned scatterplot means and vertical bars indicate 95% confidence intervals.

(a) Histogram of PHQ-9 scores in NHANES



(b) Histogram of PHQ-8 scores in Prolific

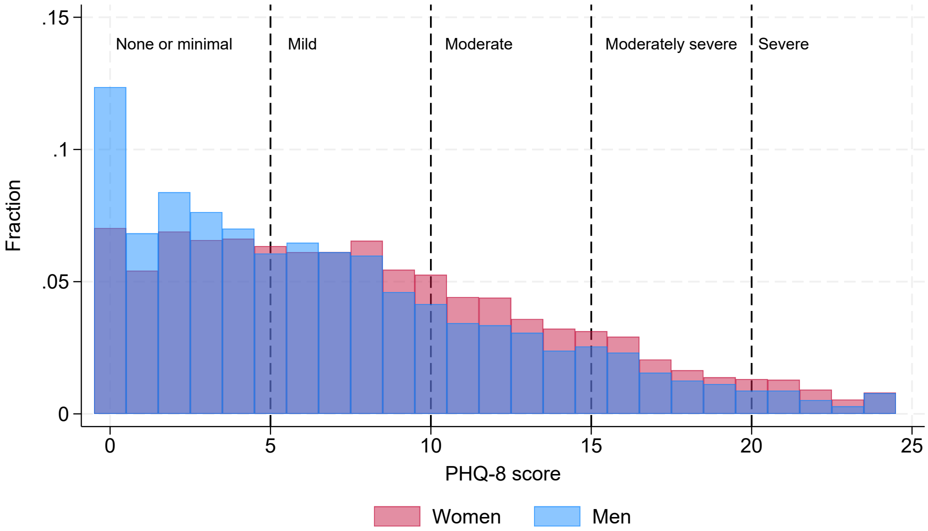


Figure A.2: Histograms of PHQ scores across samples

Notes. Panel A presents the raw histogram of PHQ-9 scores by gender in NHANES (N=6,337). Panel B plots the raw histogram of PHQ-8 scores by gender in Prolific (N=18,982).

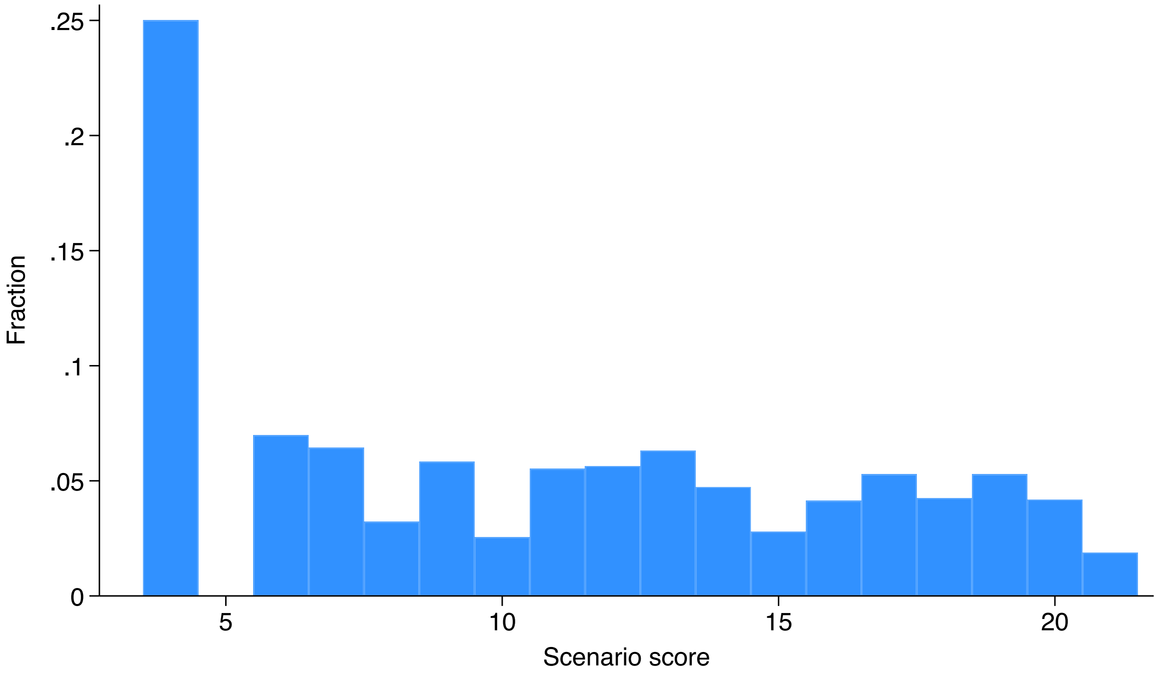
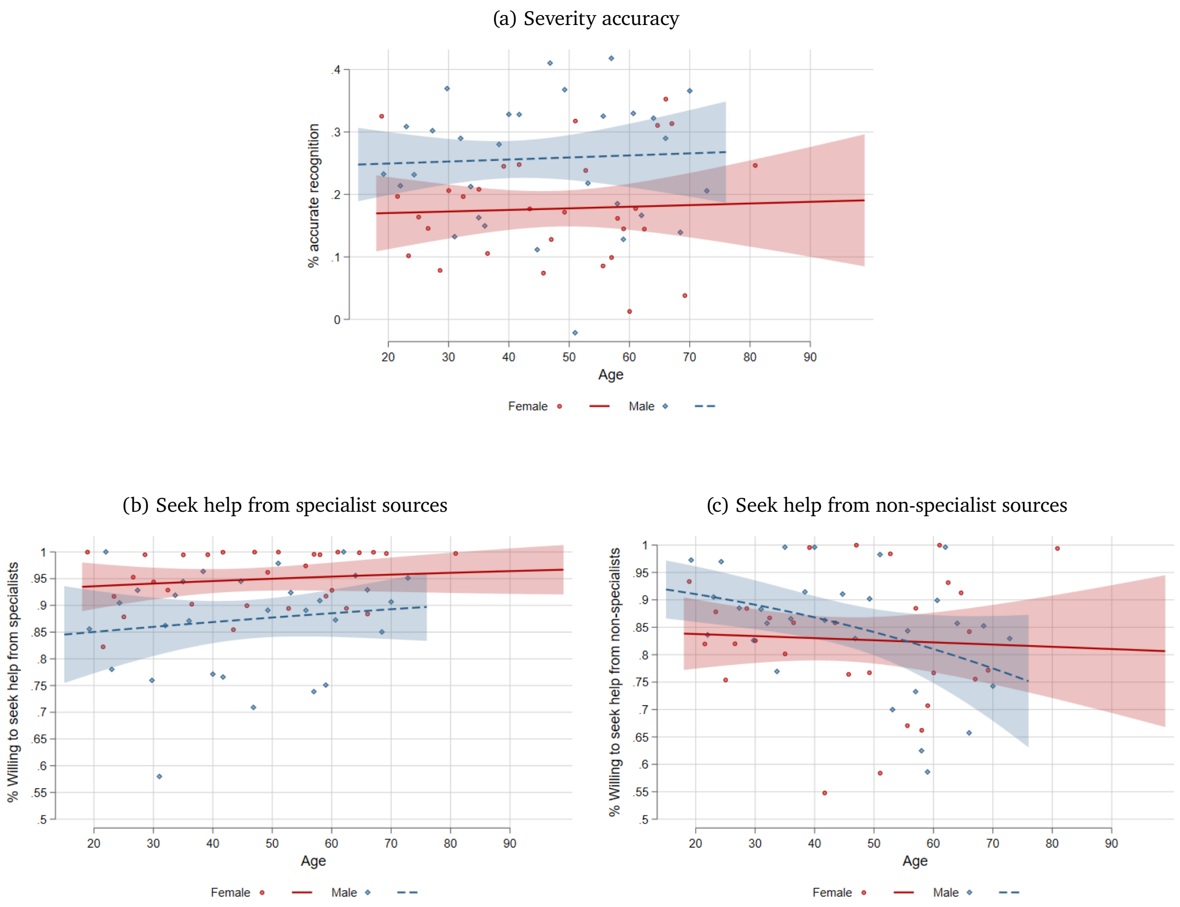


Figure A.3: Distribution of scenarios seen by participants

Notes. Fractions of scenarios presented to participants at every point of the support of the PHQ-9 score that we randomly generated.


