

# Learning to see a world of opportunities

## Pre-Analysis Plan

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# 1. Introduction

This document outlines the pre-analysis plan for the project “Learning to see a world of opportunities”. The research goal of the study is to test whether visualisation can be taught and whether it improves psychological and economic resilience among vulnerable recipients. To test these hypotheses, we designed an entrepreneurship training overlaid with visualisation techniques (“visualization curriculum”) and a traditional entrepreneurship training (“business-as-usual curriculum”). These two curricula were delivered to small-scale entrepreneurs and would be entrepreneurs in Bogotá, Colombia, through a randomized control trial. We compare the two curricula to each other and a pure control group who received no training. The implementation of this novel intervention faced a number of constraints, ranging from national political protests to the disruptive COVID-19 pandemic. The latter forced us to switch from an in-person collection of the midline data commencing in March 2020 to a phone survey within a few months. The combination of these constraints limits the statistical power of the intervention to a great extent. Hence, the logic underlying this PAP is two-fold: (1) to assess whether the intervention was impactful; and (2) to explore whether there are additional theoretical questions or mechanisms that we would like to uncover further in future work. With this vision in mind, we outline our primary hypotheses and outcome measurements below. Our analysis will be complemented by a section with exploratory analysis, where results should be treated as adhoc.

## 2. Description of the interventions

To test whether visualization can be taught and whether it improves psychological and economic resilience, we designed an entrepreneurship training overlaid with visualization techniques (“visualization curriculum”) and a traditional entrepreneurship training (“business-as-usual curriculum”).<sup>1</sup> We structured the curricula so as to reduce confounding differences: both training programs cover ten three-hour sessions on the same themes and in the same sequence.<sup>2</sup> Each class had between 15 and 25 participants. Venues were located in the same neighborhoods across Bogotá for both treatment arms. To control for trainer fixed effects, all sessions were led by two facilitators, one specialized in entrepreneurship and the other in psychology. The facilitators followed a detailed scripted manual and presentation deck in order to implement each session in a standardized manner.

The inclusion of three to four visualization exercises in each session is the key feature distinguishing the visualization curriculum from the business-as-usual curriculum. In the business-as-usual training arm, we replace the visualization exercises with group discussions, role play and written work of the same time length. For instance, in the third session, participants in the visualization treatment imagined their product or service from the shoes of their target customer and whether the product would satisfy their customers’ needs. If not, they imagined how the product could be improved to better match those needs. In contrast,

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<sup>1</sup> We conducted extensive qualitative data collection with marginalized entrepreneurs and victims of conflict to inform the curriculum content and language. We piloted the curriculum twice with 60 entrepreneurs in November 2018 and May 2019 in order to adapt and refine the sessions and tools to the needs of the target population.

<sup>2</sup> Themes include product development, customer experience, marketing, competition, savings, accessing finance, productivity and managing employees. We drew the content of each theme from existing entrepreneurship curricula (e.g. ILO’s Start and Improve Your Business Program).

participants undertaking the “business-as-usual” curriculum filled out a table that captured their customers’ characteristics and needs, and the ways in which their product or service fulfilled these needs. Participants subsequently discussed their tabulated responses with another participant (i.e., a partner).

The two curricula were implemented by the District Secretariat of Social Integration (Spanish: SDIS), an important subdivision within the Mayor’s Office of Bogotá. SDIS is mandated to develop and deliver programs that benefit vulnerable populations in the capital city, including entrepreneurship training. SDIS, the National Victims Unit (Spanish: Unidad para las Víctimas), Alta Consejería for Victims' Rights within the local government, and the National Training Service (Spanish: Servicio Nacional de Aprendizaje, SENA) all played an integral role in co-designing and piloting the curriculum.

## Teaching visualization

In designing the visualization exercises, we drew on mental imagery techniques developed by PI Emily Holmes and employed in clinical psychology. All visualization exercises followed a standardized structure. The facilitator first introduces the purpose of the exercise and prepares participants with the correct posture and breathing. The facilitator subsequently follows a script to guide participants visualizations through the exercise, which lasts on average ten minutes.<sup>3</sup> Finally, participants are asked a few debriefing questions, which aim to provide feedback on their experience and motivate how they may use the technique in their business decision making, overcoming challenges and so forth.

