Learning to see the world's opportunities: The impact of imagery on entrepreneurial success*

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February 15, 2022

We explore the importance of mental imagery for entrepreneurial success. An important skill for imagining the future, mental imagery is the process of mental experiencing and "seeing with the mind's eye", by accessing information from memory. Distressing past experiences can increase the cost of using imagery and undermine the ability to imagine the future in a balanced way, by inducing overly negative future imagery. We design a training curriculum to teach positive imagery in future decision making and test its impact on economic outcomes through a randomised control trial with roughly 2,000 would-be entrepreneurs in Colombia. When compared to a placebo entrepreneurship training, we find that imagery can be trained and those who receive the imagery training have significantly higher earnings, both before and after the start of the Covid-19 pandemic. For individuals with high levels of baseline trauma, imagery addresses their deficit in positive imagery and mediates their negative imagery. When we compare the imagery training to a no-intervention group, we find small to no results. Moreover, the placebo group have significantly lower earnings relative to the no-intervention group. Nevertheless, our results serve as a proof of concept that the ability to imagine the future more vividly and in a more balanced way is an important determinant of entrepreneurial success.

JEL Codes: D91, J24, L26, M53

*We thank Innovations for Poverty Action Colombia for their support in data collection and partnership management, and Moustafa El-Kashlan, Miguel Fajardo-Steinhäuser, George MacDonald and Misha Seong for excellent research assistance. We are grateful to Maria Paula Gómez Franco, Jose David Angel Castaño, Camilo Andres Hernandez Estrada, Mariana Medina and Manuel Pardo for their input in the curriculum design, training and supervision of the implementation team. We thank Stefan Dercon, Xavier Gabaix, Supreet Kaur, and David Laibson for very helpful comments. We gratefully acknowledge the financial support of IPA Peace and Recovery Program, J-PAL Post-Primary Education, J-PAL Jobs and Opportunity Initiative, the Rockefeller Foundation and the Institute of Global Affairs at the LSE. This RCT was registered in the American Economic Association Registry for randomised control trials under Trial number AEARCTR-0004695. It received official approval by the Innovation for Poverty Action Institutional Review Board USA (IPA IRB Protocol No. 14638) and the London School of Economics Research Ethics Committee (REC Ref No. 00769c).

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1 Introduction

Provision for the future makes no inconsiderable demands on our intellectual strength...The present always gets its rights. It forces itself upon us through our senses. To cry for food when hungry occurs even to a baby. But the future we must anticipate and picture. Indeed, to have any effect in the future, we must form a double series of anticipations. We must be able to form a mental picture of what will be the state of our wants, needs, feelings, at any particular point of time. And we must be able to form another set of anticipations as to the fate of those measures which we take at the moment with a view to the future.
-Böhm-Bawerk, The Positive Theory of Capital and Interest (1889)

The ability to imagine the future has long been considered a possible foundation for inter-temporal decision making (Böhm-Bawerk, 1889; Loewenstein, 1992; Gabaix *et al.*, 2017). A myopic view of the future reduces the incentive to invest in the future. In contrast to a standard view of time discounting, however, the ability to imagine the future requires effort and practice to develop (Becker *et al.*, 1997). An extensive body of work in neuroscience and psychology have focused on developing our understanding about this skill, in what is termed "mental imagery" (E. A. Holmes, Hales, *et al.*, 2019). Mental imagery is the process of mental experiencing or "seeing with the mind's eye" (visualising), by accessing information from memory (Pearson *et al.*, 2015; E. A. Holmes, Blackwell, *et al.*, 2016). While humans think in words and images, images are faster to retrieve and has the potential to make imagined future scenarios more vivid, thus extending the time horizon over which decisions can be made (E. Holmes *et al.*, 2010). However, despite a vast literature on the importance of inter-temporal decision making, little empirical work has linked the ability to imagine the future with economic outcomes, such as income.

There is also large heterogeneity in how often and how well people imagine the future. By impacting the memory and thus the foundation for imagining the future (Schacter *et al.*, 2007), distressing past experiences can significantly impede this capacity. Trauma induces an over-weighting of negative future scenarios and creates a deficit in the ability to imagine positive future scenarios (McNally *et al.*, 1995; Tulving, 2002; Moore *et al.*, 2007; Kleim and Ehlers, 2008; Kleim, Graham, *et al.*, 2014). As a result, trauma increases the cost of using imagery in decision making and distorts the way in which people imagine the future. Exposure to trauma is common throughout the world, with over 70% of people estimated to have experienced at least one traumatic event in their lifetime (Benjet *et al.*, 2016; Kessler *et al.*, 2017). The prevalence of trauma is only likely to be exacerbated with the Covid-19 pandemic (E. A. Holmes, O'Connor, *et al.*, 2020). Shedding light on how imagining the future relates to trauma is not only policy relevant, but also offers a first step in developing our understanding about how the memory can impact future-oriented decision making.

This paper aims at building the link between the ability to imagine the future, trauma and economic outcomes. We first use standard psychology survey measures on the ability to imagine vividly different scenarios to show that a more frequent use and higher quality of mental imagery correlate strongly with higher asset accumulation, earnings, and life satisfaction. This motivates the importance of mental imagery in individual decision-making. Consistently with clinical evidence, we also find that high trauma individuals imagine substantially more vivid and emotional negative future scenarios, but not positive future scenarios.

We then move beyond correlations to ask whether imagery is malleable and whether an improvement in the use and quality of imagery used leads to an improvement in earnings. To speak to this, we design a training curriculum to teach positive imagery in future decision making and test its impact on economic outcomes through a randomised control trial with roughly 2,000 would-be entrepreneurs in Colombia. The ten-session curriculum teaches entrepreneurs to use imagine future scenarios and the pathways for achieving these outcomes with vividness and emotion, as well as mentally practice useful behaviours, such as saving. The curriculum is also specifically designed to build up the ability to produce imagery of positive future scenarios for entrepreneurs who have experienced past trauma, following programmes developed in clinical psychotherapy (E. A. Holmes, Arntz, *et al.*, 2007; E. A. Holmes, Hales, *et al.*, 2019).[1]

The randomised control trial was conducted in partnership with the local government of Bogotá and randomly assigned participants to our imagery curriculum, a placebo business training, or a no-intervention control group. Our focus is on the comparison between the imagery curriculum and the placebo training, which we designed to have an identical structure, entrepreneurship content and delivery method. The only difference between the two is that the placebo training features written and verbal group-based activities (such as role play) instead of imagery exercises. We conduct two follow-up phone surveys 8 and 14 months after the end of the intervention and during the Covid-19 pandemic.

When comparing the imagery training to a placebo entrepreneurship training, we find that imagery can be trained: we observe a 0.18 standard deviations improvement ($p < 0.1$) on

[1] In clinical psychotherapy, mental imagery has also been used to rescript negative intrusive memories, in addition to encouraging positive imagery (E. A. Holmes, Arntz, *et al.*, 2007; E. A. Holmes, Hales, *et al.*, 2019). However, rescripting negative memories requires specialised clinical skills, which do not lend itself to scalable policies that can be delivered by lay trainers. Consequently, we focus on the development of positive imagery as a low-cost policy lever that could be used to substitute for negative imagery, rather than directly address the negative imagery itself.

our imagery index measuring the frequency of imagery use, enhanced vividness (specificity) and emotional intensity of imagined future business scenarios. We also find that those who receive the imagery training have significantly higher earnings on average, both before and after the start of the Covid-19 pandemic. Relative to the placebo group, entrepreneurs report on average an increase of 0.19 and 0.14 standard deviations in earnings pre- and post-pandemic lockdown respectively. These findings are both statistically significant at the 5% level. Imagery participants report significantly higher business survival during the pandemic, but not before the pandemic. When we further unpack the heterogeneity in our results, we find that women are driving these improvements; women are also less experienced entrepreneurs and carriers of higher trauma burden at baseline. Moreover, we show that the imagery training differentially benefits individuals with high levels of baseline trauma symptoms by addressing their deficit in positive imagery and mediating negative imagery. Indeed, we find evidence that these effects translate through to higher earnings, although the difference with the low-trauma group is not statistically significant.

Finally, we compare the imagery training to the no-intervention group to assess the impact of business training in general and find small to no differences across all outcomes. Relative to the no-intervention group, the placebo control group report lower earnings before the start and during the pandemic on average. There are several reasons that might explain these results. First, we observe differential attrition in the no-intervention group in the follow-up surveys during the pandemic, whereas balance is maintained across the two training arms. Although there is limited evidence that attrition may be selective on observable characteristics, there is suggestive evidence that there may be differential attrition based on unobservables. Using Lee (2009) bounds, we find evidence that the treatment effects of the imagery training compared to the placebo group are bounded away from zero, providing reassuring evidence that the imagery training has a positive impact relative to the placebo training. In contrast, the results arising from the comparison between both training groups and the no-intervention group are not robust to making weak assumptions on non-respondent outcomes. Second, biased reporting in the surveys may have caused the no-intervention group to diverge from the two training arms. Finally, the placebo training that drew on standard training curricula may have had a negative impact on our sample of entrepreneurs. In this case, imagery training served to mitigate the negative effects of the placebo training. We currently do not have enough data to pin down the exact reason for the negative outcomes observed in the placebo group compared to the pure control, although we believe the first and third reasons to be most likely. Even in the worst case scenarios, our conclusion that imagery matters for economic decision making still holds.

Our paper speaks to three bodies of literature. First, our results highlight a critical role for the ability to imagine future scenarios and the future consequences of current actions more vividly, contributing to the literature advancing micro-foundations for inter-temporal decision making. Becker *et al.* (1997) and Gabaix *et al.* (2017) have made the theoretical case for the importance of imagining the future as a means to micro-found inter-temporal discounting. However, only two papers in economics have empirically tested whether visualising the future affects economic choices. In a primary school setting, Alan *et al.* (2018) show that students who learn to imagine their future selves and to build counterfactual scenarios in their minds make more patient inter-temporal choices in incentivised experiments and perform better in the classroom. A recent working paper by John *et al.* (2021) compares the impact of imagery with a standard planning intervention and a pure control to encourage the take-up of water chlorination. For their primary behavioural outcome of interest, the presence of chlorine within household drinking water, they find large effects of the imagery treatment compared to the control group, although these effects are not statistically distinguishable from the planning training after 12 weeks. In other work in psychology, imagining an older version of the self has been found to increase savings (Hershfield *et al.*, 2018). In contrast to these papers, we explore the role of imagery in making forward-orientated economic decisions and measure the impact of imagery on a wider range of economic outcomes, such as earnings and business survival.