(a) Severity accuracy

(b) Seek help from specialist sources

(c) Seek help from non-specialist sources

Figure A.4: Age gradient in accuracy and seeking help

Notes. Binned scatterplots of the severity accuracy and seeking help outcomes on the age of the respondent, shown separately for male and female participants. Each point in the plot represents the regression coefficient from a regression of the outcome on the Panel labels on the scenario severity, controlling for treatment assignment (self vs. other), whether the subject in the "other" scenario is a male or a female and the order in which the scenarios were presented. The bands show 95% confidence intervals, with standard errors clustered by participant.

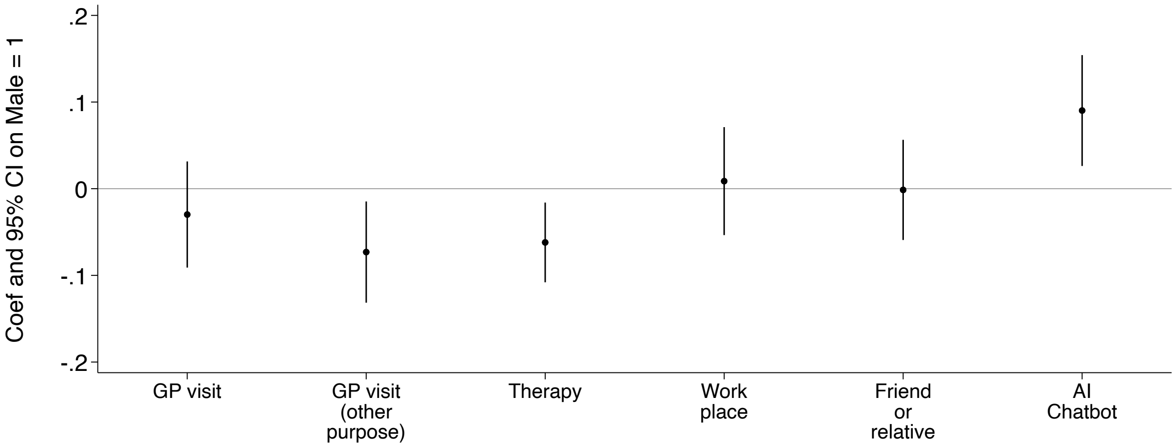


Figure A.5: Gender differences in sources of seeking help

Notes. Each point in the plot represents the coefficient from separate regressions based on regressing each of the sources on the male indicator following Equation 3. The binary outcomes are equal to 1 when the respondent responds somewhat or very likely to seek help from that source in the x-axis. The estimates show gender gaps in sources of seeking help, where a positive point estimate indicates that men are more likely to women to seek help from that source. We plot 95% confidence intervals along with the point estimates of the gender gaps, with standard errors clustered by participant.

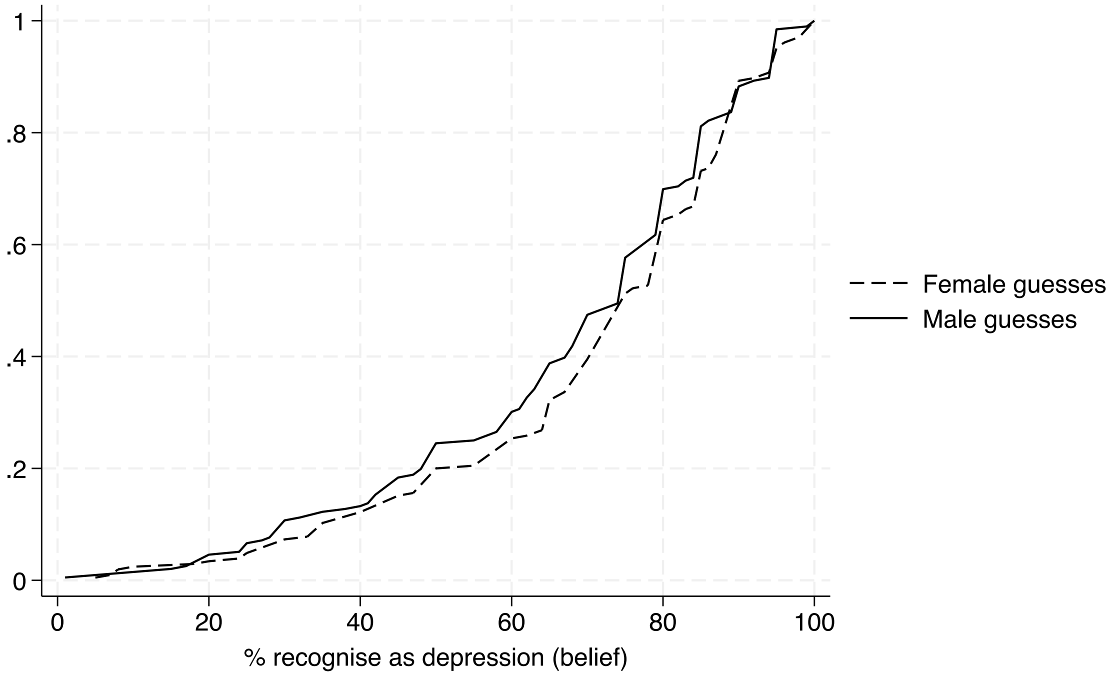
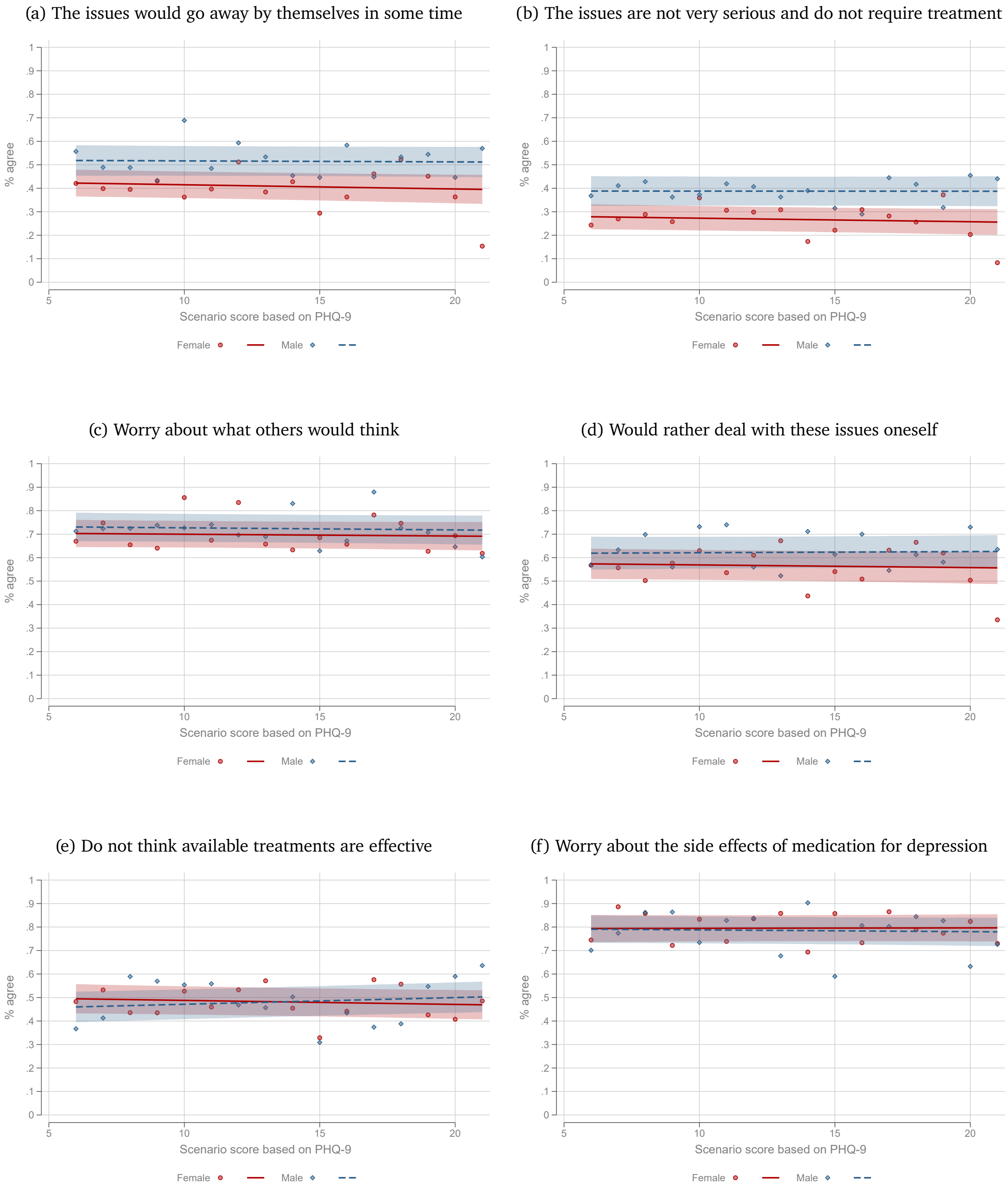


