Mental Health Literacy, Self-Stigma and Demand for Mental Health Support among University Students
Pre-Analysis Plan

Michelle Acampora[*]   Francesco Capozza[†]   Vahid Moghani[‡]

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1 Introduction

This project studies whether a mental health literacy intervention affects the demand for mental health support among university students. Moreover, it investigates what are the mechanisms responsible for any effect.

We conduct an incentivized survey experiment with a large sample of university students from one of the largest Dutch universities, which is broadly representative of the student body in the Netherlands. The choice to focus on University students in a developed country is worth noting for two reasons. Firstly, the health care policymakers and the current literature on mental health support have neglected the potential consequences of the transition phase between teenage and adulthood. We address this gap by focusing on individuals during this transition period. Secondly, university years are a decisive phase where the students are still

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[*]michelle.acampora@econ.uzh.ch
[†]capozza@ese.eur.nl
[‡]moghani@ese.eur.nl

accumulating human capital, and poor mental health status can dramatically undermine this process.

2   Design

We will recruit the students from a Dutch University that hosts 30,000 students (roughly). The expected participation rate in surveys disseminated through the University is between 5% and 10%. We expect a sample size between 1,500 and 3,000 participants. Once we reach the cap of 3,000 participants, we will end the data collection. Otherwise, we keep the survey open for 20 days after publishing it.

We will exclude all the participants who do not complete our survey experiment. We will assess whether there is differential attrition between Treatment and Control, before dropping the participants. We will also exclude the participants who have spent on the survey a time lower than 3 SD from the mean, separately for Treatment and Control since the assignment to Treatment implies a mechanically higher time required to complete the survey.

Part 1: Recruitment and Demographic characteristics   We will invite the participants to join the study via an invitation email. The message in the email will ask for their participation in a survey about their current lifestyle situation, which will try to include as many students as possible including those who might be reluctant to join surveys on mental health. In recruiting the participants, we could reach roughly 30,000 students from all the school of a Dutch university. Moreover, the participants are also informed about the monetary incentives of joining the survey.

After joining the survey, the participants will create an unique anonymous ID code (to make sure that the experiment is completely anonymous without any identifiable information of the participants). Finally, we will collect their basic demographic information. We collect self-reported information from the participants on: age, gender, school, level of education, whether they are Dutch (if not from which macro region), if they are Dutch whether they have an immigration background, their parents' education, whether they perceive themselves to have low SES, GPA and self reported mental health status. This design choice allows to

2

control whether eventual attrition later on in the experiment is related to specific observable characteristics.

Part 2: Randomization We will randomize the participants in one of the two experimental conditions. Half of the participants will receive an information bundle to increase the participants' mental health literacy. This information bundle will target the following elements:

- Staging approach to mental health problems. The information emphasizes that mental health is a spectrum and it is always possible to take care of the own mental health by self-monitoring and promoting self-care. Anyone, at any stage, can benefit by improving his/her own mental health status.

The information is a combination of peer-reviewed results from the psychology literature (Patel et al. (2018)). The remaining half of the participants allocated to the Control group will not receive any information about mental health. The control group in this experiment can be seen as a passive control group.

Part 3: Demand for Mental Health Support After the exposure to the treatment, we will elicit the participants' "willingness-to-pay" for a mental health online app. The app combines exercises of Cognitive Behavioral Therapy, and it has been shown effective in research trials[1]. To have an incentive-compatible WTP elicitation, we will use the BDM mechanism (following Cullen and Perez-Truglia (2018b)). In the BDM, the respondent's bid is compared to a price that is determined by a random number generator. If the respondent's bid is lower than the price, the respondent gets a dollar amount equal to the price. If the bid is higher than the price, the subject receives the item and no dollar amount. The rules of this mechanism make it a dominant strategy for respondents to bid exactly their true valuation for the item (Cullen and Perez-Truglia, 2018b).

One important detail of the BDM mechanism is that all subjects must provide a bid for the item at hand, but this bid is not always "executed." We tell subjects that bids from "a few participants" will be chosen at random to be executed (Cullen and Perez-Truglia (2018a)).