Visualization activities fall into one of three categories:

- (1) **Envisioning the future:** Exercises targeting thinking about the future required participants to mentally simulate the future, visualize different counterfactuals and think through the downstream consequences of their actions. For example, participants would imagine the consequences of not saving enough today in response to a negative shock in the future.
- (2) **Mental practice of goals and sub steps:** These exercises were designed to help participants make concrete and realistic plans through mental trial and error and then visually rehearse the plans to ease implementation. In particular, participants were required to set goals, ranging from big picture aspirations to concrete weekly goals. Once the goal had been defined, participants were encouraged to use visualization to pave the way and practice concrete steps for achieving these goals. Moreover, participants would reflect on what would happen when succeeding or failing to reach the goal. Examples of this type of exercise included mentally practicing conducting a customer survey, and designing and practicing a plan to become more productive by reducing waste in the workplace.
- (3) **Adopting the perspective of others:** These exercises encouraged participants to imagine the perspective of others with whom they might engage in their daily business transactions. Perspective taking exercises ranged over a wide range of entrepreneurial situations, from understanding customers’ needs to interacting with loan officers in a bank to empathizing with employees.

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<sup>3</sup> The scripts were designed to be sufficiently general in nature, such that participants could apply the visualization to their own business case.

Beyond these three specific categories, the curriculum was also designed to teach visualization as a general skill that could be used more broadly in business decision making and even in daily life. Participants were repeatedly provided the opportunity to practice the three different applications outlined above and reminded of the value of visualization in connection with real-life behaviors and outcomes. Providing a safe space to practice visualization in a guided way should also reduce any difficulties with future visualizations. This is particularly fitting for participants for whom visualizations may be unpleasant due to the lack of specificity in mental imagery or involuntary reminders of a traumatic past that occur during visualization. The complete curricula will be made available on the authors' websites.

### 3. Timeline of implementation and data collection

The intervention was implemented in two blocks to maximize quality control: Wave 1 took place between July and September 2019 and Wave 2 took place between September and December 2019.

The baseline surveys occurred just prior to notifying selected eligible participants for Wave 1 and 2 in July and September 2019 respectively. Innovations for Poverty Action (IPA) Colombia collected data on study participants through face-to-face interviews in their homes or preferred locations. When invited to participate in our survey rounds, all individuals were informed that we were conducting a survey on the population of entrepreneurs who had expressed interest in our government partner's programs. These interviews recorded information on socio-economic demographics, education, work and entrepreneurship history, business aspirations, welfare, trauma history and symptoms, and visualization ability. Data collected through the screening tool and attendance records were also merged with our survey data.

Our midline in-person survey was scheduled to commence in early March 2020. However, the survey was shortly cancelled thereafter due to the COVID-19 pandemic and stringent nationwide lockdown. A phone survey was implemented instead in May and June 2020. The research team will only have access to the data upon publishing the PAP. Please refer to IPA's letter under the AEA registry AEARCTR-0004695 for confirmation of this.

### 4. Sample

Our government partner, SDIS, recruited participants through a multi-channel media campaign, such as in community centers and through social media platforms. Interested applicants were required to fill out a short application form online or in-person, which we used to screen for eligibility.<sup>4</sup> 1967 aspiring entrepreneurs with either an existing business (55%) or a stable business idea (45%) make up our final

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<sup>4</sup> 3553 individuals applied to attend our program, of which 2337 were deemed eligible according to predefined criteria. To be eligible, participants needed to demonstrate entrepreneurship potential by reporting having a business or plans to launch a business in the following three months. We further defined entrepreneurship potential to encompass those who could describe their business or business idea in a few words and classify them by sector. In the second wave, we also prioritized applicants who reported taking at least three steps towards starting or growing their business in the last six months. Recognizing the importance of credit constraints for many of our applicants, we limited eligibility to those applicants who reported either non-zero income or business sales in the past six months. Eligible applicants were also required to be literate, over the age of 18 years and to provide three points of contact.

sample. In line with the mission of SDIS to serve “vulnerable populations”, past experiences of trauma and low-income status are common features of our sample. 83 percent reported exposure to a past traumatic experience(s) at baseline, including armed conflict and forced displacement. Participants with an existing business earn an average monthly income of COP \$693,077 (~USD \$200) at baseline, which is substantially lower than the Colombian minimum wage for a 40-hour week of COP \$877,802. 56% of participants are women, average age is 32 years old and the average entrepreneur completed secondary school.