Figure A.6: Second-order beliefs

Notes. Empirical CDF of the guesses on the fraction of Americans recognizing depression in the scenario presented. CDFs of guesses are plotted separately for female and male participants. The wording of the question used to create this plot is: We conducted a similar survey with a sample of 100 Americans. The composition of respondents in this survey was broadly representative of the American population. Participants in that survey evaluated the following exact hypothetical scenario and answered whether or not they thought [NAME] would have depression if he/she were experiencing these symptoms. *List of symptoms*. Of the 100 Americans who participated in that survey, how many do you think answered Definitely yes or Probably yes to the question: Suppose that [NAME] were experiencing the hypothetical issues at the frequencies listed above, do you think [NAME] would have depression? [*Number between 0 and 100*]


(a) The issues would go away by themselves in some time

(b) The issues are not very serious and do not require treatment

(c) Worry about what others would think

(d) Would rather deal with these issues oneself

(e) Do not think available treatments are effective

(f) Worry about the side effects of medication for depression

Figure A.7: Fraction agreeing with the perceptions statements in each panel heading

Notes. Binned scatterplot of the perceptions variables and the severity (PHQ-9) score of the hypothetical scenario, shown separately for male and female participants. The binary variables are equal to 1 when the respondent somewhat or strongly agrees with the statement. Each point in the plot represents the regression coefficient from a regression of the perception variable on the scenario severity, controlling for treatment assignment (self vs. other), whether the subject in the "other" scenario is a male or a female and the order in which the scenarios were presented. The bands show 95% confidence intervals, with standard errors clustered by participant.

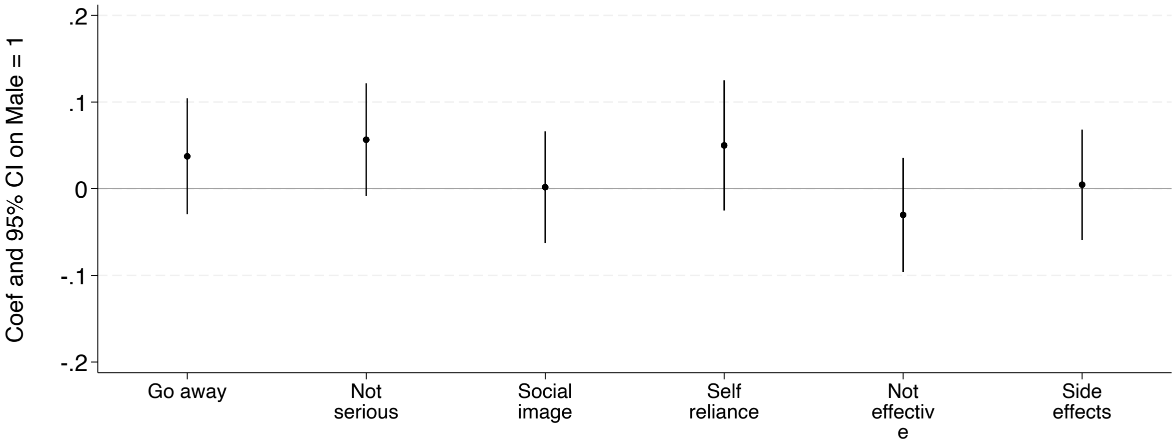


Figure A.8: Gender differences in perceptions about depression symptoms

Notes. Each point in the plot represents the coefficient from separate regressions based on regressing each of the binary perceptions outcomes on the male indicator following Equation 3. The binary outcomes are equal to 1 when the respondent somewhat or strongly agrees with the statement in the x-axis. The estimates show gender gaps in perceptions, where a positive point estimate indicates that men are more likely to women to agree with the perceptions statement. The baseline levels that each outcome takes are in Figure A.7. We plot 95% confidence intervals along with the point estimates of the gender gaps, with standard errors clustered by participant.

B Additional Tables

Table B.1: Seeking help from specialist vs. non-specialist sources

	Specialist		Non-specialist	
	(1)	(2)	(3)	(4)
Male	-0.061***	-0.106***	0.020	0.015
	(0.021)	(0.033)	(0.030)	(0.039)
Moderate	0.015	-0.010	-0.028	-0.014
	(0.018)	(0.022)	(0.023)	(0.033)
Moderately Severe	0.035*	-0.000	-0.015	-0.033
	(0.018)	(0.022)	(0.021)	(0.030)
Male × Moderate		0.052		-0.028
		(0.037)		(0.047)
Male × Moderately Severe		0.074**		0.038
		(0.037)		(0.042)
Constant	0.902***	0.923***	1.183***	1.187***
	(0.061)	(0.062)	(0.088)	(0.089)
Demog. controls	Yes	Yes	Yes	Yes
Treat/Order FE	Yes	Yes	Yes	Yes
Mean women	0.95	0.95	0.83	0.84
Observations	1203	1203	1203	1203

*Notes.*OLS regressions of seeking help from specialist sources (Columns (1)–(2)) and from non-specialist sources (Columns (3)–(4)) on a male indicator, and interactions with the severity category of the hypothetical scenario. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The seeking help question was not asked for the minimal depression scenario so the constant and Male coefficient correspond to the Mild severity scenario. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.2: Gender differences in depression recognition, accuracy and willingness to seek help on Self vs. Other

	Recognition		Accurate severity		Seek help	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.035*	-0.103***	0.071**	0.114***	-0.042**	-0.020
	(0.019)	(0.034)	(0.031)	(0.038)	(0.018)	(0.019)
Other	0.024		0.010		-0.005	
	(0.015)		(0.030)		(0.014)	
Male × Other	-0.038		-0.005		0.049**	
	(0.027)		(0.039)		(0.021)	
Other is male		0.002		0.029		-0.042
		(0.031)		(0.034)		(0.027)
Male × Other is male		0.111**		-0.130**		0.065*
		(0.050)		(0.053)		(0.035)
Constant	0.754***	0.809***	-0.125	-0.213***	0.959***	1.018***
	(0.065)	(0.104)	(0.082)	(0.073)	(0.046)	(0.051)
Demog. controls	Yes	Yes	Yes	Yes	Yes	Yes
Order FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean	0.98	0.96	0.21	0.19	0.98	0.99
Observations	1604	802	1604	802	1203	401

*Notes.*OLS regressions of depression recognition (Col. (1)–(2)), severity accuracy (Col. (3)–(4)) and willingness to seek help (Col. (5)–(6)) on a male indicator, and interactions with the "Other" treatment in hypothetical scenario in Col. (1), (3) and (5) and with the "Other is male" treatment within the "Other" scenarios in Col. (2), (4) and (6). Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The mean of women at the bottom of the table corresponds to the mean outcome for women evaluating the "Self" treatment in Col. (1), (3) and (5) and women evaluating the "Other is female" treatment in Col. (2), (4) and (6). The seeking help question was not asked for the minimal depression scenario so the constant and Male coefficient correspond to the Mild severity scenario. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.3: Seeking help from specialist vs. non-specialist sources in Self vs. Other scenarios

	Overall		Specialist		Non-specialist	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.042**	-0.037**	-0.080***	-0.068***	0.003	0.008
	(0.018)	(0.018)	(0.025)	(0.024)	(0.036)	(0.036)
Other	-0.005	-0.004	-0.018	-0.015	0.039	0.041
	(0.014)	(0.014)	(0.021)	(0.021)	(0.027)	(0.027)
Male × Other	0.049**	0.045**	0.058*	0.048	0.054	0.050
	(0.021)	(0.021)	(0.031)	(0.031)	(0.038)	(0.038)
Recognized depression		0.119**		0.285***		0.114*
		(0.048)		(0.070)		(0.062)
Constant	0.959***	0.866***	0.909***	0.687***	1.139***	1.050***
	(0.046)	(0.063)	(0.058)	(0.085)	(0.086)	(0.105)
Demog. controls	Yes	Yes	Yes	Yes	Yes	Yes
Order FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean women	0.98	0.98	0.95	0.95	0.81	0.81
Observations	1203	1203	1203	1203	1203	1203

*Notes.*OLS regressions of seeking help from specialist and non-specialists sources combined (Columns (1)–(2)) and separate (Columns (3)–(6)) on a male indicator, and interactions with *Other* treatment assignment of the hypothetical scenario. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Columns (2), (4) and (6) add a control for whether the participant recognized depression at an earlier stage right after evaluating the scenario. Standard errors are heteroscedasticity robust and clustered at the participant level. The seeking help question was not asked for the minimal depression scenario so the constant and Male coefficient correspond to the Mild severity scenario. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.4: Robustness: Main results, excluding last two scenarios.