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[1]We are going to use Sanvello as the app. Check here for the research evidence on the efficacy of the app.

Subjects find out if their bids are selected on the screen at the end of the experiment to prevent any emotional reaction during the last part of the experiment.

A BDM requires that the participants understand the instruction and fully trust the experimenter's instruction. If at least one of the two conditions does not hold, BDM does not ensure an incentive-compatible WTP elicitation. However, Burchardi et al. (2021) documents a reassuring result from a field experiment on the robustness of WTP elicitation techniques. Their results show that participants' optimal bidding and understanding of the mechanism is not affected by the type of elicitation techniques used (in their case BDM and MPL), by the moment when the random number is drawn, and by stating that participants cannot influence the random number drawn.

Part 4: Demand for Information   We will also capture the participants' willingness to be informed about the psychological service provided by the university or the coaching service provided by the university as well. The option to not acquire any information is also possible. We ask the participants to rank the alternative from the most preferred option to the least preferred option. The participants are aware that they will receive information about the most preferred option.[2] By asking the participants to make this raking, we will manage to understand who is more willing to sacrifice more specialized service by picking the coaching service, which is less ego-threatening. This discrete choice feature of the question will allow us to understand whether self-image concerns play a role in the information selection of the mental health service.

Part 5: Post Treatment questions   We will explore the potential mechanisms that could explain the reasons behind the decisions of the individuals. To do so, we will ask a battery of post-treatment questions. We explore the following potential channels related to the participants' beliefs:

- Self and social stigma;

- Already receiving support.

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[2]We follow procedure similar to the one used in Fuster et al. (2021).

- Beliefs on the effectiveness of the app and services.

- Beliefs about the educational and labour market outcomes returns of investing in mental health.

We will also elicit participants' preferences:

- Risk preferences (Falk et al., 2018)

- Time preferences (Falk et al., 2018)

Part 6: Mental Health Status   We will assess the participants' mental health status by using the diagnostic tool PHQ-4, which is widely used in psychology literature and among professionals. We will use this tool at the end of the experiment to minimize any priming effect at earlier stages of the experiment. Any discrepancies between the self-reported mental health status and the diagnosed mental health status might indicate that the students lack in the awareness of their mental health status. (Falk et al., 2021).

Experimenter Demand Effect and Follow up Survey   Although the experimenter demand effect is usually moderate (de Quidt et al. (2018)), we take several measures to make sure to minimize the experimenter demand effect as much as possible. First of all, our outcome variable, WTP for the mental health app, is an incentivized measure of a field outcome which should reduce the concerns for the experimenter demand effect. Moreover, we preserve anonymity of the participants during the experiment, which should also minimize experimenter demand effect.

Finally, we will recontact the participants of the experiment few weeks later and we will match them to their previous answers by means of their unique ID code and their demographic variables. In this follow up, we will assess whether people who are being exposed to the mental health literacy intervention are more prone to seek for help outside the experimental environment and what is their mental health status by means of a diagnostic tool. Moreover, we will also elicit their self and social stigma concerns after the experiment to assess whether these concerns are short-lived.

3 Analysis

3.1 Balancing Tests and Attrition

We will test for equality of mean of baseline characteristics measured before randomization to check if the Control and the Treatment groups look similar. For this purpose we will use two-sided t-test for equality of means, and a χ^2 test for zero difference between all the characteristics[3].

Controlling for the individual characteristics X_i, we will check if the individuals in the treated group are more likely to leave the sample before finishing the experiment. Defining C_i to be 1 if individual finishes the experiment, and 0 otherwise, we will use a linear probability model as follows:

$$C_i = \alpha + \beta t_i + \Gamma^T X_i + \epsilon_i$$

where t_i is 1 if the individual is in the treated group and 0 otherwise. Testing for $\beta = 0$, gives us an indication of differential attrition across the treated and the control groups.

In case of rejection of balancing tests, or differential attrition across groups, we use propensity scores in combination of the following methods to check the robustness of the results.