Our results also contribute to the literature on the long-lasting effects of trauma and conflict by showing that the ability to imagine the future in a more balanced way is an important determinant of entrepreneurial success. Temporary shocks have already been shown to shift social, risk and time preferences in the longer term. For example, exposure to violence has been shown to result in higher risk aversion (Voors *et al.*, 2012; Callen *et al.*, 2014), most pertinently in a Colombian context where the decades-long civil conflict has affected a large share of the population (Moya, 2018). In this paper, we explore another channel through which past traumatic experiences can affect economic choices: the ability to imagine the future, by impacting memory. The role of memory in limiting decision making and imagining the future has been explored theoretically in economics (Mullainathan, 2002; Gennaioli *et al.*, 2010; Bordalo, Coffman, *et al.*, 2016; Bordalo, Gennaioli, *et al.*, 2018). Although we cannot draw a direct link between memory and future imagery, we show how an imagery training can rebalance the ways in which past experiences affect future-oriented decision making, by mediating overly negative future imagery and increasing the quality of positive future imagery.

Lastly, we apply a structured imagery programme to the domain of entrepreneurship and showcase another example of a business training focused on promoting soft skills. Efforts to train entrepreneurs in general have had modestly positive effects on average (McKenzie, 2021). There is, however, increasing evidence that using lessons from psychology to promote "soft" skills could enhance the effectiveness of entrepreneurship training for subsistencelevel enterprises (McKenzie, Woodruff, *et al.*, 2021). For instance, a personal initiative training advocating a "proactive" mindset in Togo increased micro-enterprise profits by 30 percent on average over two years (Campos *et al.*, 2017), although the long-term effects were not replicated in other contexts (Alibhai *et al.*, 2019; Ubfal *et al.*, 2019). Business training programmes for the youth have also combined soft and hard skill development, with success in promoting self-employment (Alaref *et al.*, 2020; Chioda *et al.*, 2021). Similarly, we postulate that entrepreneurs require the skill to imagine the future: imagine new products, customers, competitors – "to form an adequate picture of the forms which goods will take, of the quantity of them, and of the time when they will come to maturity as result of those productive or commercial activities which we are now commencing", as Böhm-Bawerk (1889) describes. We demonstrate that combining hard entrepreneurship skills training with this soft skill can improve earnings in the short term. With aid agencies and governments spending more than a billion US$ on entrepreneurship training annually (McKenzie, Woodruff, *et al.*, 2021), integrating psychological methods into these programmes offers a clear pathway to impact at scale.

The next section presents a short primer on mental imagery and trauma, and a motivational framework for conceptualising how imagery shapes future-oriented thinking. Section 3 presents correlational evidence to motivate that imagery matters for economic outcomes. We describe our curriculum innovation in Section 4. Section 5 outlines our experimental design. We summarise our approach to measurement and empirical strategy in Sections 6 and 7 respectively. We present results in Section 8, while Section 9 concludes.

2 A primer on imagery, future thinking and trauma

2.1 Evidence from neuroscience and psychology

We define imagery as a process of mental experiencing or visualising resulting in an experience akin to "seeing with the mind's eye" (E. A. Holmes, Blackwell, *et al.*, 2016). While humans think either words or images, images are faster to retrieve and offer a heightened sense of realism. This heightened sense of realism occurs through two channels: increased specificity or vividness and increased emotive content of the imagined scenarios. From a neuroscience perspective, the perceptual equivalence between images and reality arises from the common activation of brain systems that are involved in perception, such as the amygdala, early visual cortex, frontal and parietal areas (E. Holmes *et al.*, 2010).[2]

[2]Mental imagery is multi-sensory, leading it to act as an "emotional amplifier" as termed in psychology. Physiologically speaking, this is the result of mental images activating brain systems underlying emotion more directly than symbolic representations that do not use sensory prompts (E. Holmes *et al.*, 2010). Lab

Yet imagery is not used uniformly across individuals; rather, its use varies, along two dimensions, with significant implications for decision making (Nelis *et al.*, 2019). First, there may be variation in how much mental imagery is used.[3] Second, the content of mental imagery is not homogeneous and there exists stark differences in the nature of the projections it gives rise to. In turn, variation in use and content has prompted questions of whether imagery should be thought of as an innate trait or a malleable skill that can be trained.

An individual's past experiences of trauma may be a driver of both types of variation. Research demonstrates that imagining the future and reflecting on the past use the same neural machinery (Schacter *et al.*, 2007). Put differently, we draw on our memory to imagine the future.[4] Unsurprisingly, therefore, distressing circumstances which bring about trauma can influence future mental imagery both in terms of the quality and nature of imagery. Trauma may decrease specificity or hijack mental projections in such a way that all mental images become characterised by only negative outcomes. A substantial literature supports the idea of trauma inducing either an overly negative or "over-general" personal memory (McNally *et al.*, 1995; Moore *et al.*, 2007; Kleim and Ehlers, 2008). Indeed, evidence suggests that those suffering from post-traumatic stress disorder (PTSD) experience decreased specificity, compared to those without the condition. However, this decreased specificity is present in response to positive, but not negative, cues suggesting that positive imagery is especially hampered by trauma (Kleim, Graham, *et al.*, 2014). Furthermore, those who have experienced past trauma may struggle to use imagery at all, with studies showing deficits in memory (Douglas Bremner *et al.*, 1995; Jenkins *et al.*, 1998; Buckley *et al.*, 2000) and hence the ability to mentally project into the future.[5] When imagery involves reliving distressing circumstances of the past due to intrusive negative imagery, people may avoid imagining altogether. In many ways, deficiencies in terms of the content and the use of imagery, brought about by trauma, cannot be disentangled. Collectively, they result in a sense of a "foreshortened future", whereby individuals struggle to project themselves into future experiences.[6]

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experiments have demonstrated imagery's more powerful impact on emotions than verbal cognition (E. A. Holmes, Blackwell, *et al.*, 2016).

[3]Less than 1% of the population who are otherwise healthy are estimated to have aphantasia, which is the inability to produce visual imagery (Zeman *et al.*, 2015; Pearson, 2019). However, this condition typically applies to the visual domain, so this small subset of the population may still be able draw on other senses during mental imagery.

[4]Neuroimaging studies, including fMRI scans that look at blood flows to the brain to detect areas of activity, find that the same neural machinery used to store information is activated during mental simulations about the future and perspective of others (Schacter *et al.*, 2007).

[5]Changes to important brain areas, such as the hippocampus, amygdala, and medial prefrontal cortex, that support the memory function have been shown to occur (Bremner, 2006).

[6]A similar phenomenon occurs in depression. Imagery of past negative events and suicidal imagery of the future coexist in depressed individuals (E. A. Holmes, Arntz, *et al.*, 2007). Imagining predominantly negative scenarios may lead to persistent negative mood, which hinders active behaviour. Moreover, de-

Mental experiencing has been shown to be closely linked to decision making. Vivid and emotional images can be motivational and induce behavioural change, more so than verbal descriptions of the same scenarios (Mathews *et al.*, 2013; Pearson *et al.*, 2015). Specifically, imagery can be used to identify a concrete and emotionally motivating future outcome and then mentally map out the possible pathways towards achieving that outcome, both in terms of the steps and potential obstacles. Empirical evidence from psychology supports the notion that imagining one's own future behaviour can increase the likelihood of enacting that behaviour in reality (Gregory *et al.*, 1982; Koehler, 1991; Conway *et al.*, 2004; Rutchick *et al.*, 2018; Renner *et al.*, 2019). For instance, imagining the process of voting has been shown to increase voter turnout (Libby *et al.*, 2007). In an economics domain, an imagery intervention that encouraged women to visualise the future increased take-up of water chlorination and reduced child diarrhoea (John *et al.*, 2021). The frequency, speed and emotional intensity with which a person can imagine certain scenarios also increases the subjective probability that the scenario will occur, through a form of an "availability heuristic" (Carroll, 1978), in turn also driving behavioural change. Naturally, deficits in the ability to generate vivid and emotional mental images can hinder decision making, especially for those who have experienced past trauma. For instance, feeling anxiety or fear, in response to a threatening or negative image, increases the decision maker's awareness of the danger involved in that scenario (Arntz *et al.*, 1995; Forgas, 1995). The subjective probability attached to the feared outcome increases avoidant, and ultimately sub-optimal, behaviour.

To improve future-oriented decision making, therefore, requires rebalancing the content of future imagery among those who have experienced past trauma. Previous efforts to improve future-oriented decision making have operated in non-economic domains, while those focused on addressing the effects of trauma have lacked scalability. For example, mental imagery is already frequently adopted by professional athletes and musicians to mentally rehearse and avoid physical injury from over-practice, thereby reducing performance anxiety (Driskell *et al.*, 1994; Munroe *et al.*, 2000; Osborne *et al.*, 2014).[7] On the other hand, in clinical psychotherapy, imagery has been used to re-script negative intrusive memories, in order to lessen their emotional content or build up the ability to produce positive imagery as a substitute for negative imagery (E. A. Holmes, Arntz, *et al.*, 2007; E. A. Holmes, Hales, *et al.*, 2019). The program required specialised clinical skills leading to high unit costs. This paper extends the application of this skill to the domain of business decision making while

pressed individuals are more likely to avoid imagining altogether in the attempt to stop negative intrusive memories, even when compared to non-depressed individuals with a similar frequency of intrusive memory (Newby *et al.*, 2011).

[7] "Repeatedly imagining a finger movement sequence (as in piano playing) not only improves performance but there is a corresponding change in motor cortex. Thus, imagery selectively activates those areas involved in processing related sensory information in reality, or in producing similar responses and actions" (E. Holmes *et al.*, 2010, p. 351).

ensuring it remains a low-cost, scalable policy lever.