	Recognition		Accurate severity		Seek help	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.043**	-0.088***	0.064**	0.053	-0.030*	-0.045*
	(0.018)	(0.032)	(0.031)	(0.037)	(0.016)	(0.026)
Moderate	0.024	-0.018	0.106***	0.114***	0.012	0.010
	(0.018)	(0.016)	(0.029)	(0.036)	(0.013)	(0.016)
Moderately Severe	0.042**	0.020	0.379***	0.356***	0.009	-0.009
	(0.017)	(0.014)	(0.035)	(0.046)	(0.015)	(0.015)
Male × Moderate		0.083**		-0.017		0.003
		(0.034)		(0.057)		(0.028)
Male × Moderately Severe		0.047		0.050		0.039
		(0.033)		(0.070)		(0.032)
Constant	0.866***	0.894***	-0.077	-0.070	0.994***	1.003***
	(0.102)	(0.100)	(0.134)	(0.135)	(0.051)	(0.053)
Demog. controls	Yes	Yes	Yes	Yes	Yes	Yes
Treat/Order FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean women	0.98	0.98	0.22	0.22	0.98	0.98
Observations	802	802	802	802	802	802

Notes. OLS regressions of depression recognition (Col. (1)–(2)), severity accuracy (Col. (3)–(4)) and willingness to seek help (Col. (5)–(6)) on a male indicator, and interactions with the severity category of the hypothetical scenario. The sample is restricted to the first two (of four) scenarios evaluated by participants. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The mean of women at the bottom of the table corresponds to the mean outcome for women across all severity levels in Col. (1), (3) and (5) and the mean for women in the Mild severity level in Col. (2), (4) and (6). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.5: Robustness: Main results, excluding scenarios with suicidal ideation.

	Recognition		Accurate severity		Seek help	
	(1)	(2)	(3)	(4)	(5)	(6)
Male	-0.083***	-0.132***	0.044*	0.067**	-0.046**	-0.048*
	(0.025)	(0.040)	(0.026)	(0.030)	(0.021)	(0.025)
Mild	0.109***	0.087***	0.041	0.036	0.000	0.000
	(0.027)	(0.032)	(0.030)	(0.036)	(.)	(.)
Moderate	0.144***	0.089***	0.136***	0.173***	0.006	0.013
	(0.026)	(0.032)	(0.039)	(0.050)	(0.016)	(0.016)
Moderately Severe	0.158***	0.094***	0.351***	0.399***	-0.006	-0.028
	(0.032)	(0.036)	(0.060)	(0.077)	(0.024)	(0.033)
Male × Mild		0.047		0.006		0.000
		(0.051)		(0.044)		(.)
Male × Moderate		0.113**		-0.076		-0.014
		(0.049)		(0.066)		(0.034)
Male × Moderately Severe		0.135**		-0.105		0.046
		(0.058)		(0.112)		(0.047)
Constant	0.793***	0.817***	-0.204***	-0.214***	1.053***	1.052***
	(0.101)	(0.100)	(0.076)	(0.078)	(0.066)	(0.066)
Demog. controls	Yes	Yes	Yes	Yes	Yes	Yes
Treat/Order FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean women	0.92	0.87	0.14	0.05	0.98	0.98
Observations	991	991	991	991	590	590

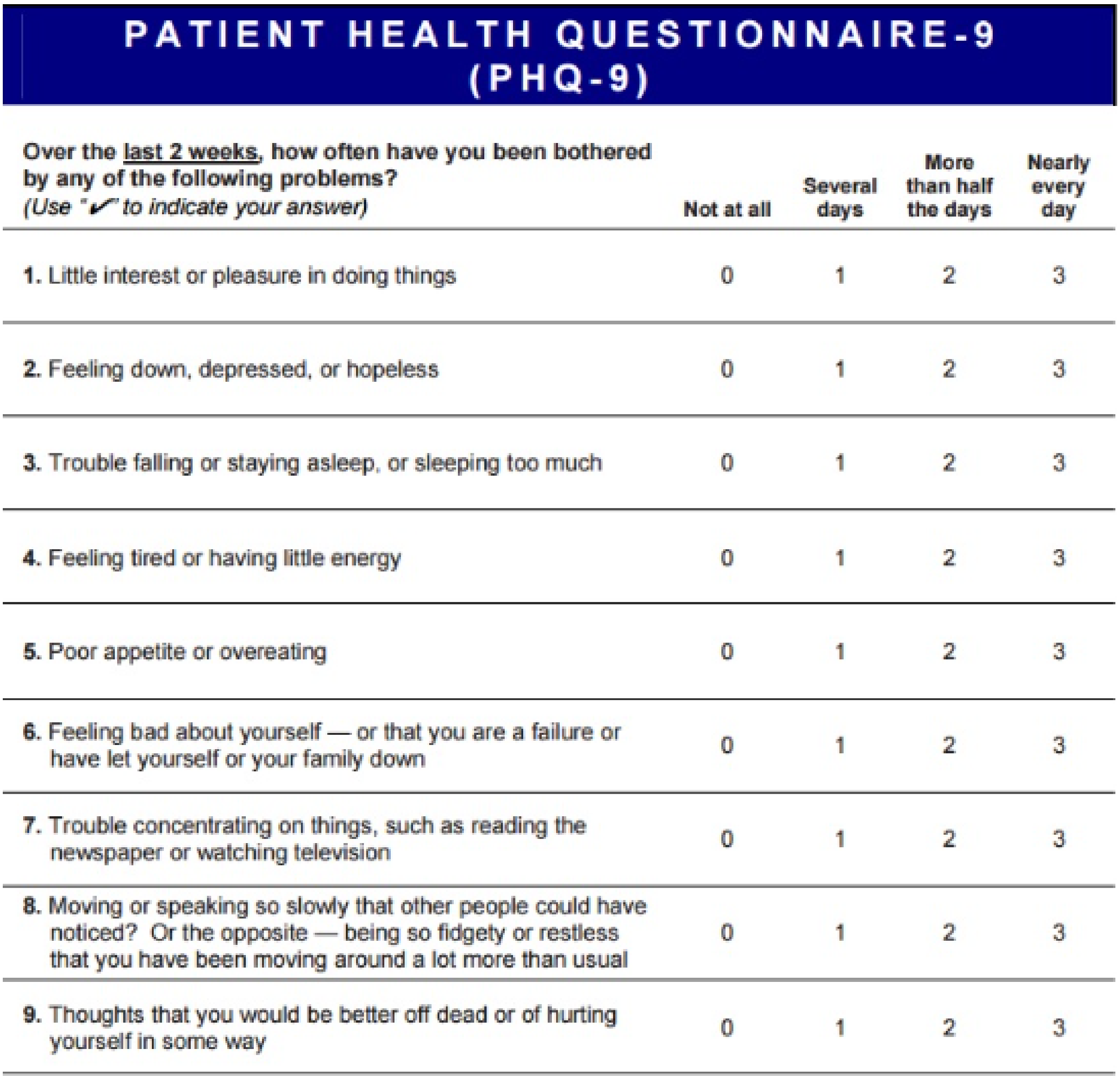
Notes. OLS regressions of severity accuracy (Col. (1)–(2)) and willingness to seek help (Col. (3)–(4)) on a male indicator, and interactions with the severity category of the hypothetical scenario. The sample is restricted to scenarios which do not include the suicidal ideation question from the PHQ-9. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The mean of women at the bottom of the table corresponds to the mean outcome for women across all severity levels in Col. (1) and (3) and the mean for women in the minimal severity level in Col. (2) and (4). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.6: Robustness: Main results, excluding participants who do not recognize depression.