Randomization was done within each block. We randomized participants into three treatment arms, stratifying by sex, age, entrepreneurship status (existing business or idea), sales for business owners or income for people without a business.<sup>5</sup> We further stratified by the governmental division responsible for the recruitment of different categories of participants (i.e. youth, victims of conflict and Venezuelan migrants, people with disabilities, formerly homeless, elderly and LGBTQ). In total, 956 individuals were randomly assigned to the visualization treatment, 558 individuals to the business-as-usual training and 453 entrepreneurs to the pure control arm, whose members did not receive any training. We doubled the sample size for the visualization treatment in order to meet the budget reporting requirements of our government partner.

## 5. Analysis while blind to treatment assignment

As the first step in our analysis, Innovations for Poverty Action (IPA) Colombia will provide the research team with all data but omitting treatment status. We will use this data to assess whether the variables are poorly measured (e.g. variance is too high), contain very little variation (e.g. top or bottom-coded) or the existence of large outliers. We will then revise the PAP based on this analysis and make a second deposit with justifications, prior to receiving the full dataset from IPA with treatment status.

## 6. Primary outcomes

Through our randomized control trial, we seek to test whether visualization can be taught and whether it improves psychological and economic resilience. We are interested in three sets of primary outcomes (or “families”): mental imagery, psychological resilience and economic resilience. The imagery outcomes are considered “first stage” outcomes, used to check that the curriculum combining entrepreneurship and visualization is having the intended impact. The psychological resilience and economic resilience outcomes are considered “second stage” outcomes that we hypothesize are affected by mental imagery. We will apply a multiple hypothesis test correction across the indices within the three families. Moreover, we will analyze the three families of primary outcomes in the overall sample first and then interact the treatment with a key variable of interest: baseline trauma (we will specify in the last section how this was assessed and scored). We describe this process in more detail below.

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<sup>5</sup> Participants who reported living in the same address were assigned to the same treatment status to avoid spillovers. Moreover, formerly homeless participants affiliated with the same shelter were also assigned to the same treatment status.

## Outcome variables construction

Unless otherwise specified, we construct our indices within each family following Kling, Liebman, and Katz (2007): (i) all variables are first consistently signed (e.g. higher value associated with higher imagery ability); and (ii) each component of the index is then standardized by subtracting the control group mean and dividing by the control group standard deviation. In the case where there are multiple subscales, we take two additional steps: (iii) the sum of the standardized components is taken and (iv) the sum is standardized again using the control group mean and standard deviation. For the psychological scales, we first sum the individual response items within a scale prior to standardizing the indices. Tables 1, 2 and 3 provide details on the construction of the outcome variables for each family.

### Family 1: Mental Imagery

Our intervention was designed to increase both the *frequency* with which participants make use of visualization – or “mental imagery” in clinical terms – in their business lives, and the “*quality*” of the images that they generate conditional on making use of imagery. We provide a separate measure for each, before constructing an overall imagery index.

#### ***Adapted version of the Spontaneous Use of Imagery Scale***

To measure the frequency of visualization usage, we adapted the Spontaneous Use of Imagery Scale (Reisberg, Pearson and Kosslyn, 2003) to the entrepreneurship domain. Our scale consists of eight statements designed to assess the propensity of an individual to make use of imagery in business-related scenario. Specifically, respondents are asked to consider business-related statements and determine the extent to which they agree with the statement using a five-point Likert scale. For example, we ask respondents to consider “When I need to go to a meeting, I picture the route in my mind before going.”

#### ***Adapted Prospective Imagery Task***

To assess the quality of visualization in an entrepreneurship domain, we adapted the Prospective Imagery Task. This exercise asks respondents to imagine three business-related positive and three negative scenarios. For example, respondents are asked to imagine a scenario in which “the COVID-19 pandemic is over, and you are struggling to make ends meet” or “the COVID-19 pandemic is over, and your business is doing well”. Respondents are then asked to assess the vividness, emotional intensity associated with each image. We expect a significant difference in the average level of vividness and emotional affect of these images between treatment and control, whereby it is increased in the former. We build four indices from this scale:

- (1) Two indices for positive scenarios: one for emotional valence and one for vividness;
- (2) Two indices for negative scenarios: one for emotional valence and one for vividness.