Teaching mental imagery within a given domain - entrepreneurship - raises the question of whether we expect participants' learning to be domain-specific or to be extended more broadly into other decision-making areas. A substantial literature in developmental psychology has drawn the distinction between domain-general (Li *et al.*, 2014) and domain-specific (Siegler, 2006) theories of learning and development. While we acknowledge that mental imagery has the potential to be domain-general, our intervention focuses on how imagery can be effective when applied to specific business-related scenarios. In addition, to the large literature exploring targeted mental imagery applications, there are instances where adjustments to the mental imagery training used can produce different physiological responses, with possible implications for whether the training is beneficial within a given domain (Spring *et al.*, 1981; Warner *et al.*, 1988; Page *et al.*, 2001). We take an agnostic approach in the paper on whether our imagery training is effective beyond the business domain. We let the data speak to this point by collecting measures on people's mental imagery in both business-specific and non-business scenarios.

A few studies in the entrepreneurship literature have explored whether mental imagery can be linked to better business decision making. Anthony *et al.* (1993) find that mental imagery can be used to enhance long term strategic thinking whilst Neck *et al.* (1999) find that mental imagery can aid organisational leadership. The study by Zaleskiewicz *et al.* (2020) compares imagery ability among entrepreneurs and non-entrepreneurs, finding that there are no differences in the use of non-business imagery between the two groups. However, entrepreneurs in their study are more frequent users of business-related imagery which, in turn, is correlated with increased risk taking and improved economic outcomes. Evidence of this kind suggests that entrepreneurship may be a particularly effective domain in which to focus the use of imagery.

2.2 A motivating theoretical framework on imagery and future thinking

In this section, we present a simple motivating framework to conceptualise how imagery can shape future thinking and the role of trauma in undermining this ability.

The key intuition is that mental imagery makes the downstream consequences of current and future actions more concrete and thus can improve choices in the pathway to achieving future outcomes. Consider a perfectly rational and risk-neutral entrepreneur making a choice between actions A and B. A has a known utility outcome of U_A and it is the default option. B has either a high utility of U_B^H or a low utility of U_B^L, but the true utility is unknown to the entrepreneur. We assume that $U_B^H > U_A > U_B^L$. The entrepreneur holds a prior belief over the probability of obtaining a high utility outcome from B, represented by γ. The expected utility of B is given by $\gamma U_B^H + (1-\gamma)U_B^L < U_A$. The inequality follows from the notion that A is the default action in the status quo.

Mental imagery reveals the true utility with probability λ at a small mental cost of C. In other words, the entrepreneur can exert mental effort to experience each option and, thus, get a better idea of their utility. In the extreme case of perfect introspection, the entrepreneur will choose B in the high utility state and A if B has a low utility. Even if mental imagery imperfectly captures reality, imagery 'demystifies the future' by adding an additional level of specificity and emotion to future outcomes, and thus increases expected utility prior to imagery as follows:

$$\lambda(\gamma U_B^H + (1-\gamma)U_B^L) + (1-\lambda)(U_A) - C \underbrace{>}_{small\ C} U_A$$

In other words, when the mental cost of imagery is relatively low, the expected utility of deciding between A and B after imagining is higher than simply choosing the status quo.

Trauma undermines the ability to imagine the future through two channels. Firstly, trauma can increase the cost of mental imagery C if future imagery is overly negative or suppressed, such that $C_T > C$. Secondly, trauma can induce an over-general memory and hence non-specific future imagery. In other words, trauma can reduce the quality of mental imagery and thus lower the probability with which the true future utility is revealed by imagery, so $\lambda_T < \lambda$. As a result, some people who experienced past trauma might choose not to use imagery or if they do, the imagery could be overly negative or non-specific.[8]

A training that promotes positive mental imagery serves to reduce the mental cost of imagery C and increase the probability λ that imagery reveals the true utility of future outcomes. As a result, training can induce a greater use and quality of imagery. On quality, the training can help individuals to increase the level of specificity and emotional intensity of images about future outcomes.

[8]We do not model the asymmetry between imagery of positive or negative scenarios. One way to do so would be to define two different weights, λ_1 for positive scenarios and λ_2 for negative scenarios, with $\lambda_2 > \lambda_1$ for a traumatized decision maker, .

3 Correlations between imagery and economic outcomes

What is the impact of imagery on economic outcomes? Using data on a sample of nearly 2,000 micro-entrepreneurs, we approach this question in three steps.[9] First, we show that mental imagery is correlated with better economic outcomes to motivate the importance of imagery in economic choices. Second, we ask whether imagery is malleable and can be taught through a training programme using a randomised control trial. Third, we explore whether an improvement in the quality and frequency of imagery leads to an improvement of economic outcomes, especially for entrepreneurs with higher baseline trauma.

Upon investigation of the importance of mental imagery in determining economic outcomes, we document four new empirical observations.

> *1. People who have a higher capacity to use imagery invest more in durable goods and are more satisfied with their life.*

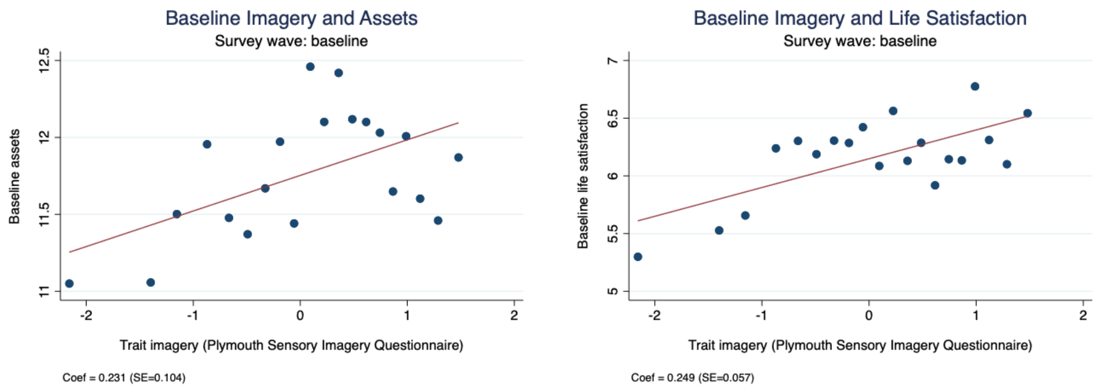
We hypothesise that higher quality mental imagery as an innate trait should be related with better long-term outcomes, such as asset accumulation and life satisfaction. We measure trait mental imagery using a contextually-adapted version of a well-known psychometric scale, the Plymouth Sensory Imagery Questionnaire or Psi-Q (Andrade *et al.*, 2014). Akin to a personality trait, the Psi-Q is intended to capture a cognitive trait and in particular, the extent to which a person's use of imagery is richly developed. We show that trait mental imagery is positively related with both outcomes that typically unfold over time for our entire sample at baseline.

The left panel of Figure 1 shows that trait mental imagery (on the x-axis) is positively correlated with the total count of household assets (on the y-axis), both measured at baseline and controlling for age, gender, income categories, entrepreneurship status, and the time period and group in which the respondents participated in the programme. Including these controls allows us to test whether a correlation exists between imagery and wealth *within* groups of people who share these same characteristics. Quantitatively, the correlation between imagery and asset count is small, but statistically significant: an increase of one standard deviation in the Psi-Q score is correlated with an increase in assets of 0.23 ($p < 0.05$), which corresponds to a quarter of a television or a mobile phone, the latter being an asset owned by most of the sample.

The right panel of Figure 1 shows that trait imagery (on the x-axis) is positively correlated with self-reported life satisfaction using the Cantril ladder (y-axis), both measured at baseline and controlling for the same variables as above. More precisely, the scatter plot

[9] Section 5 provides further details about the data and sample.

Figure 1: Baseline imagery, assets and life satisfaction



Notes: The figure shows the correlation between trait mental imagery and total count of household assets (left panel) and life satisfaction (right panel). Trait imagery is measured using the Plymouth Imagery Scale Questionnaire and life satisfaction using a Cantril Ladder with ten steps. Asset count is the total number of assets owned by a respondent's household out of a list of different asset types (e.g., TV, computer). All these measures are collected in our baseline survey prior to the intervention. The imagery index is standardised to be mean zero and unitary standard deviation in the no-intervention group. Regressions control for gender, age, business status and income category at baseline, and subdivision-wave interaction fixed effects.

shows that going from one standard deviation below to one standard deviation above the mean in the Psi-Q score is correlated with an increase in life satisfaction of approximately half a step along the Cantril ladder ($p = 0.000$).

> *2. Individuals who use mental imagery with higher frequency and quality over a short time period achieve better earnings in the same time frame.*

We also assess whether the use of mental imagery is correlated with better economic outcomes in the short term. We build an imagery index that combines the extent to which people report using imagery in daily life by spontaneously producing images in their minds (Spontaneous Use of Imagery Scale or SUIS (Nelis *et al.*, 2019)) and the vividness and emotional intensity with which respondents report imagining pre-defined future scenarios (Prospective Imagery Task or PIT (E. A. Holmes, Lang, *et al.*, 2008)). The index thus measures both the frequency and quality with which individuals use mental imagery in the immediate term (i.e. over a few months), rather than an innate trait that would be invariant over time. Figure 2 shows a positive correlation between maximal earnings reported in the six months before the first national lockdown imposed in response to the Covid-19 pandemic, and the use and quality of imagery measured three months after the start of the lockdown.[10]

[10] The earnings index includes both income and business sales and it is standardised to be mean zero and unitary standard deviation in the no-intervention control group. For more detail on the construction of this index, see Section 6 for more detail.

We restrict our sample to respondents that only received the placebo training[11], and again control for gender, age, business status, time period and group of programme participation.