	Accurate severity		Seek help	
	(1)	(2)	(3)	(4)
Male	0.048**	-0.013	-0.017	-0.025
	(0.022)	(0.015)	(0.014)	(0.021)
Mild	0.074***	0.053**	0.000	0.000
	(0.022)	(0.025)	(.)	(.)
Moderate	0.181***	0.154***	0.014	0.016
	(0.027)	(0.033)	(0.010)	(0.013)
Moderately Severe	0.415***	0.365***	0.001	-0.010
	(0.030)	(0.037)	(0.012)	(0.015)
Male × Mild		0.050		0.000
		(0.033)		(.)
Male × Moderate		0.064		-0.004
		(0.044)		(0.021)
Male × Moderately Severe		0.112**		0.025
		(0.049)		(0.024)
Constant	-0.160*	-0.133	0.990***	0.996***
	(0.090)	(0.090)	(0.045)	(0.046)
Demog. controls	Yes	Yes	Yes	Yes
Treat/Order FE	Yes	Yes	Yes	Yes
Mean women	0.17	0.01	0.98	0.98
Observations	1463	1463	1145	1145

Notes. OLS regressions of depression recognition (Col. (1)–(2)), severity accuracy (Col. (3)–(4)) and willingness to seek help (Col. (5)–(6)) on a male indicator, and interactions with the severity category of the hypothetical scenario. The sample is restricted to scenarios where participants recognise the presented scenario as depression. Demographic controls are participant age, education, employment, income level and familiarity with depression screening tools. Order controls include which of the treatment blocks was presented first. Standard errors are heteroscedasticity robust and clustered at the participant level. The mean of women at the bottom of the table corresponds to the mean outcome for women across all severity levels in Col. (1), (3) and (5) and the mean for women in the minimal severity level in Col. (2), (4) and (6). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C PHQ-9 questionnaire and severity classification



PATIENT HEALTH QUESTIONNAIRE-9
(PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

The PHQ-9 score is calculated by the simple addition of the frequencies for each symptom, with no weight for how "serious" the symptom is.

Severity classification:

- 0-4: None or minimal
- 5-9: Mild
- 10-14: Moderate
- 15-19: Moderately severe
- 20-27: Severe

D Background information on GBD data and survey data from NHANES and Prolific

Obtaining consistent measures of mental health prevalence in the United States is challenging because no centralized administrative registry exists. Available data instead come from fragmented sources, such as healthcare utilization records and surveys, each capturing different populations and affected by changes in screening practices, coding conventions, and reporting incentives (Choi et al., 2025). For example, increases in recorded mental health events may reflect shifts in diagnosis or reporting rather than underlying prevalence. These limitations make single-source estimates difficult to interpret and particularly problematic when studying differences across demographic groups. Aggregated estimates such as those from the Global Burden of Disease project synthesize multiple data inputs to provide a harmonized measure of prevalence and are therefore commonly used when comprehensive population-level data are unavailable.

E Vignette scenarios

E.1 Treatment *Self*

First, participants are introduced to the context of the vignette:

> Please imagine that you have been experiencing the following issues. Note that this is a *hypothetical scenario*. Review the list of hypothetical issues along with how often you would have experienced them **over the last two weeks**:

Three or more of the randomly selected symptoms were shown to the participant in a tabular form, along with a frequency which is one of *Several days, More than half the days, Nearly every day*.

E.2 Treatment *Other*

The scenario was introduced in the same way as in treatment *Self*. The key difference is that the subject of the scenario is a hypothetical male or female individual. We use first names to make gender identity salient. The chosen names – Michael and Jessica – are among the most popular names in the birth cohort in Texas.

> For these questions, imagine a hypothetical individual, [NAME]. [NAME] is 34 years old, lives in [TOWN in the US], and works as a marketing professional.
>
> Please imagine that [NAME] has been experiencing the following issues. Note that this is a *hypothetical scenario*. Review the list of hypothetical issues along with how often [NAME] would have experienced them **over the last two weeks**:

F Survey questionnaire

Q1. Suppose that [you/NAME] were/was experiencing the hypothetical issues at the frequencies listed above, do you think [you/NAME] would have depression? *[Definitely yes, probably yes, probably no, definitely no]*

Q2. How severe do you think the depression would be if [you/NAME] were experiencing these issues in real life? *[None or minimal, Mild, Moderate, Moderately Severe, Severe]*

Q3. If [you/NAME] were experiencing these hypothetical issues, how likely do you think it is that [you/she,he] will seek help from the following sources? For these questions, imagine that there are no constraints on the time or money that has to be spent, and no problems relating to health insurance coverage for these options. *[Very unlikely, Somewhat unlikely, Somewhat likely, Very likely]*

1. a General Practitioner solely for this purpose
2. a General Practitioner during a visit for another purpose
3. a Psychologist or a therapist
4. a counselor at your workplace or university
5. a close friend or relative
6. an AI-enabled mental health chatbot

Q4. Based on the hypothetical issues and their frequencies experienced by [you/NAME], please indicate the extent to which you agree or disagree with the following statements. *[Strongly disagree, Somewhat disagree, Somewhat agree, Strongly agree]*

1. The issues would go away by themselves in some time
2. The issues are not very serious and do not require treatment
3. I/[NAME] worry/worries about what others would think of me/her/him if they became aware that [I/she,he] had these issues
4. I/[NAME] would rather deal with these issues [myself/herself,himself] than rely on help from others
5. I/[NAME] do/does not think that the available treatments for these issues are effective
6. I/[NAME] am/is worried about the side effects of medication for depression

Q5. We conducted a similar survey with a sample of 100 Americans. The composition of respondents in this survey was broadly representative of the American population. Participants in that survey evaluated the following exact hypothetical scenario and answered whether or not they thought [NAME] would have depression if he/she were experiencing these symptoms.

List of symptoms

Of the 100 Americans who participated in that survey, how many do you think answered Definitely yes or Probably yes to the question: Suppose that [NAME] were experiencing the hypothetical issues at the frequencies listed above, do you think [NAME] would have depression? [*Number between 0 and 100*]

G Randomization procedure

Each vignette always includes the first two questions of the PHQ-9. Additional questions and symptom severities are randomly generated. The procedure to randomly generate a list of symptoms was as follows:

1. Randomly select one of the four categories. The likelihood with which categories are picked are: Mild - 1/6, Moderate - 1/3, Mod. Severe - 1/3, Severe - 1/6. Each category has an upper and a lower score bound.[18]
2. For the first two questions of the PHQ-9, select severities such that the score adds up to 4 (so one of (1,3),(2,2),(3,1)).
3. Next, generate a random sequence of numbers from 3 to 9, and pick them one by one. These correspond to questions in the scenario.
4. For each item in the sequence, pick a score from 1 to 3. This represents the severity of the symptom.
5. Check whether the total score exceeds the minimum threshold for the category. If not, repeat step (4). If so:
   - If all questions have been iterated through, stop
   - If score exceeds the max score for that category as well, stop
   - Else, flip a coin. If Heads, pick another question (step (4)). If Tails, stop.

[18] According to the PHQ-9 scoring, there are 5 severity levels: 0-4 None or minimal, 5-9 Mild, 10-14 Moderate, 15-19 Moderately severe, 20-27 Severe. We do not focus on the lowest severity level to ensure that we are presenting scenarios where some level of depression is expected.

H Mechanisms: Additional details and results

H.1 Psychic costs

Recognizing that one may be experiencing mental health issues and seeking treatment can be psychologically costly (Cronin et al., 2024). These psychic costs may be driven by emotional and mental burdens such as feelings of shame, guilt, fear, or denial, and can be exacerbated by social image concerns (Chandrasekhar et al., 2018; Smith, 2023). We hypothesize that these psychic costs may be higher when evaluating scenarios that affect oneself rather than another (unknown) person, and that men and women differ on this dimension.

To study potential psychic costs, we exploit the within-subjects treatment variation in *Self* and *Other* scenarios and define an indicator equal to 1 when the scenario corresponds to the *Other* condition. This allows us to examine whether the observed gender differences in depression recognition are driven by men being more likely to recognize symptoms as depression in others than in themselves. Such a pattern would suggest that psychological costs may affect self-attribution of depressive symptoms.

We assess these patterns using both graphical evidence and regression analysis, modifying Equation 3 to include an indicator for the *Other* treatment and its interaction with the Male indicator when analyzing perceptions. To examine whether the gender of the scenario subject influences responses, we restrict the sample to *Other* scenarios and estimate a similar specification using an indicator for whether the subject of the scenario is male (*Other* is male). This allows us to test whether participants respond differently based on the gender of the hypothetical individual experiencing symptoms.