## Family 2: Psychological resilience

Table 2 below outlines the survey questions used to construct our indices of psychological resilience. We build two indices: (1) psychological resilience and (2) anxiety and depression.

## Family 3: Economic resilience

Table 3 below outlines the survey questions used to construct our indices of economic resilience. We distinguish between two time periods: (1) economic activity before the COVID-19-induced lockdown and (2) economic activity during the COVID-19 lockdown period.

Table 1. Primary outcomes: Imagery

Family 1	Sample	Index	Questions	Multiple hypothesis correction
<p><b>Mental Imagery</b></p>	<p>1. Overall 2. Interacted with trauma</p>	<p>a. Spontaneous Use of Imagery Scale (SUIS)</p>	<p>Respondents were asked “On a scale of 1 to 5, how much do you agree with this statement?”, where numbers 1 to 5 meant respectively: Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree. The statements used were as follows:</p> <ul style="list-style-type: none"> <li>• When I need to go to a meeting, I picture the route in my mind before going.</li> <li>• When I think about a customer using my product or service, I imagine the customer's experience through pictures and sensations in my mind.</li> <li>• When I think about the day ahead, I create mental pictures of all the tasks I must do.</li> <li>• When I am faced with difficult situations, I mentally experience the actions I could take and the consequences of those actions before reacting.</li> <li>• When I think about the type of business I want to have, I live the experience of running that business in my mind.</li> <li>• When I feel overwhelmed, I find a mental place or time where I feel safe and calm.</li> <li>• When someone is upset with me, I live that person's experience in my mind to understand what might have caused the situation.</li> <li>• When I buy an asset for my business, an image of owning the asset pops up in my mind before buying it.</li> </ul>	<p>False Discovery Rate (FDR) correction across these five indices, within sample 1 or 2</p>
		<p>b. Adapted Prospective Imagery Task (PIT) Positive Emotional Valence</p>	<p><i>Adapted Prospective Imagery Task (PIT) – positive statements and questions on emotional valence</i></p> <p>What is the intensity of the emotion produced in you by this image, using a scale from 1 to 5 where 1 means "no emotion at all", 2 "little, but weak emotions", 3 "moderate emotions", 4 "strong emotions" and 5 "extremely strong emotions"?</p> <ul style="list-style-type: none"> <li>• I first want you to imagine that the COVID-19 pandemic is over, and you save enough money to buy an asset you really want.</li> <li>• Now I want you to imagine the COVID-19 pandemic is over and you spend quality time with your family and friends.</li> <li>• Now I want you to imagine that the COVID-19 pandemic is over, and your business is doing well.</li> </ul>	

		<p>c. PIT Negative Emotional Valence</p>	<p><b><i>Adapted Prospective Imagery Task (PIT) – negative statements and questions on emotional valence</i></b></p> <p>What is the intensity of the emotion produced in you by this image, using a scale from 1 to 5 where 1 means "no emotion at all", 2 "little, but weak emotions", 3 "moderate emotions", 4 "strong emotions" and 5 "extremely strong emotions"?</p> <ul style="list-style-type: none"> <li>• In the first scenario, I want you to imagine that the COVID-19 pandemic is over, and you are struggling to make ends meet.</li> <li>• Now I want you to imagine that the COVID-19 pandemic is over, and you have had a serious disagreement with someone close to you.</li> <li>• Now, I want you to imagine that the COVID-19 pandemic is over and your business closes.</li> </ul>	
		<p>d. PIT Positive Vividness</p>	<p><b><i>Adapted Prospective Imagery Task (PIT) – positive statements and questions on vividness of image</i></b></p> <p>Using a scale for the mental image where 1 means "no image at all", 2 means "vague and dim", 3 means "moderately clear and vivid", 4 means "reasonably clear and vivid" and 5 means "perfectly clear and vivid", how detailed is this image from 1 to 5?</p> <ul style="list-style-type: none"> <li>• I first want you to imagine that the COVID-19 pandemic is over, and you save enough money to buy an asset you really want.</li> <li>• Now I want you to imagine the COVID-19 pandemic is over and you spend quality time with your family and friends.</li> <li>• Now I want you to imagine that the COVID-19 pandemic is over, and your business is doing well.</li> </ul>	
		<p>e. PIT Negative Vividness</p>	<p><b><i>Adapted Prospective Imagery Task (PIT) – negative statements and questions on vividness of image</i></b></p> <p>Using a scale for the mental image where 1 means "no image at all", 2 means "vague and dim", 3 means "moderately clear and vivid", 4 means "reasonably clear and vivid" and 5 means "perfectly clear and vivid", how detailed is this image from 1 to 5?</p> <ul style="list-style-type: none"> <li>• In the first scenario, I want you to imagine that the COVID-19 pandemic is over, and you are struggling to make ends meet.</li> <li>• Now I want you to imagine that the COVID-19 pandemic is over, and you have had a serious disagreement with someone close to you.</li> <li>• Now, I want you to imagine that the COVID-19 pandemic is over and your business closes.</li> </ul>	