We find that an increase of one standard deviation in the imagery index is related to an increase of approximately 0.2 standard deviations in the earnings index ($p = 0.001$). As a benchmark, this effect is comparable to the average impact of business training programmes that focus on teaching 'soft' or psychological skills, which typically amounts to approximately 10 percent on business sales in low- and middle-income countries (McKenzie, 2021; McKenzie, Woodruff, *et al.*, 2021). Overall, Observation 1 and 2 demonstrate that there is good reason to believe that the ability to use mental imagery is relevant for economic outcomes and wellbeing.

> *3. Attaching a higher subjective probability to mental imagery of future scenarios is positively correlated with realised earnings.*

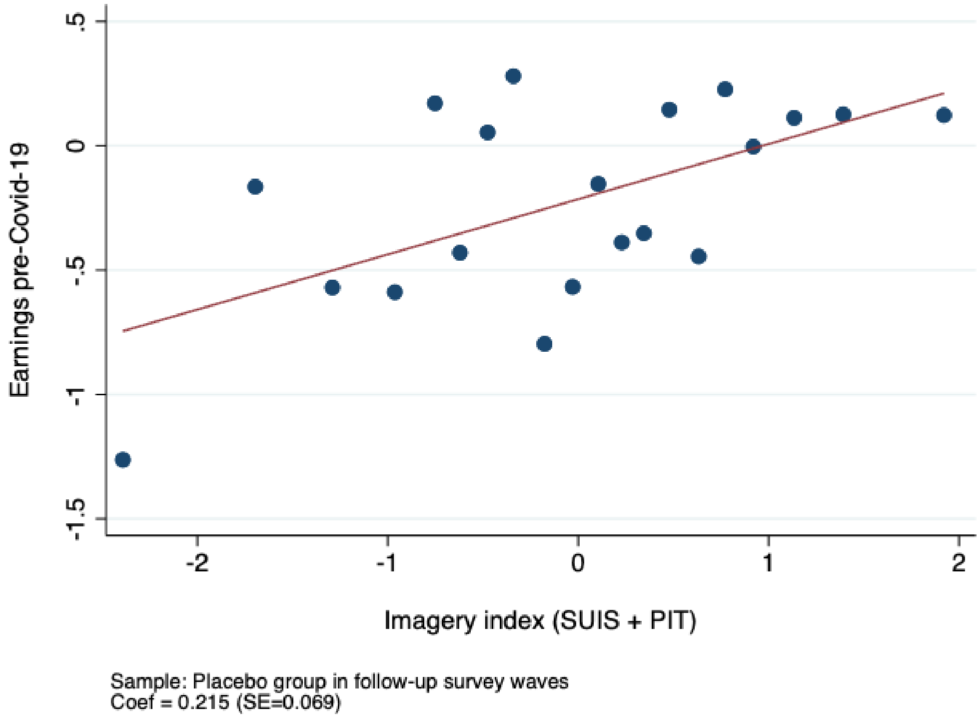
Our third observation pertains to a particular channel through which mental imagery should improve inter-temporal decision making: by increasing the subjective probability attached to future scenarios. Figure 3 reports the correlation between an individual's subjective belief that their mental imagery of pre-defined future scenarios will be realised (using the PIT scale) and the pre-Covid-19 realised earnings introduced above. We find that an increase of one standard deviations in the likelihood attached to the imagined scenarios increases realised earnings by 0.14 standard deviations ($p < 0.05$).

Observations 2 and 3 are both consistent with the idea that imagery may improve decision making and economic performance by making the future more vivid and more easily available in one's mind eye. Observation 2 highlights that this greater availability is achieved through higher vividness and emotional arousal when imagining future scenarios, while Observation 3 suggests that individuals rationally update their subjective probability that certain future events will happen, leading to higher earnings. However, most of the economic studies on the relationship between beliefs about the future and economic choices focus on the subjective likelihood that people attach to positive relative to negative scenarios (Eil *et al.*, 2011; Brunnermeier *et al.*, 2005). In contrast, the index of subjective probability in Figure 3 averages the perceived probability across positive and negative scenarios, suggesting that mental imagery increases the realism of the future beyond through the sole channel of heightened optimism.

> *4. Stronger symptoms of trauma are positively related with negative future imagery.*

[11] If we restrict our sample to those who received no training at all, we find consistent results for Observations 2, 3 and 4, although measured with slightly more noise, due to the smaller sample size.

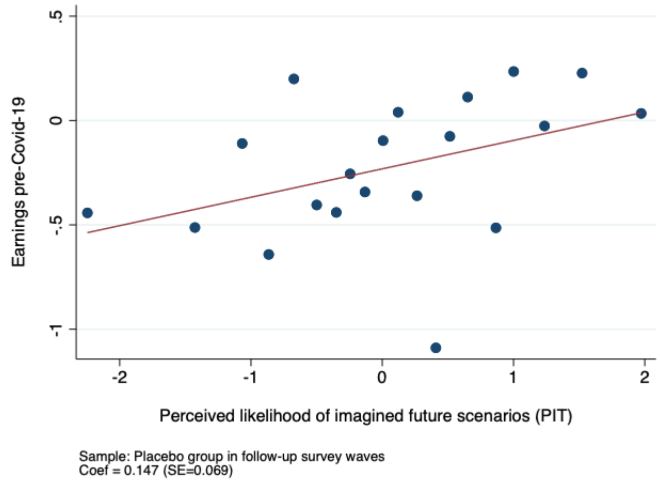
Figure 2: Imagery and earnings pre-Covid-19



Notes: The figure shows the correlation between imagery and an index of earnings in the six months prior to the first national lockdown in response the Covid-19 pandemic. The imagery index combines the Prospective Imagery Task (PIT) and the Spontaneous Use of Imagery Scale (SUIS) for general scenarios. The index of earnings pre-Covid-19 combines business sales (conditional on business survival) and take-home income of the respondent. Both measures are collected in our first follow-up survey and are standardised to be mean zero and unitary standard deviation in the no-intervention group. We restrict the sample to respondents that received placebo training. Regressions control for gender, age, business status and income category at baseline, and subdivision-wave interaction fixed effects.

Finally, we document that trauma can cause a distortion in the way in which people imagine future scenarios, by creating disproportionately powerful negative future imagery, often to the detriment of positive future imagery. In Figure 4, we examine the relationship between trauma symptoms and the self-reported quality of positive and negative future scenarios imagined using the PIT scale. We measure symptoms of trauma using the Impact of Event Scale-Revised, which is a 22-item self-reported measure that assesses subjective distress caused by past traumatic events. Imagery quality is represented by an index that combines vividness, emotional intensity and likelihood of the imagined non-business scenario occurring in real-life from the PIT scale. For example, we asked participants to imagine that the Covid-19 pandemic is over and they are struggling to make ends meet (negative future scenario) or they have saved enough money to buy an asset they really want (positive future

Figure 3: Subjective probability of imagined scenarios and earnings in the months before Covid-19



Notes: The figure shows the correlation between the subjective probability attached to both general scenarios imagined in the Prospective Imagery Task (PIT) and an index of earnings pre-Covid-19, which combines sales (conditional on business survival) and take-home income. Both measures are collected in our first follow-up survey. They are standardised to be mean zero and unitary standard deviation in the no-intervention group. We restrict the sample to respondents that received only the placebo training. Regressions control for gender, age, business status and income category at baseline, and subdivision-wave interaction fixed effects.

scenario). We again restrict the sample to the placebo group.[12]

The left panel of Figure 4 shows that individuals with higher trauma symptoms report significantly more vivid and emotionally intense negative future scenarios using the PIT scale (slope of 0.014; $p = 0.000$), but there is no relationship between trauma symptoms and positive future scenarios (slope of -0.004; $p = 0.219$), as shown in the right panel.

4 Intervention

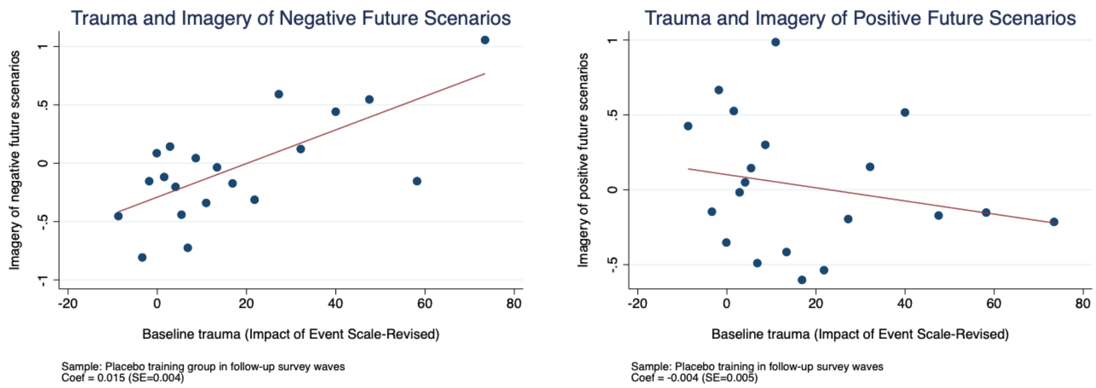
4.1 Description of intervention

To test whether mental imagery can be taught and whether it improves economic outcomes, we designed an entrepreneurship training overlaid with imagery techniques (termed 'imagery curriculum') and compared its impact to a traditional entrepreneurship training (termed 'placebo curriculum').[13] We designed the imagery and placebo curricula to be as similar as

[12]We focus on non-business scenarios so that we can include the entire sample, as business scenarios were only asked of respondents with a business at the time of the survey.

[13]We conducted extensive qualitative data collection with marginalised entrepreneurs and victims of conflict to inform the curriculum content and language. In order to adapt and refine the sessions to the

Figure 4: Quality of positive and negative imagery by baseline trauma



Notes: The figure shows the relationship between imagery quality and baseline level of trauma for defined positive and negative future scenarios. Baseline trauma is measured using the Impact of Event Scale-Revised, which is a 22-item self-reported measure that assesses subjective distress caused by past traumatic events. Imagery quality is represented by an index that combines vividness, emotional intensity and likelihood of the imagined scenario occurring in real-life from the PIT scale. Both measures are collected in our first follow-up survey. They are standardised to be mean zero and unitary standard deviation in the no-intervention group. We restrict the sample to respondents that received only the placebo training. Regressions control for gender, age, business status and income category at baseline, and subdivision-wave interaction fixed effects.

possible in terms of structure, content and delivery. Both programmes were implemented by the local government of Bogotá, specifically the District Department of Social Integration (SDIS) and District Department of Economic Development.