Table B.2 presents estimates from regressions of our three main outcomes on indicators for Male and Other, as well as their interaction, reported in Columns (1), (3), and (5). Consistent with our main results, men are on average 3.5 pp less likely than women to recognize depression (Column (1)). The interaction between Male and Other is small and statistically insignificant, suggesting that men are less likely than women to recognize depression regardless of whether the symptoms are about themselves or about others. A similar pattern is observed in Column (3), where men are more accurate in recognizing the severity of depression than women regardless of whether the scenarios is about the Self or Other. The evidence on recognition suggests that the gender gap is not driven by psychological costs of self-attribution.

In the case of help-seeking, the main results did not reveal a large gender difference. However, a clear pattern emerges when separating help-seeking responses in the *Self* and *Other* scenarios. When evaluating *Self* scenarios, men are 4.2 pp less likely than women to report that they would seek help. In contrast, when evaluating *Other* scenarios, the interaction coefficient fully offsets this gap, indicating no gender difference in the belief that someone else should seek help. Importantly, the regressions control for severity category, so the gender gap in seeking help for oneself and the reversal when it is for others is not due to differences in the underlying distribution of symptom severity across scenarios.

The difference between seeking help in the *Self* and *Other* treatments is entirely driven by willingness to seek help from specialist sources (see Table B.3). The gender gap in specialist sources is 8 pp (Column (3)) and remains of similar magnitude and statistically significant even after controlling for whether the participant recognized the scenario as depression (Column 4). In other words, reluctance to seek help for oneself appears to be distinct from the ability to recognize depression among men. There is no statistically significant gender gap in seeking help for *Self* or *Other* from non-specialist sources (Column (5)).

A final note on social desirability bias concerns. To attribute our findings entirely to social desirability bias, women would have to systematically overstate depression recognition at mild severity and men systematically understate it, with both groups then shifting behavior at higher-severity scenarios in ways that cancel out the bias. Likewise, men would need to underreport willingness to seek help for themselves while simultaneously overstating it for others. This set of coordinated reporting patterns seems implausible, and the heterogeneity we observe across *Self* and *Other* scenarios is inconsistent with what a uniform social desirability bias would predict.

Our key takeaway from the *Self* vs. *Other* analysis is that men may be facing a “double whammy” when it concerns mental health: not only are they less likely than women to recognize depression in themselves and in others, but are also less likely to seek help when the symptoms concern themselves.

H.2 Norms

We hypothesize that gender or masculinity norms may affect how men are able to recognize or seek help when they are experiencing mental health issues. The underlying idea is that gender or masculinity norms could discourage men from recognizing depression or seeking help as normative expectations would shape individual responses. Traditional norms often emphasize traits like toughness, self-reliance, and emotional restraint in men, which can create barriers to acknowledging mental health struggles (De Haas et al., 2024). We examine the role of norms in two ways: (1) by comparing how participants evaluate *Other* scenarios depending on whether the subject is male or female, and (2) by analyzing participants' second-order beliefs about whether others in the study would recognize a given scenario as depression.

In Table B.2, we report regression results on our three main outcomes using the *Other* scenarios only in Columns (2), (4), and (6). The main regressors are indicators for Male and Other is male, as well as the interaction between the two. We have already shown that men are less likely than women to recognize depression, regardless of whether the symptoms are attributed to themselves or to others. If norms drive men's lower recognition, we should see especially low recognition when the subject in *Other* is also male, suggesting that normative expectations about how men should feel or behave influence how male respondents interpret symptoms in others of the same gender.

Column (2) of Table B.2 shows that in *Other* scenarios where the subject is a woman, the gender gap in recognition is 10.3 pp. However, the interaction coefficient is 11.1 pp, implying that when the subject is a man, the gender gap effectively disappears. In sum, men are not less likely to recognize depression in others when the symptoms are attributed to another man, suggesting that gender norms are unlikely to be the main driver of men's lower recognition rates.

The second test uses an incentivized second-order belief question, which asks participants to guess what fraction of Americans (specifically, participants in a previous study we conducted) believed that the symptoms described in a given scenario corresponded to depression.[19] The scenario was held constant across all participants; only the gender of the subject in the vignette was randomized. If norms are an important driver of men's lower recognition of depression, we would expect male participants to estimate a lower fraction of Americans recognizing the symptoms as depression compared to female participants.

Figure A.6 presents the empirical cumulative distribution functions (CDFs) of male and female participants' guesses about the share of Americans who recognized the scenario as depression. The two CDFs nearly fully overlap, indicating no meaningful difference in beliefs across gender. This suggests that differences in perceived social norms are unlikely to explain the gender gap in depression recognition.

To summarize, both pieces of evidence suggest that gender or masculinity norms are unlikely to be the primary mechanism driving the gender gap in depression recognition. However, if other types of gender norms exist that are not captured by the two questions we asked, we cannot fully rule out this mechanism based on our null finding.

H.3 Perceptions

We hypothesize that men and women may differ in (i) how they perceive depression symptoms, (ii) the social image concerns or stigma held about depression, (iii) the effectiveness of treatment options, or (iv) whether treatments for depression have side effects. We evaluate whether there are important gender differences in these perceptions using responses to survey questions which were presented to participants in each of the first three scenarios (see Appendix F). Using Q4 in the survey,[20] we generate binary outcomes for each of

[19] The scenario corresponds to a PHQ-9 score of 4 (mild depression) and includes questions 1 and 2. Details on the second-order belief question and incentivization are provided in Appendix F. We deviated from our pre-registration where we stated that this scenario would have a PHQ-9 score of 11, based on pilots which showed larger differences at milder severities.

[20] Q4 reads: Based on the hypothetical issues and their frequencies experienced by [you/NAME], please indicate the extent to which you agree or disagree with the following statements. *[Strongly disagree, Somewhat disagree, Somewhat agree, Strongly agree]*.

the sub-questions, which take the value of 1 when the respondent somewhat or strongly agrees with the statement. We then investigate the gender difference in responses to these questions using an index, and separately for each of the sub-questions.

We do not find any evidence of gender differences in perceptions about the scenario. Both visual evidence from scatterplots (presented in Figure A.7) and regression estimates (using Equation 3, presented in Figure A.8) fail to find any differences. However, some interesting descriptive evidence emerges: The overall agreement with the statements regardless of gender or scenario severity is 46.1% for "the issues would go away by themselves in some time," 32.7% for "the issues are not very serious and do not require treatment," 71.1% for "I/[NAME] worry/worries about what others would think of me/her/him if they became aware that [I/she,he] had these issues," 59.4% for " I/[NAME] would rather deal with these issues myself/herself,himself] than rely on help from others," 48.1% for "I/[NAME] do/does not think that the available treatments for these issues are effective," and 79.1% for "I/[NAME] am/is worried about the side effects of medication for depression." These overall averages are indicative of the pattern across severity levels, as the scatterplots remain relatively flat across the full range of PHQ-9 scores (see Figure A.7). In short, nearly half of participants believe the issues would resolve on their own, a third view them as not requiring treatment, and large majorities express concern about stigma, self-reliance, treatment effectiveness, and medication side effects.

The only perceptions where men and women appear to slightly differ are in the beliefs that "the issues would go away on their own over time" and "the issues are not very serious and do not require treatment", both of which are related to help-seeking behavior. For the latter, the confidence bands do not overlap starting at moderate depression levels, suggesting that men may be more likely than women to dismiss the symptoms and believe that treatment is unnecessary, particularly as severity increases.

Although gender differences in perceptions are largely absent, the overall levels of agreement with the statements reveal striking patterns. In over 70% of scenario evaluations, participants report concerns about what others would think and about the side effects of depression medication. We interpret these findings in light of recent work in economics on perceptions of stigma and depression. Roth et al. (2024a) document widespread misperceptions about stigma: individuals believe that 38% of Americans hold stigmatizing beliefs, while the actual rate is only 16%. The high share of respondents expressing concern about others' opinions may reflect anticipated stigma, but could also reflect general discomfort with disclosure or fears of burdening others. Concerns about medication side effects build on evidence of misperceptions about the effectiveness of online therapy (Roth et al., 2024b), suggesting that reluctance to seek treatment Cronin et al. (2024) may be even greater when pharmacological options are involved.