3.2 Baseline Results

We will perform a t-test to compare how WTP for the app differs between Treatment and Control group.

We will perform a Mann-Whitney test to compare whether the respondents in the Treatment are more willing to acquire any type of information about support service compared to the respondents in the Control group.

For the baseline results, we will use the following regressions

$$y_i = \alpha + \beta t_i + \Gamma^T X_i + \epsilon_i$$

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[3]We first standardize the differences and look and the sum of squared differences as the test statistics.

Where y_i is the willingness to pay (WTP) for the app, t_i is a dummy variable that gets value equal to 1 if the respondent is allocated to the Treatment group, and X_i is a vector of controls (age, gender, mental health status, Dutch vs non-Dutch, self-reported GPA, SES).

We will also run a regression where y_i is a binary variable that takes value 1 if the respondents' highest ranked option for information is university psychologist (and 0 for the others), t_i is a dummy variable that gets value equal to 1 if the respondent is allocated to the Treatment group, and X_i is a vector of controls (age, gender, mental health status, Dutch vs non-Dutch, self-reported GPA, SES). We will repeat the same procedure with y_i being 1 if the highest ranked option is coaching service, and any of the two services (two separate regressions).

We will run an ordered logit model where the outcome variable is the ranking of information about the services on a dummy variable that takes value 1 if the participant is assigned to Treatment and demographic variables (age, gender, mental health status, Dutch vs non-Dutch, self-reported GPA, SES).

We will run logit models (separately) where the outcome variables are if the respondent is willing to receive information (about university psychologist, coaching service and no information) on a dummy variable that takes value 1 if the participant is assigned to Treatment and demographic variables (age, gender, mental health status, Dutch vs non-Dutch, self-reported GPA, SES).

4   Heterogeneity Analysis

We will look at the heterogeneity of the baseline results by the individual characteristics using a linear regression similar to Equation 3.2, but interacting the the treatment t_i and the characteristic of interests x_i, which changes in each separate regression.

$$y_i = \alpha + \beta_1 t_i + \beta_2 t_i \times x_i + \beta_3 x_i + \Gamma^T X_i + \epsilon_i$$

y_i is either the WTP for the app or the demand for information. We specify three different outcome variables for the demand for information: demand for information about the university psychologist ($y_i = 1$ and 0 otherwise), demand for information about the coaching service ($y_i = 1$ and 0 otherwise), and demand for information about any service (both university psychologist and coaching service). X_i are the usual controls.

x_i is one of following variables: Gender, Self-reported GPA (High GPA = 1 if they report a value higher or equal to 7,5), Dutch, low SES, Mental Health Status (Depressed if PHQ-4 $\geq$ 6, and Depressed if their self-reported Mental Health is Bad or Very Bad), Risk Preferences, Time Preferences, and a dummy which takes value 1 for those who reported to be already receiving psychological support (Already Receiving). For low SES, we follow three different ways to code the variable: self-reported financial stress (if Bad or Very Bad, then low SES = 1), highest education level of the mother (if no university, then low EDU = 1), and highest education level of the father (if no university, then low EDU = 1).

Depending on whether we have enough observations, we will eventually run heterogeneity analysis for non-Dutch students (we define a dummy European = 1 if the students are European but non-Dutch, and 0 otherwise), and for the Dutch students with an immigrant background, for bachelor students compared to pre-master and master students, and for the different (university) schools the students belong to.

We will also perform the heterogeneity analysis using random forests following Wager and Athey (2018).

4.1 Mechanisms

To study the mechanisms, we will look at how the answers to the post-treatment beliefs questions differ between Treatment and Control. We will standardize the answers to the post-treatment questions by using the mean and standard deviation of the answers from the control group. Then, we will regress each standardized answer m_i separately in the following regression:

$$m_i = \alpha + \beta t_i + \Gamma^T X_i + \epsilon_i$$

β from the regression above, gives us the differences between the control and the treated

8

participants in terms of m_i. X_i are the usual demographic variables (age, gender, mental health status, Dutch vs non-Dutch, self-reported GPA, SES).