Table 2. Primary outcomes: Psychological resilience

Family 2	Sample	Index	Questions	Multiple hypothesis correction
Psychological Resilience	1. Overall 2. Interacted with trauma	a. Psychological resilience	<p>On a scale of 1 to 5, how much do you agree with the following statements? We will use the same scale as before, where 1 means "I strongly disagree" and 5 means "I strongly agree".</p> <p><b><u>Brief Resilient Coping Scale (Sinclair and Wallston, 2004)</u></b></p> <ul style="list-style-type: none"> <li>● I am looking for creative ways to alter difficult situations.</li> <li>● Regardless of what happens to me, I am controlling my reaction to it.</li> <li>● I am growing in positive ways by dealing with difficult situations.</li> <li>● I am actively looking for ways to replace the losses I am encountering in life.</li> </ul> <p><b><u>Brief Resilience Scale (adapted subset) (Smith et al., 2008)</u></b></p> <ul style="list-style-type: none"> <li>● I believe that I will bounce back quickly after the COVID pandemic.</li> </ul> <p><b><u>Self-efficacy (Chen et al., 2004)</u></b></p> <ul style="list-style-type: none"> <li>● I will be able to achieve most of the goals that I have set for myself.</li> <li>● When facing difficult tasks, I am certain that I will accomplish them.</li> <li>● In general, I think that I can obtain outcomes that are important to me.</li> <li>● I believe I can succeed at any endeavor to which I set my mind.</li> <li>● I will be able to successfully overcome many challenges.</li> <li>● I am confident that I can perform effectively on many different tasks.</li> <li>● Compared to other people, I can do most tasks very well.</li> <li>● Even when things are tough, I can perform quite well.</li> </ul>	FDR across these two indices within sample 1 or 2
		b. Anxiety and Depression Scale	<p><b><u>Kessler Scale (Kessler et al. (2002)</u></b></p> <p>Consider how often you have felt the following emotions over the past 30 days on a scale from 1 to 5, where 1 means "never", 2 means "rarely", 3 means "sometime", 4 means "almost always" and 5 means "always":</p> <ul style="list-style-type: none"> <li>● About how often during the past 30 days did you feel nervous?</li> <li>● About how often during the past 30 days did you feel hopeless?</li> <li>● About how often during the past 30 days did you feel restless or fidgety?</li> <li>● About how often during the past 30 days did you feel so depressed that nothing could cheer you up?</li> <li>● About how often during the past 30 days did you feel that everything was difficult?</li> <li>● About how often during the past 30 days did you feel worthless?</li> </ul>	

Table 3. Primary outcomes: Economic resilience

Family 3	Sample	Index	Questions	Multiple hypothesis correction	
Economic resilience	1. Overall 2. Interacted with trauma	<b>Economic outcomes pre-COVID-19</b>		FDR across these seven indices within sample 1 or 2	
		a. Business status pre-COVID	<ul style="list-style-type: none"> <li>• Dummy equal to 1 if the person had a business pre-COVID, 0 otherwise</li> </ul>		
		b. Index constructed as: (Sales + Income) if business + Income if no business	<ul style="list-style-type: none"> <li>• Please reflect on your best month of sales in the six months prior to the start of the lockdown. How much revenue did your main business receive from sales in total that month? Revenues mean every peso received in the business in exchange for a product or service sold to a customer.</li> <li>• How much income did you take home during a typical week in February this year?</li> </ul>		
		c. Investment pre-COVID	<p>In the past nine months, since September 2019, did you invest in the following categories for your business, to acquire a new asset or significantly improve an existing asset? (yes/no answers)</p> <ul style="list-style-type: none"> <li>A. Tools and utensils for manual work</li> <li>B. Machinery and equipment for production</li> <li>C. Vehicles used in your business</li> <li>D. Land, space in a shop or building</li> <li>E. Other physical assets</li> <li>F. Training for yourself</li> <li>G. Software or computer programs</li> </ul>		
		<b>Economic outcomes during COVID-19</b>			
		d. Business status during COVID	<ul style="list-style-type: none"> <li>• Dummy equal to 1 if the person has a business which is NOT permanently closed, 0 if the person has no business or the business has permanently closed during COVID (since March 2020)</li> </ul>		
		e. Index constructed as: (Sales + Income) if business (currently open or temporarily closed) + Incomes if no business (permanently closed)	<ul style="list-style-type: none"> <li>• In the last 30 days, how much revenue did your main business receive from sales? Revenues mean every peso received the business in exchange for a product or service sold to a customer.</li> <li>• In total, how much income did you personally take home last week?</li> </ul>		