Both curricula took the form of ten three-hours sessions covering the same entrepreneurship themes in identical order. We structured the ten sessions to follow the journey of an aspiring entrepreneur, whereby each session centres on a particular topic deemed relevant from extensive qualitative interviews with our population of interest. These themes include product development, customer experience, marketing, competition, savings, accessing finance, productivity and managing employees.[14] At the beginning of each session in both curricula, we motivated the relevance of the content through real-life stories and relatable examples.

Both treatment arms also had an identical delivery format. The curricula were imple-

needs of the target population, we piloted the curriculum twice in November 2018 and May 2019 with a total of 60 entrepreneurs. We also obtained ongoing feedback throughout the curriculum development process from various government ministries that were mandated to develop and deliver programmes that benefit vulnerable populations. In particular, we worked closely with the lead psychologist team at the National Victims Unit (Unidad para las Victimas), Alta Consejería for Victims' Rights within the local government, and the National Training Service (Servicio Nacional de Aprendizaje or SENA).

[14]The curricula drew on materials from existing entrepreneurship training programmes, including the International Labour Organization's Start and Improve Your Business programme.

mented in weekly sessions with participants assigned to a particular time slot. Each session had a class size of between 15 and 25 participants and venues were located in the same neighbourhoods across Bogotá. Two trainers led each session, with one trainer experienced in psychology or social work and the second in entrepreneurship. All trainers were recruited through the same call using a well-defined selection criteria. Moreover, to minimise the impact of trainer heterogeneity, trainers were required to follow a standardised scripted manual and presentation deck prepared by the research team. Trainers received over three weeks of training. They also rehearsed before each week's session in group workshops led by four supervisors who had co-designed and piloted the curricula together with the research team. For all activities, trainers were kept separate by treatment arm. Participants received a certificate if they attended seven or more sessions.

The key feature that distinguishes the imagery curriculum from the placebo curriculum is the inclusion of three to four imagery exercises in each session. In the placebo curriculum, we replace the imagery exercises with group discussions, role play and written work of the same content time length. For example, in the imagery curriculum, participants were encouraged to imagine their product or service in detail and how they felt towards the product, before imagining the day in the life of their business and noting the emotions that arise. In contrast, participants in the placebo curriculum were asked to think about their product and write down the ways in which their business idea matches their passions and skills.[15] The following subsection describes the imagery exercises in more detail.

4.2 Teaching imagery

As highlighted by Böhm-Bawerk, imagery is like a muscle. While individuals might differ in the extent to which they use imagery naturally (a physical endowment), it ultimately takes costly effort to learn how to visualise the future. We designed our imagery curriculum with the goal to teach imagery in business decision making and to make subjects aware that this is a portable skill that needs to be trained and strengthened with practice. In particular, we exemplify how imagery might be used to increase the specificity of future scenarios and goals, and thus help entrepreneurs make business decisions with medium to long-term consequences (e.g., when choosing the product to sell, when asking for a loan in a bank). The curriculum seeks to demonstrate the value of imagery in various ways, including

[15] As a second example, participants in the imagery treatment were asked to imagine their product or service from the shoes of their target customer in the third session and empathise with the customer to determine whether the product satisfied their customers' needs. In contrast, participants undertaking the placebo training filled out a table that summarised the characteristics and needs of their customer and then list the ways in which their product fulfilled these needs. Participants subsequently discussed their tabulated response with another participants.

showing how performance might be improved with the use of imagery within the sessions and linking the exercises to real-life behaviours and outcomes. Moreover, providing a safe space to practice imagery in a guided way should also reduce the cost of future imagery, which is particularly fitting for participants for whom imagery may be unpleasant due to the lack of specificity in imagery or involuntary reminders of a traumatic past. Under the common goal of teaching imagery as a portable skill, imagery activities fall into one of three categories: (1) thinking about the future, (2) mental practice and (3) adopting the perspective of others.

The first category of exercises required participants to imagine future scenarios, different counterfactuals and think through the downstream consequences of their actions. In doing so, the imagery exercises encouraged participants to become more specific about these future scenarios. The future scenarios encompass both those that arise as a result of behaviours taken in the present (such as savings) or plausible scenarios that may occur beyond one's control. In many exercises, participants are asked to set a goal, which ranged from a big picture aspiration to concrete weekly goals. Once the goal had been defined, participants were encouraged to use imagery to pave concrete steps for achieving these goals.[16] For instance, we designed a session on savings, after learning that many entrepreneurs shared the view that saving was perceived to be impossible for them during our qualitative study. In this session, participants first performed basic accounting to establish the minimum amount of money they could realistically commit to saving every week and then imagined their savings contribution accumulating over weeks, months and years to appreciate the long-term power of small habits. To motivate the importance of savings, participants subsequently visualised the consequences of experiencing a personal negative shock in the instance where they had saved versus not.[17] Moreover, they established a use for their savings and developed a simple savings strategy that entailed a set of actions triggered in response to a pre-identified reminder.

By becoming more specific about future scenarios through imagery, the curriculum also sought to enable participants to simulate the utility they attach to these future scenarios.

[16]Our extensive qualitative study highlighted the need to concretise the pathway of actions for our population of interest. Many victims of conflict who aspired to start a business envisioned exporting their products without being able to describe how they plan to make their first sale.

[17]The following excerpt showcases how imagery is used to imagine a counterfactual future scenario:

> *Imagine your entrepreneurial business works well and you receive a constant flow of profits. You feel satisfied and use your profits to cover personal expenses that you could not afford before. As you pay all these expenses, you forget to save. Six months later, you discover that one of your relatives or close friends gets sick. You need an emergency treatment that is awfully expensive. But you realize that you have no savings. What do you do? How do you feel in this situation? Is this a situation you could imagine happening in the future? How would this event affect your life in one year from now?*

Imagery can produce a strong emotional response in participants, which carries information about the utility associated with the content of the imagery. Consequently, in the second session, we motivate the value of imagery by asking participants to decide whether they would like to start a business as a fishmonger. After making a provisional decision, participants are asked to imagine the day in the life of a fishmonger in the most intimate details, including smelling the fish upon arriving at the fish market. Details are provided in the following excerpt:

> *Now, I will take you through a day in Julián's life. Your alarm clock rings at 3 am. It is still dark and cold. You travel in your truck for an hour to get to Paloquemao's market. You arrive to the fish market. You can see and smell fresh fish piled up on top of the tables, with noisy salesmen. Think about this scene for a moment. I would like for you to paint an image or a video in your head, as if you were an artist or a film director trying to capture this moment. What do you see? What do you smell? How do you feel right now?*

Participants then imagine describing their day and business to a relative or friend and noting how they feel during this conversation. Upon completing the exercise, participants are asked to reflect on what imagery has taught them and reconsider whether they would like to become a fishmonger after all. In contrast, the placebo curriculum did not place any emphasis on emotion and instead encouraged participants to rationalise their utility by writing lists. During this particular exercise, participants were asked to write down the ways in which becoming a fish monger matched or did not align with their passions and skills, before discussing these reflections in pairs.

If the first category of imagery exercises can be thought of as experimentation between different pathways of action and identifying the utility associated with those actions, the second category reinforces these insights through mental practice. In other words, participants use imagery to practice a plan chosen through mental trial and error. While mentally practising their plan in a safe space, participants identify potential obstacles and how to overcome them. Mental rehearsing should improve the concreteness and realism in their plan and thus increase their propensity to choose the better option more frequently. For example, participants visualise making an origami step-by-step before attempting in reality. We intend for this illustrative example to highlight how practising plans improves performance and reduces errors. Similarly, we extend this idea to the entrepreneurship domain by asking participants to mentally practise conducting their customer survey, their savings strategy or a plan to become more productive and reduce waste, to name a few examples. Participants are encouraged to implement these plans as homework and report back on their experiences, with the hope that these reflections should serve to improve the quality of imagery over time.

The final category of exercises entails adopting the perspective of others. We hypothesise that mental simulations should allow people to predict the choices and behaviour of others more precisely and react accordingly. Adopting the perspective of others is particularly important for entrepreneurs who should cater to their customers, while differentiating themselves from their competitors. Moreover, with high credit constraints, our sample of micro-entrepreneurs may be required to request funding from informal and formal networks and adapt their pitch to sell their proposal most effectively. In addition, our sample hire approximately two part or full time employees on average; managing and motivating these employees will thus be necessary. Our curriculum is designed to develop perspective taking for this wide range of situations. For instance, over several sessions, participants visualise their product or service from the shoes of their target customer and identify how best to improve their product so to satisfy their needs[18], differentiate from their closest competitors and minimise customer dissatisfaction.

All imagery exercises were implemented following a standardised 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 through the exercise, which lasts five to ten minutes on average. The scripts are designed to be sufficiently general in nature, such that participants could apply the imagery to their own business case. After the exercise, participants are asked to reflect on a few debriefing questions in pairs and as a group, which aim to provide feedback on their experience and motivate how they may use the technique in their business decision making. The structure was designed to teach imagery as a general skill that could be used more broadly in the domain of business decision making. Through debriefs and homework tasks, participants were repeatedly provided the opportunity to practise the three applications outlined above and reminded of the value of imagery in connection with real-life behaviours and outcomes.

5 Experimental design

This section provides an overview of the treatment arms, the timeline of activities, a description of the sample, take up rates and attrition.

[18]In place of this particular imagery exercise, the placebo curriculum asked participants to describe their target customer in detail to a partner and reflect on their needs. Their partner then evaluated whether the product met the needs of the respective customer on a scale of 1 to 5. Upon sharing the score, the pair discussed ways in which to improve the product such that it better meets the needs of the customer.