We will repeat the same procedure for the following variables: Self-Stigma, Social Stigma, Perceived Benefits of Mental Health for Education, Perceived Benefits of Mental Health for Labor Market Outcomes, Beliefs about the effectiveness of the app. Additionally, since self- and social stigma are measured by asking different questions for each type of stigma, we will also create two indexes to combine the information from each of these questions, from the same class of stigma. In order to do so, we will standardize each component of the index and sum respondents' standardized outcomes, weighting each item by the inverse of the covariance matrix of the standardized outcomes (following Anderson 2008).

4.2   Persistence of the effect

We will recontact the participants in a follow-up survey a few weeks after the end of the main experiment. We will assess whether there is differential attrition in participation to the follow up among participants originally allocated to Treatment and Control.

In order to do so, we will regress 3.1. If the Treatment dummy coefficient is significant with a p-value smaller than 0.05, we will use the Lee Bounds to provide estimates of the next regression.

We will assess whether participants in the Treatment are more likely to seek mental health support compared to those in the Control. We will regress 3.2 with a dummy equal 1 if the participant is receiving support on Treatment dummy and the same controls as the main analysis. We will also monitor the students' mental health and stigma concerns in the follow up by using the same questions as in the main study.

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Appendix

A Instructions

This study is part of a scientific research project that aims to promote wellbeing and equality at EUR. You can fill in the survey in Dutch by changing the language using the tool at the top of the page.

This online survey, which takes **around 10 minutes**, is **completely anonymous**, and you are **free to leave the survey at any time**. There is **no deception or false information** involved in any stage of this survey.

By completing the survey, you are eligible to enter a **lottery to win a voucher worth €100.** The voucher can be spent on an online shopping platform of your choice.

By clicking NEXT you explicitly give your consent and agree that:

- We can collect your **anonymous** personal data, and we only use this data for **scientific purposes**. We promise to protect your data according to the new General Data Protection Regulation (GDPR) laws (Read More).
- You confirm that **you are a student at Erasmus University Rotterdam**.
- We reserve the right to exclude respondents from the lottery in case of multiple submitted responses or low-quality/inattentive responses.

If you have any question concerning this experiment, do not hesitate to send an e-mail to **capozza@ese.eur.nl** or **moghani@ese.eur.nl**

Figure 1: Informed Consent screen

1 in every 75 respondents who complete the survey will receive a **€100 voucher**. In addition to this lottery, you have the chance of winning **additional prizes** within the experiment.

Please note that all the prizes in the experiment will be given in the form of vouchers. Participation in the lottery is entirely voluntary.

In case I win the lottery, I want my vouchers (the €100 of participation and other prizes) to be from:

Amazon.nl	○

Bol.com	○

I do not wish to participate in the lottery	○

Figure 2: Preferences for the voucher provider screen

To start the survey, you need to create a unique code for yourself. This way, your answers will remain anonymous, and you will be able to check later if you win the lottery using your unique code.

To generate your unique code, please type the following from left to right without any space, in lower case letters, in the text box below.

- The first two letters of your father's name (for example, ab)
- Your day of birth (from 1 to 31)
- The first two letters of the name of your elementary school (for example, ab)
- The number of your siblings (0 to 99)
- The last two letters of your mother's name (for example, ab)
- The last two digits of your phone number (00 to 99)

Figure 3: Anonymous ID generation screen

What is your age?

What is your gender?

Female ○

Male ○

Other ○

Prefer not to say ○

Figure 4: Demographics part 1 screen

Were you born in the Netherlands?

Yes ○

No ○

Figure 5: Demographics part 2 screen

Were both of your parents born in the Netherlands?

Yes ○

No ○

Figure 6: Demographics part 3 if the participant is Dutch screen

In which region were you born?

Asia Pacific (Central & South Asia, Northeastern Asia, Southeastern Asia)	○
Australia and Oceania	○
Europe (Northern Europe, Southern Europe, Eastern Europe, Western Europe)	○
Middle East/Africa (Middle East, Northern Africa, Southern Africa)	○
North America	○
South America, Central America, Caribbean	○

Figure 7: Demographics part 3 if the participant is non-Dutch screen

In what degree program are you currently enrolled?