		and/or no business pre-COVID)	
		f. Actual and perceived safety nets during COVID-19	<p>Please tell us how much you agree with the following statements using the same scale as before from 1 to 5, where 1 means that "I strongly disagree" and 5 means that "I strongly agree".</p> <ul style="list-style-type: none"> <li>• I had an adequate amount of personal savings to ensure my safety for the first two months of the lockdown (scale 1-5)</li> <li>• I have enough cash to cover my ongoing expenses for the next week (scale 1-5)</li> <li>• If I had to find \$200,000 pesos in the next month, I would be able to obtain them with ease (scale 1-5)</li> </ul> <p><i>Savings</i></p> <ul style="list-style-type: none"> <li>• Please reflect on your best savings week in the six months prior the lockdown. How much did you save during that week, from all your income-generating activities?</li> </ul>
		g. Business behavioural response to COVID-19	<p>I am now going to ask you questions about your business response to the COVID-19 pandemic. Please respond yes, no or doesn't apply, if the question does not apply to you. (yes/no answers)</p> <ul style="list-style-type: none"> <li>• Have you rearranged for yourself or workers to work from home?</li> <li>• Have you adapted your main business to meet the social distance criteria and adopt safety and sanitation measures so that your customers and workers are less exposed to COVID-19?</li> <li>• Have you identified alternative ways to access raw materials or alternate suppliers, should there be disruptions in your supply chain?</li> <li>• Do you consult your suppliers and customers more regularly to assess their situations?</li> <li>• Do you work out your operational costs more frequently than before the lockdown (such as rent, supplies, among others)?</li> <li>• Have you identified new business opportunities for your main business that could increase sales, which still adhere with government regulations?</li> <li>• Has your main business begun or increased the use of the Internet, online social networks, apps or digital platforms to sell your products or services?</li> <li>• Have you had conversations with the people or institutions who have lent your credit to assess flexibility on loan requirements?</li> </ul>

			<ul style="list-style-type: none"> <li>• Have you collaborated or talked with other entrepreneurs like you to share health and safety practices, stock or equipment, among others?</li> <li>• Has your main business requested (or is benefiting from) any government measure, either local or national, issued in response to the COVID-19 outbreak?</li> <li>• If open: Have you started selling new products or services in your main business, since March 24, 2020?</li> <li>• If closed temporarily: Do you plan to make changes to your business before reopening, such as changing your products or services or the way in which you produce or distribute?</li> <li>• Have you opened a new business since the lockdown started that is still operating, in other words, since March 24, 2020?</li> </ul> <p><u>“Safe” working hours sub-index</u>  <i>Sub-index of “safe” working hours constructed as the sum of total hours worked, multiplied by the share of hours worked in safety</i></p> <ul style="list-style-type: none"> <li>• How many hours did you work specifically on your main business last week?</li> <li>• How many hours did you work specifically on your new business last week?</li> <li>• How many hours did you work in total last week for someone else, for a wage?</li> <li>• Of the hours you said you worked last week, how many hours did you work following social distancing, frequent handwashing, use of face mask and working from home if possible? (0, ¼, ½, ¾, 1)</li> </ul>	
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## 7. Empirical strategy

Our objective is to measure the effects of the visualization training on mental imagery use and quality, and on the economic and psychological resilience of study participants. For every primary outcome, we estimate the following specification at the individual level:

$$y_i = \beta_0 + \beta_1 \cdot \text{imagery}_i + \theta \cdot m_i + \delta \cdot x_i + \eta + \mu_i$$

where  $y_i$  is the outcome of interest for individual  $i$ .  $\text{imagery}_i$  is a dummy capturing whether an individual has been offered the visualization training.  $m_i$  is the vector of randomization strata dummy variables and  $x_i$  is the vector of other baseline covariates used to increase precision in our estimates. We include wave and wave-sub direction fixed effects  $\eta$ .  $\mu_i$  is a mean zero error term.