5.1 Treatment arms

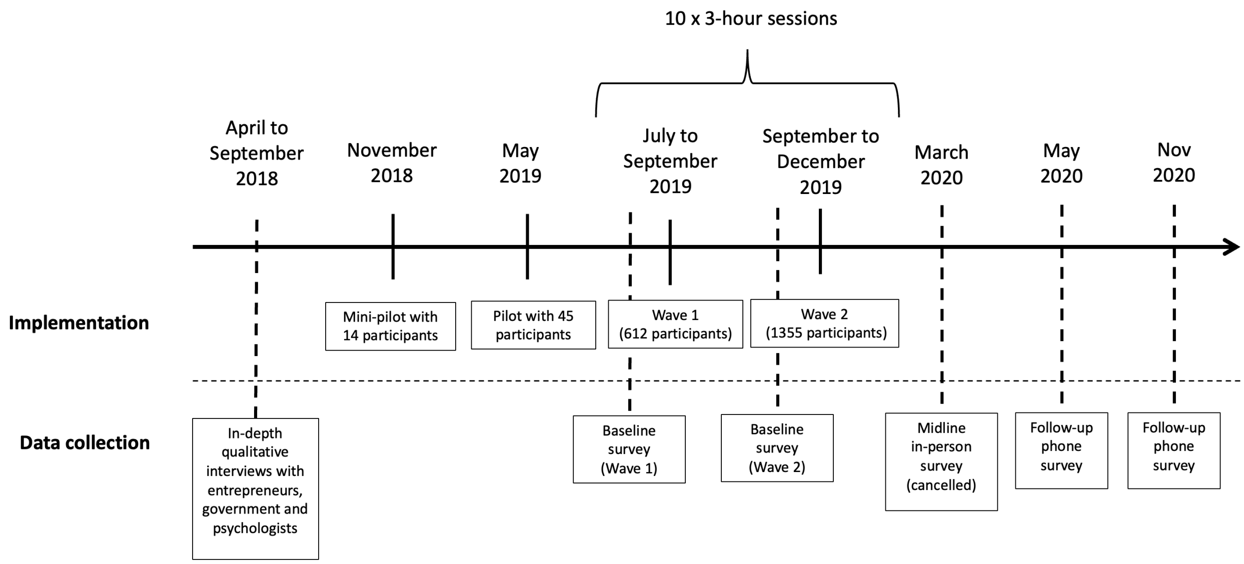
1967 participants were randomised into three treatment arms across two waves of implementation in a randomised control trial. To isolate the effect of imagery, we randomised 956 participants into the imagery programme and 558 participants into the placebo training. Of these, 770 and 431 participants in the imagery and placebo training arms respectively agreed to participate in the training prior to knowing their treatment status. To test the effect of the training, we randomised a further 453 people into a no-intervention group that received nothing. We doubled the number of participants in the imagery training relative to both the placebo and no-intervention control groups in order to meet the budget reporting requirements of our government implementing partner.

5.2 Timeline of activities and data collection

For ease of implementation, the intervention was delivered in two waves, the first taking place from July to September 2019 and the second from September to December 2019. Figure 5 shows the timeline of the intervention and data collection. We conducted an extensive qualitative study and two pilots to refine the curriculum and RCT design in the year prior to implementation. Before starting the training within both waves, we first screened interested applicants to determine eligibility, randomised eligible participants into the three treatment arms and conducted a baseline survey. We conduct the first follow-up phone survey 6 to 8 months and the second follow-up phone survey 12 to 14 months after the end of the training programme.[19]

[19] Our in-person follow-up survey was scheduled to commence in early March 2020. However, the survey was cancelled shortly thereafter in response to the Covid-19 pandemic and the stringent nationwide lockdown in Colombia. We implemented two phone surveys commencing in May and November 2020 instead.

Figure 5: Timeline of implementation and data collection



To reduce the correlation between treatment assignment and social desirability bias in survey responses, we used surveyors from Innovations for Poverty Action (IPA) Colombia, an independent nonprofit research organisation. IPA Colombia communicated to respondents that they were conducting a survey on entrepreneurs in Bogotá in collaboration with our local government partner. All respondents were compensated COP $10,000 ($2.8) for their time, irrespective of whether they completed the survey.

5.3 Sample

We designed our curricula to target a low-income population in a country where there are over eight million registered victims of conflict, of whom 85% were forcibly displaced, and more than 1.2 million Venezuelan migrants. Our government partners recruited participants through a multi-channel media campaign by advertising an entrepreneurship programme promoting soft skills, including through community centres and 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.[20] To meet their mandate, the District Secretariat of

[20] 3553 individuals applied to attend our programme, of which 2337 were deemed eligible according to our 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 prioritised applicants who reported taking at least three steps towards starting or growing their business in the last six months. In order to account for

Social Integration was required to train numerous sub-populations, all of whom can be defined as low income.[21] When we randomly select and randomise eligible applicants into our three treatment arms, we stratified by subdivision, sex, age, entrepreneurship status (existing business or idea), sales for business owners or income for people without a business.[22]

Our final sample include 1,967 would-be entrepreneurs with either an existing business (51%) or a stable business idea only (49%). Table 1 provides descriptive statistics for this sample. In line with the mission of our government partners to serve "vulnerable" populations, 85% reported baseline exposure to traumatic past experiences, including armed conflict and forced displacement. 58% of participants are women. The average entrepreneur is 32 years old and has completed secondary school. Participants earn an average monthly income of COP $693,077 (approximately USD $200) at baseline, which is approximately 80% of the Colombian monthly minimum wage of COP $877,802.

As presented in Table 1, participants appear well balanced on baseline characteristics across all treatment and control groups. This balance extends across a wide range of characteristics, including variables that were not used for stratification in the randomisation procedure.

the need to self-fund transportation costs to the training centres, 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.

[21]The sub-populations include: victims of conflict; Venezuelan migrants; low-income youth; LGBTQ groups; entrepreneurs with disabilities or carers thereof; the formerly homeless; and the elderly. Appendix Table A1 summarises the breakdown of the sample by subdivision and treatment status.

[22]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. For our analysis, we aggregate the data to household level.

Table 1: Baseline Balance Table

Variable	(1) Imagery Treatment N	Mean/SE	(2) Placebo Treatment N	Mean/SE	(3) Pure Control N	Mean/SE	T-test Difference (1)-(2)	(1)-(3)	(2)-(3)	F-test for joint orthogonality
Female	906	0.578	531	0.580	415	0.571	-0.002	0.007	0.009	0.043
		(0.016)		(0.021)		(0.024)				
Age (18-28)	906	0.604	531	0.571	415	0.629	0.033	-0.025	-0.058*	1.704
		(0.016)		(0.022)		(0.024)				
Age (29-45)	906	0.240	531	0.250	415	0.272	-0.011	-0.033	-0.022	0.815
		(0.014)		(0.019)		(0.022)				
Age (46-59)	906	0.092	531	0.113	415	0.094	-0.021	-0.002	0.019	0.919
		(0.010)		(0.014)		(0.014)				
Years Education	720	13.132	429	13.046	327	13.366	0.086	-0.234	-0.320	0.869
		(0.125)		(0.177)		(0.173)				
Only Business Owner	906	0.242	531	0.245	415	0.236	-0.003	0.006	0.009	0.048
		(0.014)		(0.019)		(0.021)				
Only Have a Business Idea	906	0.491	531	0.488	415	0.494	0.003	-0.003	-0.006	0.018
		(0.017)		(0.022)		(0.025)				
Have Business and Business Idea	906	0.267	531	0.266	415	0.270	0.002	-0.003	-0.004	0.011
		(0.015)		(0.019)		(0.022)				
Income Strat: Sales $\leq$ 1 month salary	906	0.667	531	0.663	415	0.641	0.004	0.026	0.022	0.434
		(0.016)		(0.021)		(0.024)				
Income Strat: Sales > 1 month salary	906	0.240	531	0.230	415	0.248	0.010	-0.009	-0.018	0.221
		(0.014)		(0.018)		(0.021)				
Refused to Provide Income	906	0.094	531	0.107	415	0.111	-0.014	-0.017	-0.003	0.590
		(0.010)		(0.013)		(0.015)				
Assets Owned	720	11.681	429	11.794	327	11.835	-0.114	-0.155	-0.041	0.225
		(0.144)		(0.189)		(0.209)				
Household Size	719	3.484	428	3.579	326	3.650	-0.095	-0.165	-0.070	1.303
		(0.058)		(0.077)		(0.095)				
Save Monthly Y/N	716	0.552	429	0.531	326	0.580	0.020	-0.028	-0.048	0.873
		(0.019)		(0.024)		(0.027)				
Had Access to Credit	716	0.156	428	0.143	326	0.138	0.014	0.018	0.004	0.379
		(0.014)		(0.017)		(0.019)				
No. of Traumatic Events	906	2.123	531	2.295	415	2.308	-0.172	-0.185	-0.013	1.279
		(0.076)		(0.105)		(0.125)				
Reported Experiencing Trauma (Y/N)	719	0.828	429	0.837	326	0.844	-0.009	-0.016	-0.007	0.228
		(0.014)		(0.018)		(0.020)				
Impact Event Score	710	17.945	428	17.650	324	17.785	0.295	0.159	-0.136	0.024
		(0.842)		(1.092)		(1.164)				
Kessler Score	719	13.170	429	13.232	326	13.138	-0.062	0.032	0.094	0.054
		(0.157)		(0.194)		(0.220)				
Wave 1 Participant	906	0.294	531	0.392	415	0.304	-0.098***	-0.010	0.088***	7.918***
		(0.015)		(0.021)		(0.023)				

Notes: The table presents a balance test at baseline for all three treatment arms. Columns 1, 2, and 3 show the sample size, mean, and standard errors for the imagery treatment, placebo treatment, and no-intervention groups, respectively. The following 3 columns show the differences between treatment arms and p-values for t-tests measuring differences between treatment arms. The final column presents an F-test across all three treatment arms. * p<0.10, ** p<0.05, *** p<0.01

5.4 Take up and attrition

We find that take up of the treatment is substantial, with about 67% of individuals attending at least one session in the imagery training across both waves, conditional on confirming attendance. By way of comparison, attendance rates in the McKenzie and Woodruff (2014) review of business training programmes in developing countries range from 39 to 92%, with a mean of 64%. Of those attending at least one session, 48% attended seven or more of the ten sessions in the imagery treatment and qualified for a certificate. Similarly, 63% attended at least one session in the placebo training across both waves. Of those attending at least one session, 53% attended seven or more sessions in the placebo training.[23]

We surveyed 74% of all participants in our first follow-up survey and 63% of participants in our second follow-up survey. We test whether attrition is differential across all three treatment groups. We find that 64% of participants from our imagery and placebo groups responded to our endline survey, so there is no differential attrition. However, only 57% of the no-intervention group were interviewed in the second follow-up survey. The difference is statistically significant at the 10% level.[24]

Table 2 shows that there is little evidence to suggest that there is selective attrition on observable characteristics at endline, especially between imagery and placebo groups. Attrition tables at the stage of training acceptance and at midline are provided in the Appendix Tables A11 and A12.