Bachelor's	○
Pre-Master's	○
Master's (including MSc., MPhil., LLM., Medical Training)	○

Figure 8: Demographics part 4 screen

What is your overall GPA?

Below 5.5

5.5-6.5

6.5-7.5

7.5-8.5

Above 8.5

Prefer not to say

Figure 9: Demographics part 5 screen

What is the education level of your Mother/Parent A?

Elementary education or lower

Secondary education

Vocational education/MBO

Higher education (below Master's level)

Master's

PhD

Not applicable

Figure 10: Demographics part 6 screen

What is the education level of your Father/Parent B?

Elementary education or lower	○

Secondary education	○

Vocational education/MBO	○

Higher education (below Master's level)	○

Master's	○

PhD	○

Not applicable	○

Figure 11: Demographics part 7 screen

How would you describe your mental health currently?

Very Good	○

Good	○

Fair	○

Bad	○

Very Bad	○

Figure 12: Demographics part 8 screen

How would you describe your current financial situation?

Always stressful ○

Somewhat stressful ○

Sometimes stressful ○

Rarely stressful ○

Never stressful ○

Figure 13: Demographics part 9 screen

Mental wellbeing is not binary but is a spectrum. Therefore, a **staging approach** is a new way to think about someone's mental wellbeing.

This approach implies that taking care of mental health is a **continuous process with positive outcomes:** regardless of how someone feels right now, taking care of their mental health could always lead to higher wellness and fulfillment. The staging approach suggests some **simple steps** towards higher wellness, such as promoting self-care and increasing monitoring.

These general tips apply to anyone, including university students. For example, research evidence suggests that university students who were investing in their mental health were also showing a better academic performance.

Figure 14: Information Treatment screen

Next, you will play against a computer.

We will pick a few participants to implement their choices in this part. You can earn money or receive a service, but **you will never lose money**.

Figure 15: Intermezzo prior to BDM screen

You can receive one month of access to **an app** for **mental health support** (read more about the app here). This self-care app helps individuals to monitor their moods. Additionally, the app provides best existing practices to manage stress-, anxiety-, and depression-like symptoms. This app has been evaluated to be effective in medical trials (e.g., see this study).

Here, you state a price for one month of access to the app. A computer will bid against you. The computer's bid will be between 0 and 10 independent of your price.

- If your price is higher than the computer's bid, you will receive a one-month subscription to the app for free. In this case, you won't receive any money.
- If your stated price is below or equal to the computer's bid, you receive a payment equal to the computer's bid. In this case, you won't receive the app subscription.

Regardless of the computer's bid, it is always in your best interest to report your true personal valuation for the app as the price.

Figure 16: BDM instructions screen

Regardless of the computer's bid, it is always in your best interest to report your true personal valuation for the app as the price.

What is your stated price to get a **one-month subscription** to this app? Move the slider to insert your answer.

€
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9 9.5 10

State your price

Figure 17: Bidding screen

We are going to provide information about the services currently available at EUR to seek mental health care/support. On campus, it is possible to receive support from: University Psychologist and Coaching service.

Please, rank the following options from the most preferred one (1) to the least preferred one (3). You are going to receive information about your most preferred option (or no information if that is your most preferred choice).

University Psychologists service

Coaching service

No information

Figure 18: Information Demand screen

Below is a link to get more information about coaching services at EUR:

Click here to learn more about coaching services at EUR!

Click NEXT to continue

Figure 19: Information about Psychological support screen

Below is a link to get more information about psychological counseling opportunities at EUR:

Click here to learn more about psychological counseling at EUR!

Click NEXT to continue

Figure 20: Information about Coaching service screen

Think about the relationship between mental health and educational performance of the university students and complete the following sentence:

Good mental health is ...... for the students' educational performance in the university.