For the imagery and “business-as-usual” treatment arms, we will restrict the sample for analysis to people who confirmed their participation to the programs (approximately 78 percent of the sample for these treatment groups). People were blind to treatment assignment when they had to confirm their intention to participate. Moreover, staff members who called potential participants to ask for their confirmation were following guidelines and scripts that did not contain any reference to the exact treatment to which people were assigned. Nevertheless, we collected outcomes on the full sample (including people who did not confirm participation) to check for differences between groups and to increase precision.

We run this specification separately for (1) the imagery and pure control groups and (2) imagery and “business as usual” training groups.<sup>6</sup> Our estimates  $\beta_1$  measure the intent-to-treat impacts of the interventions relative to the pure control or “business as usual” groups respectively. For every primary outcome, we test the null hypothesis that the imagery treatment has no impact.

Randomization occurred at the individual level for most of the sample. For all specifications, we use robust standard errors to correct for heteroskedasticity. One small subset of the sample – the formerly-homeless – were clustered at the level of their shelter to prevent spillovers. Similarly, participants who live together were assigned to the same treatment status. We enter in the group average for the shelter or household for these specific cases.

For the sake of completeness, we also estimate the intent-to-treat impact of the “business-as-usual” training relative to the pure control group in our exploratory analysis section. We will also explore instrumenting using random assignment as an instrument for attendance.

### **Correction for multiple hypothesis testing**

We use false discovery rate (FDR) corrections to account for multiple comparisons across our indices of primary outcome variables within Families 1, 2 and 3, as detailed in Tables 1, 2 and 3. In our exploratory

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<sup>6</sup> Due to the preferences of our implementation partner and insufficient sample size, we are currently missing two sub-directions in the pure control group. Thus, in order to use the full available sample, we are going to run two separate regressions comparing visualization treatment to each of the other two arms.

analysis, we will estimate the intent-to-treat effect of the interventions on a host of other outcomes variables and potential mechanisms that were not pre-specified. We will not correct for multiple hypothesis testing in our exploratory analysis, so these results should be considered ex-post.

### Covariates

In our analysis, we first present results with only our randomization strata dummy variables and fixed effects:

- Sex, age, entrepreneurship status, sales and income ( $m_i$ )
- Sub-division within SDIS and wave ( $\eta$ )

To increase the precision of our estimates and soak up any imbalance across treatment groups, we also present results including a set of baseline covariates ( $x_i$ ). Following Belloni et al. (2014), we adopt the “post-double-selection” method for selecting regressors, including first-order interaction and quadratic terms.

## 8. Heterogeneity analysis

Who benefits most from the program? Research in clinical psychology and neuroscience suggests that trauma increases the cost of imagery (e.g. distressing intrusive imagery), and can alter the quality of imagery. Accordingly, we expect our imagery program to have differential treatment effects for those individuals who show higher symptoms of post-traumatic stress at baseline.

To conduct heterogeneity analysis, we will run a fully interacted model, whereby the key coefficients are on the treatment, a dummy for high reported trauma symptoms at baseline and their interaction.

We will define the dummy for high trauma as follows:

1. We give a score of zero in the Impact of Event Scale-Revised (measuring symptoms of post-traumatic stress) to all respondents who reported that they did not experience a traumatic event (on a contextually adapted trauma history checklist) in the past.
2. We create a dummy variable for those participants with an Impact of Event Scale-Revised score of above 33 at baseline. A score of 33 is considered the threshold above which post-traumatic stress symptoms may be considered to be a probable clinical concern (Creamer, Bell and Failla, 2003).
3. We include a dummy for high reported post-trauma symptoms and an interaction term in the main specifications for all Families 1, 2 and 3, outlined in Tables 1, 2 and 3 respectively.
4. We correct for multiple hypothesis testing across indices within families.
5. We conduct a two-sided test to test the null hypothesis that there are no heterogenous treatment effects.