I Pre-Analysis Plan

The section below correspond to the pre-analysis plan we submitted to the AER RCT registry with ID AEARCTR-0014621 and fist registered on October 21, 2024 and and first published on October 28, 2024.

I.1 Introduction

Mental health disorders are a leading cause of disability worldwide, affecting over 1 billion people (Rehm and Shield, 2019). The prevalence of these conditions contributes to significant economic burdens, with annual costs of approximately $201 billion in the U.S. and $3.7 billion in Norway (Bütikofer et al., 2024). Research has shown that mental health issues negatively impact educational outcomes, such as grade repetition, test scores (Currie and Stabile, 2006, 2009), and dropout (Fletcher, 2010), as well as labor market outcomes, including lost working days (Ridley et al., 2020; Currie, 2024) and income (Smith and Smith, 2010; Goodman et al., 2011; Biasi et al., 2021).

Undetected mental health issues can also generate substantial costs as untreated individuals continue obtaining poor health and economic outcomes. Detecting and treating mental health issues is crucial, yet global statistics indicate that many individuals suffering from these conditions remain undiagnosed and untreated. Worldwide, there are substantial gender disparities in depression and suicide rates. Women are more frequently diagnosed with depression, yet men have a significantly higher rate of completed suicides. These patterns suggest that a larger proportion of men than women may not be diagnosed in time, raising important questions about how gender influences both the recognition of mental health issues and the likelihood of seeking help.

This study investigates gender differences in the recognition of mental health symptoms, particularly depression, and the likelihood of seeking help. Through an analysis of administrative data on mental health diagnosis and suicide from Norway, combined with an online experiment using a representative U.S. sample, the project aims to explore whether gender-based differences in mental health symptom recognition and help-seeking behaviors contribute to the disparities in suicide and depression rates. The study also provides insights into potential factors such as perceptions, psychic costs, and social norms that may drive these gender differences.

I.2 Design

The study uses a within-subjects design wherein all participants are exposed to two treatment blocks. In each of these blocks, participants will be shown one or more *hypothetical scenarios*. A scenario consists of a list of depression symptoms and the frequency of their occurrence over the past two weeks. The displayed symptoms are chosen from the PHQ-9 questionnaire (Kroenke et al., 2001), which is a widely used (and often self-administered) instrument that screens for depressive disorders. The list of symptoms and frequencies are randomly chosen to meet certain thresholds which indicate different levels of depression severity.

After reviewing the hypothetical scenario, participants are asked to state their views on: (i) whether the symptoms indicate that the subject of the scenario suffers from depression (*recognition*), (ii) perceptions of depression *severity*, (iii) the likelihood of *seeking help* from different sources, and (iv) beliefs and attitudes regarding depression and mental health.

Treatment blocks. The two treatment blocks, *Self* and *Other*, differ only in the subject of the hypothetical scenario. In *Self*, the subject of the hypothetical scenario is the participant. In *Other*, the subject of the scenario is a hypothetical individual (who is either Male or Female). Participants will evaluate 2 scenarios in each treatment block and the order of the blocks will be randomized. The symptoms in the second scenario in the *Other* treatment is fixed and the subject of that scenario is the same as the subject of the first scenario in that treatment. This common scenario will be used to elicit second order beliefs by asking participants to provide their best guess of the percentage of participants in the study who thought that the scenario described a person with depression. This guess will be incentivized based on the actual responses from participants in the study.

Participants will also be presented with a set of standard demographic questions and a question about their past experience with treatment for mental health issues such as depression or anxiety.

I.3 Treatment *Self*

Vignette. First, participants are introduced to the context of the vignette:

> Please imagine that you have been experiencing the following issues. Note that this is a *hypothetical scenario*. Review the list of hypothetical issues along with how often you would have experienced them **over the last two weeks**:

List of symptoms. Three or more of these symptoms are shown to the participant in a tabular form, along with a frequency which is one of *Several days, More than half the days, Nearly every day*. The list contains the questions exactly as stated in the PHQ-9 instrument:

1. Little interest or pleasure in doing things.

2. Feeling down, depressed, or hopeless.

3. Trouble falling or staying asleep, or sleeping too much.

4. Feeling tired or having little energy.
5. Poor appetite or overeating.
6. Feeling bad about yourself —or that you are a failure or have let yourself or your family down.
7. Trouble concentrating on things, such as reading the newspaper or watching television.
8. Moving or speaking so slowly that other people could have noticed. Or the opposite —being so fidgety or restless that you have been moving around a lot more than usual.
9. Thoughts that you would be better off dead, or thoughts of hurting yourself in some way.

Each frequency corresponds with a score in the PHQ-9 scale as follows:

- Several days = 1
- More than half the days = 2
- Nearly every day = 3

The PHQ-9 score is calculated by the simple addition of the frequencies for each symptom, with no weight for how "serious" the symptom is. For example, to obtain the maximum score of 27 in the PHQ-9 scale, all nine items must have a frequency equal to 3 (nearly every day). The scores map into a suggested interpretation of the severity of depression as follows: Minimal Depression (1−4), Mild (5−9), Moderate (10−14), Moderately Severe (15−19), and Severe (>= 20). We consider all categories except Minimal in this experiment.

I.4 Treatment *Other*

Vignette context. The scenario is introduced in the same way as in treatment *Self*. The key difference is that the subject of the scenario is a hypothetical male or female individual. We use first names to make gender identity salient. The chosen names – Michael and Jessica – are among the most popular names in the birth cohort in Texas.

> For these questions, imagine a hypothetical individual, [NAME]. [NAME] is 34 years old, lives in [TOWN in the US], and works as a marketing professional.
>
> Please imagine that [NAME] has been experiencing the following issues. Note that this is a *hypothetical scenario*. Review the list of hypothetical issues along with how often [NAME] would have experienced them **over the last two weeks**:

List of symptoms. Presented in the same way as in the *Self* block.

I.5 Generating the list of symptoms

Each vignette always includes the first two questions of the PHQ-9. Additional questions and symptom severities are randomly generated. The procedure to randomly generate a list of symptoms is as follows:

1. Randomly select one of the four categories. The likelihood with which categories are picked are: Mild - 1/6, Moderate - 1/3, Mod. Severe - 1/3, Severe - 1/6. Each category has an upper and a lower score bound.[21]

2. For the first two questions of the PHQ-9, select severities such that the score adds up to 4 (so one of (1,3),(2,2),(3,1)).

3. Next, generate a random sequence of numbers from 3 to 9, and pick them one by one. These correspond to questions in the scenario.

4. For each item in the sequence, pick a score from 1 to 3. This represents the severity of the symptom.

5. Check whether the total score exceeds the minimum threshold for the category. If not, repeat step (4). If so:
   - If all questions have been iterated through, stop
   - If score exceeds the max score for that category as well, stop
   - Else, flip a coin. If Heads, pick another question (step (4)). If Tails, stop.

After the scenario, participants are asked to respond to a few questions.

I.6 Outcomes of interest

We divide our outcomes of interest in two groups. The first group of outcomes aims to document gender differences in the recognition of depression symptoms, the severity of depression, along with the willingness to seek help. The second group of outcomes relate to three candidate mechanisms that may drive any observed gender differences in the first group of outcomes.

For the main outcomes related to recognition of depression, we use the answers to the following questions in the *Self* and the *Other* treatments:

[21] According to the PHQ-9 scoring, there are 5 severity levels: 0-4 None or minimal, 5-9 Mild, 10-14 Moderate, 15-19 Moderately severe, 20-27 Severe. We do not focus on the lowest severity level to ensure that we are presenting scenarios where some level of depression is expected.