Not at all important	○
Slightly important	○
Moderately important	○
Very important	○
Extremely important	○

Figure 21: Post Treatment beliefs part 1 screen

Think about the relationship between mental health and future job of the university students and complete the following sentence:

Good mental health during studies is ...... for the students' future job characteristics (e.g. the salary and the type of job).

Not at all important	○
Slightly important	○
Moderately important	○
Very important	○
Extremely important	○

Figure 22: Post Treatment beliefs part 2 screen

21

Which type of mental health care/support are you receiving now:

Professional support (i.e. visiting a general practitioner, praktijkondersteuner, psychologist, psychotherapist, or counselor)	☐
Coaching services	☐
Digital apps (e.g., meditation or self-care apps)	☐
Peer-to-peer support	☐
Support from family or friends	☐
None	☐

Figure 23: Post Treatment beliefs part 3 screen

How effective do you think digital apps are for mental health?

Very effective	○
Somewhat effective	○
Sometimes effective	○
Rarely effective	○
Never effective	○

Figure 24: Post Treatment beliefs part 4 screen

My self-confidence would **NOT** be threatened if I sought psychological help.

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and 4 means "Strongly agree".)

| 0 | 1 | 2 | 3 | 4 |

Your Opinion

I would feel worse about myself if I had a mental health disorder (for example anxiety/mood/psychosis syndrome).

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and 4 means "Strongly agree".)

| 0 | 1 | 2 | 3 | 4 |

Your Opinion

Figure 25: Self-Stigma questions part 1 screen

I would feel less of myself if I received mental health support.

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and 4 means "Strongly agree".)

| 0 | 1 | 2 | 3 | 4 |

Your Opinion

Please indicate to what extent **you agree or disagree** with the following statements.

I would feel inadequate if I went to a therapist for psychological help.

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and a 4 means "Strongly agree".)

| 0 | 1 | 2 | 3 | 4 |

Your opinion

Figure 26: Self-Stigma questions part 2 screen

I would worry about telling my family if I sought professional psychological help (now and in the past).

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and 4 means "Strongly agree".)

0	1	2	3	4

Your Opinion

Please indicate to what extent **you agree or disagree** with the following statements.

At university, the teaching staff and the peers think less of students if they find out about their mental health problems.

(Please use a scale from 0 to 4, where 0 means "Strongly disagree" and 4 means "Strongly agree".)

0	1	2	3	4

Your Opinion

Figure 27: Social-Stigma questions screen

Please tell, in general, how willing or unwilling you are to **take risks**.

Please use a scale from 0 to 10, where 0 means "completely unwilling to take risks" and 10 means you are "very willing to take risks".

0	1	2	3	4	5	6	7	8	9	10

Move the slider

How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?

Please use a scale from 0 to 10, where 0 means "completely unwilling to give up" and 10 means you are "very willing to give up".

0	1	2	3	4	5	6	7	8	9	10

Move the slider

Figure 28: Risk and Time Preferences screen

Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious or on edge?

Not at all ○

Several days ○

More than half days ○

Nearly every day ○

Figure 29: PHQ-4 questions part 1 screen

Over the last 2 weeks, how often have you been bothered by not being able to stop or control worrying?

Not at all ○

Several days ○

More than half days ○

Nearly every day ○

Figure 30: PHQ-4 questions part 2 screen

Over the last 2 weeks, how often have you been bothered by little interest or pleasure in doing things?

Not at all ○

Several days ○

More than half days ○

Nearly every day ○

Figure 31: PHQ-4 questions part 3 screen

Over the last 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless?

Not at all ●

Several days ○

More than half days ○

Nearly every day ○

Figure 32: PHQ-4 questions part 4 screen

If you are experiencing mental health issues or psychological distress, remember that **you don't have to deal with this alone!**

You can contact your general practitioner or use the university psychologist service if you wish to receive professional advice. **If you urgently need help, don't hesitate to call Stichting by dialing 113.**

Please tick the box to verify that you have read the information. Click Next when you are done!

| I have read the information above. | ☐ |

Figure 33: Emergency number screen