[23] Take up rates are 58% and 55% in the imagery and placebo group, respectively, if we do not condition on confirmed attendance. Our sample is highly resource-constrained and mobile. In collaboration with SDIS, we developed several strategies to maximise compliance among those who were randomised to both training treatments. For instance, participants were assigned to venues that matched their location preferences to the best extent possible. Our supervisors ensured that participants were reminded on a weekly basis over WhatsApp groups, text messages and phone calls. Participants who attended seven or more sessions received a certificate signed off by SDIS and our World Bank collaborator and invited to attend a graduation ceremony in the case of the second wave.

[24] Although the differential attrition is more pronounced in the second follow-up survey, we see early evidence of selective attrition in the first follow-up survey. While we interviewed 74% and 75% of respondents from the placebo and imagery treatments respectively, only 70% of the no-intervention group responded to the first follow-up survey. A t-test reveals that the difference across the no-intervention group and imagery/placebo treatment is marginally significant with $p = 0.1$.

Table 2: Endline Attrition Table

Variable	(1) Imagery Treatment N	Mean/SE	(2) Placebo Treatment N	Mean/SE	(3) Pure Control N	Mean/SE	T-test Difference (1)-(2)	(1)-(3)	(2)-(3)	F-test for joint orthogonality
Female	579	0.573 (0.021)	341	0.610 (0.026)	251	0.594 (0.031)	-0.037	-0.020	0.016	0.610
Age (18-28)	579	0.604 (0.020)	341	0.540 (0.027)	251	0.610 (0.031)	0.065*	-0.005	-0.070*	2.212
Age (29-45)	579	0.237 (0.018)	341	0.258 (0.024)	251	0.291 (0.029)	-0.021	-0.054*	-0.033	1.373
Age (46-59)	579	0.100 (0.012)	341	0.147 (0.019)	251	0.092 (0.018)	-0.046**	0.009	0.055**	2.997*
Years Education	497	12.949 (0.148)	294	12.885 (0.210)	216	13.216 (0.222)	0.063	-0.267	-0.331	0.658
Only Business Owner	579	0.254 (0.018)	341	0.258 (0.024)	251	0.239 (0.027)	-0.004	0.015	0.019	0.150
Only Have a Business Idea	579	0.491 (0.021)	341	0.504 (0.027)	251	0.490 (0.032)	-0.014	0.000	0.014	0.095
Have Business and Business Idea	579	0.256 (0.018)	341	0.235 (0.023)	251	0.271 (0.028)	0.021	-0.015	-0.036	0.528
Income Strat: Sales $\leq$ 1 month salary	579	0.705 (0.019)	341	0.674 (0.025)	251	0.689 (0.029)	0.030	0.015	-0.015	0.466
Income Strat: Sales $>$ 1 month salary	579	0.211 (0.017)	341	0.220 (0.022)	251	0.207 (0.026)	-0.009	0.004	0.013	0.083
Refused to Provide Income	579	0.085 (0.012)	341	0.106 (0.017)	251	0.104 (0.019)	-0.021	-0.019	0.002	0.692
Assets Owned	497	11.468 (0.170)	294	11.532 (0.225)	216	11.634 (0.249)	-0.065	-0.166	-0.102	0.147
Household Size	496	3.504 (0.068)	293	3.635 (0.090)	215	3.715 (0.120)	-0.130	-0.211	-0.080	1.536
Save Monthly Y/N	494	0.559 (0.022)	294	0.527 (0.029)	215	0.563 (0.034)	0.031	-0.004	-0.036	0.454
Had Access to Credit	494	0.160 (0.017)	294	0.156 (0.021)	215	0.149 (0.024)	0.003	0.011	0.008	0.069
No. of Traumatic Events	579	2.389 (0.099)	341	2.567 (0.134)	251	2.597 (0.165)	-0.179	-0.208	-0.029	0.897
Reported Experiencing Trauma (Y/N)	496	0.837 (0.017)	294	0.864 (0.020)	215	0.842 (0.025)	-0.027	-0.005	0.022	0.540
Impact of Event Score	490	18.320 (1.023)	294	18.459 (1.339)	215	18.276 (1.442)	-0.139	0.043	0.183	0.005
Kessler Score	496	13.149 (0.188)	294	13.287 (0.231)	215	13.093 (0.280)	-0.138	0.056	0.194	0.162
Wave 1 Participant	579	0.306 (0.019)	341	0.370 (0.026)	251	0.319 (0.029)	-0.064**	-0.013	0.051	2.037

Notes: The table presents a balance test at the second follow up survey for all three treatment arms. Columns 1, 2, and 3 show the sample size, mean, and standard errors for the imagery treatment, placebo treatment, and no-intervention groups, respectively. The following 3 columns show the differences between treatment arms and p-values for t-tests measuring differences between treatment arms. The final column presents an F-test across all three treatment arms. * p<0.10, ** p<0.05, *** p<0.01

6 Measurement

In constructing our outcome measures, we follow a detailed pre-analysis plan, registered in the American Economic Association Registry.[25] We collect all data via phone surveys and therefore our measures are limited by this format.

[25] https://www.socialscienceregistry.org/trials/6576

6.1 Primary outcome measures

We are interested in three sets of primary outcomes (or "families"): imagery, psychological resilience and economic outcomes. The imagery outcomes are considered "first stage" outcomes, used to check that the curriculum combining entrepreneurship and imagery is having their intended impact. The psychological resilience and economic outcomes are considered "second stage" outcomes that we hypothesise are affected by imagery.

6.1.1 Mental imagery

Our intervention was designed to increase the frequency with which participants make use of imagery in their business lives and to improve the quality of the images generated, conditional on using imagery. We construct a mental imagery index that captures both dimensions through adapted versions of two widely-used imagery scales in the psychology literature. We are primarily interested in the channel through which imagery might affect business decision making, so we adapt these scales to the entrepreneurship domain.

To measure the frequency of imagery usage, we adapt the Spontaneous Use of Imagery Scale (Reisberg *et al.*, 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 scenarios. 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."

To assess the quality of imagery in an entrepreneurship domain, we adapt the Prospective Imagery Task (MacLeod, 1996; Stöber, 2000). This exercise asks respondents to imagine three positive and three negative business-related and non-business-related 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 in which "the Covid-19 pandemic is over, and your business is doing well". Respondents are then asked to assess the vividness or level of detail of each image, and the emotional intensity generated by the image. We measure vividness and emotional intensity to pick up on the extent to which imagery is an "emotional" and "motivational amplifier".

From this scale, we build four sub-indices: two indices for imagery vividness and two indices for the emotional intensity of the images associated with the positive and negative scenarios respectively. We construct separate sub-indices for positive and negative imagery, as we expect the intervention to have differential effects on each type, especially for participants with a past history of trauma. In particular, participants with post-traumatic stress disorder tend to lack vividness in autobiographical positive imagery and overcompensate in the emotional intensity of negative imagery (Kleim, Graham, *et al.*, 2014).

The full list of questions used in the construction of the imagery index can be found in Appendix Table A2.

6.1.2 Psychological resilience

We explore whether the imagery training has downstream effects on mental wellbeing during the pandemic by building two indices. The first index captures psychological resilience, defined as the ability to respond well in the face of adversity. The second index reflects psychological distress, as measured by the Kessler K6 non-specific distress scale. The full list of questions used in the construction of the psychological resilience indices can be found in Appendix Table A3.

6.1.3 Economic outcomes

In addition to mental wellbeing, we assess the downstream impact of imagery training on economic outcomes. Our methodology allows us to unpack whether the imagery training improves economic decision making and outcomes relative to a more traditional entrepreneurship training or no training at all. Given the onset of a Covid-19-induced national lockdown in Colombia three months after the end of our intervention, we are well placed to evaluate whether imagery improves economic resilience in response to a negative shock. We construct economic indices to capture these downstream treatment effects and distinguish between two time periods: (1) economic activity period prior to the Covid-19 induced lockdown (i.e. before 24 March 2020) and (2) economic activity during the lockdown.

Our first primary economic outcome is an index of sales and take-home income, conditional on owning a business, or simply take-home income if no business exists at the time of the survey. We ask participants to recall both outcomes for the period prior to the national lockdown and in the week prior to the survey. Business status is our second economic outcome of interest and in particular, whether a business is open or only temporarily closed (versus permanently closed) during the lockdown. Our third economic outcome of interest is business investment undertaken both pre-Covid and during the pandemic. We construct the investment index by identifying whether respondent newly acquired or significantly improved existing business assets in a predefined list. We are furthermore interested in whether our imagery training helped entrepreneurs in developing better safety nets, proxied by savings in the pre-Covid period and their perceptions of informal support networks during the pandemic. Finally, we assess whether treated entrepreneurs adapt their business more effectively to the pandemic and the associated government restrictions. To measure this, we ask participants to respond with yes/no answers to a list of thirteen business behaviours, ranging from setting up a safe work environments to identifying alternative supply chains to diversifying their products. We combine the index of behaviours with a sub-index of reverse-coded "unsafe" working hours, defined as the proportion of total hours worked "unsafely" in which social distancing, frequent hand washing, the use of face masks or home working were not adhered to (the government Covid-19 guidelines of the day).