Q1. Suppose that [you/NAME] were/was experiencing the hypothetical issues at the frequencies listed above, do you think [you/NAME] would have depression? *[Definitely yes, probably yes, probably no, definitely no]*

Q2. How severe do you think the depression would be if [you/NAME] were experiencing these issues in real life? *[None or minimal, Mild, Moderate, Moderately Severe, Severe]*

The main outcome is a binary variable equal to 1 if the answer to Q1 is definitely yes or probably yes, and 0 otherwise. Another primary outcome is whether participants identify the severity of depression correctly, where the variable equals to 1 if the severity level is identified correctly and 0 otherwise.[22]

The third main outcome captures the willingness to seek help after seeing the list of symptoms and answering Q1 and Q2. The questions in the survey are:

Q3. If [you/NAME] were experiencing these hypothetical issues, how likely do you think it is that [you/she,he] will seek help from the following sources? For these questions, imagine that there are no constraints on the time or money that has to be spent, and no problems relating to health insurance coverage for these options. *[Very unlikely, Somewhat unlikely, Somewhat likely, Very likely]*

1. a General Practitioner solely for this purpose
2. a General Practitioner during a visit for another purpose
3. a Psychologist or a therapist
4. a counselor at your workplace or university
5. a close friend or relative
6. an AI-enabled mental health chatbot

We will use the responses to the set in Q3 to generate an outcome variable which equals 1 if the response is somewhat likely or very likely for one or more of the options presented in Q3 and 0 otherwise. As secondary outcomes we have whether help would be sought from a mental health specialist or from non-specialists. The specialist variable will be equal to 1 if the response is somewhat likely or very likely in at least one of options 1-3 in Q3 and 0 otherwise. The non-specialist variable will be equal to 1 if the response is somewhat likely or very likely in at least one of options 4-6 in Q3 and 0 otherwise.

[22] The range of values from 5 to 27 that we generate in our scenarios all correspond to some level of depression from mild to severe.

In the second group of outcomes we propose three different factors that could underlie gender differences in recognizing depression and seeking help. We refer to these three factors as perceptions, psychic costs and norms.

To capture gender differences in perceptions we will generate binary outcomes from each of the answer options in Q4. Each of these variables would be equal to one if the response is somewhat or strongly agree and 0 otherwise. We will also generate an index summarizing the perceptions in a single variable.

Q4. Based on the hypothetical issues and their frequencies experienced by [you/NAME], please indicate the extent to which you agree or disagree with the following statements. *[Strongly disagree, Somewhat disagree, Somewhat agree, Strongly agree]*

1. The issues would go away by themselves in some time
2. The issues are not very serious and do not require treatment
3. I/[NAME] worry/worries about what others would think of me/her/him if they became aware that [I/she,he] had these issues
4. I/[NAME] would rather deal with these issues [myself/herself,himself] than rely on help from others
5. I/[NAME] do/does not think that the available treatments for these issues are effective
6. I/[NAME] am/is worried about the side effects of medication for depression

To study psychic costs, we will use the *Self* and *Other* scenarios and create a binary variable equal to 1 if the scenario being evaluated corresponds to *Other*.

To study norms, we will survey responses to Q5.

Q5. We conducted a similar survey with a sample of 100 Americans. The composition of respondents in this survey was broadly representative of the American population. Participants in that survey evaluated the following exact hypothetical scenario and answered whether or not they thought [NAME] would have depression if he/she were experiencing these symptoms.

List of symptoms

Of the 100 Americans who participated in that survey, how many do you think answered Definitely yes or Probably yes to the question: Suppose that [NAME] were experiencing the hypothetical issues at the frequencies listed above, do you think [NAME] would have depression? [*Number between 0 and 100*]

Everyone in the study will see the same list of symptoms and frequencies. The symptoms are 1, 2, 5, 6, and 7 from the PHQ. The frequencies corresponding to these symptoms (in terms of score levels) are 2, 2, 2, 3, and 2 respectively.

Participants respond with a number from 0 to 100, scaled to a fraction from 0 to 1. For example, if the participant believes that 50% of the Americans participating in the study thought that the scenario represented a depression case, the outcome will take the value of 0.5.

This question is incentivized—participants are told the following: If the difference between your guess and the number of people (out of a 100) who answered Definitely or Probably yes is within +/- 5 of the actual number, you will earn a bonus reward of $ 1.

I.7 Gender differences in depression recognition and seeking help

We are interested in whether men and women differ in how likely they are to recognize depression-related symptoms and to seek help given the symptoms. Recognizing symptoms of depression is crucial, as it is the first step toward seeking help. When symptoms go unrecognized, a condition may remain untreated, potentially leading to severe outcomes, including suicide. Differences in the ability to recognize depression may impose barriers that prevent people from seeking help when dealing with mental health issues.

I.8 Proposed analyses to assess gender differences in recognition and seeking help

Our design involves randomly choosing symptoms and frequencies from the PHQ-9 instrument and showing them in a tabular form to participants. As explained above, we choose symptoms (i.e., items form the PHQ-9 scale) and frequencies so that the combinations of symptoms and frequencies gives an overall score between 5 and 27.

We first propose to analyze the raw data by plotting the three main outcome variables (recognize, correct and seek help) against the PHQ-9 score, and separately by the gender of the respondent.

Second, we will conduct a regression analysis of the three main outcomes on a gender indicator ($Male = 1$ if the participant is male) (see Equation 3), and *Male* along with indicators for severity levels of the scenario (Moderate, Moderately severe and Severe, with excluded indicator Mild) and the interactions between Male and the severity levels (see Equation 4). The regressions will include respondent fixed effects (γ_i). In robustness checks we will explore PHQ-9 item fixed effects and adding controls such as other demographics and familiarity with screening tools for depression and anxiety.

$$y_i = \alpha_0 + \alpha_1 \text{Male}_i + \gamma_i + \varepsilon_i \tag{3}$$

$$\begin{aligned} y_i = \beta_0 + \beta_1 \text{Male}_i + \beta_2 \text{Moderate}_i + \beta_3 \text{Male}_i \times \text{Moderate}_i + \beta_4 \text{Modsevere}_i + \\ \beta_5 \text{Male}_i \times \text{Modsevere}_i + \beta_6 \text{Severe}_i + \beta_7 \text{Male}_i \times \text{Severe}_i + \gamma_i + \varepsilon_i \end{aligned} \tag{4}$$

I.9 Hypotheses

We formulate the following hypotheses regarding the main outcomes (recognize, correct and seek help):

1. Conditional on a severity level, men are less likely to recognize the symptoms as depression and to correctly classify the severity of depression than women.

2. Men are less likely to state that they will seek help than women if the scenario is about *Self*.

3. In the case of scenarios referring to *Other*, it may be the case that the differences in recognition and seeking help are smaller than in *Self* depending on whether the subject of the scenario is a man or a woman. We explore this in Section I.10 and do not formulate a specific hypothesis for now.

I.10 Potential factors underlying gender differences in depression recognition and seeking help

If we find that the hypotheses in Section I.7 are validated, we propose three factors that could be behind these gender differences in depression recognition and seeking help.

Perceptions. Men and women may differ in how they perceive depression symptoms, what others would think of them, how effective treatments options are, or whether they have side effects. Differences in these dimensions are potential candidates for why they decide whether or not to seek help.

Psychic costs. Recognizing that one may be experiencing issues can be difficult for some people because it imposes a emotional and mental burden that can include feelings of shame, guilt, fear, or denial. These psychic costs would be lower when evaluation scenarios about someone else instead of oneself.

Norms. Gender or masculinity norms may affect how men are able to recognize or seek help when they are experiencing mental health issues. Traditional norms often emphasize traits like toughness, self-reliance, and emotional restraint in men, which can create barriers to acknowledging mental health struggles.

I.11 Proposed analyses to provide evidence on potential underlying factors

For perceptions, we will provide visual evidence of gender differences of the response items obtained from Q4 and t-tests for whether the differences are statistically significant. We will also conduct a regression analysis using Equations 3 and 5.

For psychic costs we will present regressions of the three main outcomes on the Male indicator, an indicator for treatment Other, and the interaction between the two:

$$y_i = \delta_0 + \delta_1 \text{Male}_i + \delta_2 \text{Other}_i + \delta_3 \text{Male}_i \times \text{Other}_i + \gamma_i + \varepsilon_i \tag{5}$$

For norms, we will provide regression results of the second order belief (SOB) when the subject of the scenario being evaluated is a man or a woman. We will regress the percent value from Q5 on the Male indicator as in Equation 3.

I.12 Hypotheses

We formulate the following hypotheses regarding perceptions, psychic costs and norms:

1. Men are more likely to respond somewhat or strongly agree to most/all of the six items in Q4 about perceptions than women. In Equation 3, we expect the coefficient α_1 to be larger for men, indicating that the value of the index is higher for men than for women.

2. Psychic costs are larger for men than for women. We hypothesise that δ_3 in Equation 5 is positive and significant, indicating that men are more likely to recognize depression in others than in themselves. We do not have a specific hypothesis on whether this is the case among women.

3. Men have more traditional norms than women regarding mental health issues. Men report similar SOB than women when the subject of the scenario is a woman but lower SOB then women when the subject of the scenario is a man.

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