The full list of questions used in the construction of the economic indices for the period prior to the Covid-19 national lockdown and during the lockdown can be found in Appendix Tables A4 and A5 respectively.

6.1.4 Trauma

Research in clinical psychology and neuroscience suggests that trauma can increase the cost of mental imagery by inducing distressing images and alter the quality of imagery by undermining the specificity of images. Accordingly, we expect our imagery programme to have differential treatment effects for those individuals who reported higher baseline levels of trauma.

We measure trauma at baseline by first conducting a contextually-relevant trauma history checklist that captures whether respondents experienced or witnessed a traumatic event. To proxy for the level of trauma, we use the 22-item Impact of Event Scale-Revised to assess subjective distress in the past month caused by the most traumatic event ever lived, conditional on experiencing a traumatic event. Symptoms include "trouble concentrating", "troubles removing them from memory" and "trying not to talk or think about them". We construct a dummy variable for high trauma by assigning a value of one to 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). All respondents who reported that they did not experience a traumatic event in the past were assigned a score of zero.

6.1.5 Variable and index construction

To construct the variables of interest, we follow the procedure outlined in our pre-analysis plan. Given the presence of outliers, we winsorise the main economic measures (e.g. revenues, income, savings) at the 99th percentile. To address the right-skewed nature of their distributions, we use the inverse hyperbolic sine transformation of the raw measures.

We use the methodology of Kling *et al.* (2007) to construct indices and adopt the following steps: (i) we first ensure that all variables are consistently signed (e.g. higher value associated with higher imagery ability); and (ii) then standardise each component of the index by subtracting the no-intervention group mean and dividing by its standard deviation. In the case where there are multiple sub-scales, we take two additional steps: (iii) we take the sum of the standardised components and (iv) standardise the sum 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 standardising the indices.

7 Empirical strategy

The Covid-19 pandemic heightened the noise inherent in business revenue and household income. Given the low auto-correlation in these measures, we conducted multiple follow-up surveys to average out the noise and increase statistical power. There were two surveys in total: the first commencing in May 2020 and the second commencing in November 2020. Hence, our analysis combines these two phone surveys, with clustering at the household level and the inclusion of survey fixed effects.

For each primary outcome, we estimate the following specification at the household level:[26]

$$y_{iws} = \beta_0 + \beta_1 \cdot T_{iw} + \theta m_{iw} + \phi x_{iw} + \eta_w + \delta_s + \mu_{iw}, \tag{1}$$

where y_{iw} is the outcome of interest for household i in wave w and survey s; T_{iw} is a dummy capturing whether the household was offered a given training; m_{iw} is the vector of randomisation strata dummy variables; x_{iw} is the vector of baseline covariates used to increase precision in our estimates; and η_w and δ_s are wave-subdivision pair and survey fixed effects respectively. The strata variables include the subdivision, gender, age group, entrepreneurship status (business, business idea or both) and income/sales group (low, medium or high) of the individual included in the randomisation.

We first compare the results for the imagery training relative to the placebo training to isolate the effect of teaching imagery. We then compare results for both the imagery and placebo training to the no-intervention group in order to evaluate the effect of business training more broadly. Our estimates measure the intent-to-treat impacts of the interventions relative to the defined control group. For every primary outcome, we test the null hypothesis that the treatment has no impact. For inference, we present standard errors clustered at the household level and false discovery rate q-values calculated within each family of primary

[26]The majority of participants reflect single-unit households. We collapse the data to the household level for those individuals who reported living in the same address as another selected participant at screening and were thus randomised into the same treatment status.

outcomes using the sharpened two-stage procedure of Benjamini *et al.* (2006). We present results with and without the inclusion of baseline covariates x_{iw} as controls. Following Belloni *et al.* (2014), we adopt the "post-double selection" method for selecting regressors, including first-order interactions and quadratic terms.

Following our pre-analysis plan, we restrict the sample for analysis to people who confirmed their participation in the imagery or placebo programmes, which is approximately 78 percent of the sample for these treatment groups. Participants were blind to which programme they would receive 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.

We also present heterogeneous treatment effects by trauma and gender in separate specifications. In each of them, we interact the treatment indicator variable T_{iw} with an indicator H_{iw} for being a woman or having experience a high level of trauma symptoms in the past month. This means that we use low-trauma individuals and men as the base categories for each specification respectively. To conduct heterogeneity analysis, we estimate a fully interacted model as follows:

$$y_{iws} = \beta_0 + \beta_1 \cdot T_{iw} + \beta_2 \cdot H_{iw} + \beta_3 \cdot T_{iw} * H_{iw} + \theta m_{iw} + \eta_w + \delta_s + \mu_{iw}, \tag{2}$$

where β_3 captures the additional average treatment effect for high-trauma individuals relative to low-trauma individuals or women relative to men, depending on the specification.

8 Results

8.1 Imagery versus placebo training

We begin by evaluating whether imagery can indeed be taught and the downstream effects of teaching imagery on psychological and economic outcomes. To isolate the impact of teaching imagery, we compare the results of the imagery treatment relative to the placebo training. With the exception of the imagery exercises in the imagery treatment, the two interventions were otherwise identical in terms of content and delivery. The following results are also robust to controlling for baseline covariates selected using a post-double selection method following Belloni *et al.* (2014) (Appendix Tables X to X) and the inclusion of participants who did not confirm participation to the training when still blind to treatment status (Appendix Tables

A14 and A15).

8.1.1 Is imagery malleable?

We first consider whether the imagery training had its intended impact: to develop imagery as a skill in business decision making. We combine the SUIS, PIT vividness and emotional intensity measures to create an overall imagery index. We focus on business scenarios as the relevant domain in which imagery was trained and thus most likely to have an impact. Given that the business-specific imagery was only asked to individuals with a business at the time of the surveys, we restrict our sample to households that had a business at baseline (51% of the sample). We find that there is no differences in business status across treatment arms in both follow-up surveys, lending support to the assumption of monotonicity.[27]

In support of the hypothesis that imagery can be trained, we find a 0.181 standard deviation difference in our imagery index for business scenarios between the imagery and placebo groups, as reported in Table 3. Even though we are considering half our sample, this difference is statistically significant at the 10% level ($p = 0.058$). As shown in Table 3, we see no difference in our imagery index between the imagery and placebo groups when we consider non-business scenarios for this sub-sample ($p = 0.934$). There are two possible reasons underlying the stronger imagery treatment effects in business-specific scenarios relative to non-business scenarios. First, imagery is domain specific and thus can only be trained for a specific type of decision making, while recognising that business decision making encompasses a rather broad cluster of decisions. Second, the sub-sample of entrepreneurs who had a business already at baseline were better able to train in imagery, as they had a greater opportunity to practice the skill within the domain of business decision making. However, there are null treatment effects on non-business imagery for both the business sub-sample (0.007 standard deviations) and the overall sample (-0.006 standard deviations). See Appendix Table A7.

Table 3 further decomposes the business-specific imagery index into its five constituent parts for the subset of individuals who had a business at baseline.[28] Consistent with our theory of change, we observe that imagery participants reported more frequent use of imagery using the SUIS scale (column 3) and higher quality images of future scenarios using the PIT

[27] 84.5% of households in the imagery treatment that had a business at baseline also had a business in the first follow-up survey, compared to 81% in the placebo group (difference not statistically significant at $p = 0.286$). These proportions shift to 75.5% in the imagery treatment and 73.7% in the placebo training in the second follow-up survey (difference not statistically significant at $p = 0.660$). The effect of imagery training on business status is likely driven by participants who started a business during the programme.

[28] Appendix Tables A6 and A7 decompose the imagery index into its constituent parts for non-business scenarios for the sub-sample of households with a business at baseline and the entire sample respectively, as all participants were asked to imagine future non-business scenarios.

Table 3: Imagery vs Placebo Training: Effect on Imagery

	Combined imagery index		Business-specific imagery sub-components				
	(1) Imagery (non-business)	(2) Imagery (business)	(3) SUIS	(4) Positive PIT Vivid	(5) Positive PIT Emotion	(6) Negative PIT Vivid	(7) Negative PIT Emotion
Imagery training	0.007	0.181*	0.086	0.056	0.042	0.174**	0.158*
	(0.080)	(0.095)	(0.091)	(0.093)	(0.088)	(0.086)	(0.085)
FDR q-values			0.522	0.607	0.607	0.186	0.186
Strata Controls	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓
Mean DV in Placebo	-0.01	-0.09	-0.04	-0.04	-0.06	-0.10	-0.02
R-squared	0.038	0.047	0.033	0.056	0.025	0.023	0.036
Total N	936	798	797	792	792	789	789
N in Placebo	341	285	285	283	283	282	281
N in Treat	595	513	512	509	509	507	508

Notes: The table presents the difference-in-means in the standardised imagery measures between the imagery and placebo arms for the subsample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns 1 and 2 present results for non-business and business-specific imagery respectively. Differences in observation numbers between columns 1 and 2 reflect that some participants with a business at baseline closed their business during the Covid-19 pandemic and were excluded from business-specific scenarios. Columns 3 to 7 decompose the overall business imagery index into its constituent parts and we calculate the false discovery rate q-values across these five hypotheses following the sharpened two-stage procedure of Benjamini *et al.* (2006). Column 3 presents the standardised SUIS index, which captures the frequency with which people use imagery. Column 4 to 7 present results on the self-reported quality of scenarios imagined using the PIT scale, with columns 4 and 5 focusing on positive future scenarios and columns 6 and 7 on negative future scenarios. We average across the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

scale (columns 4 to 7). Only the results on the quality of negative future imagery are statistically significantly different from zero. Relative to the placebo training, the imagery treatment increased the vividness of negative future business scenarios by 0.174 standard deviations ($p = 0.043$) and their emotional intensity by 0.158 standard deviation ($p = 0.063$) on average. None of these results remain statistically significant once we correct for multiple hypothesis testing across these five hypotheses, following Benjamini *et al.* (2006). Imagery participants in turn were more likely to report a higher subjective likelihood that the future business scenarios could occur in their lives (0.048 standard deviations), although this difference is also not statistically significant ($p = 0.567$).

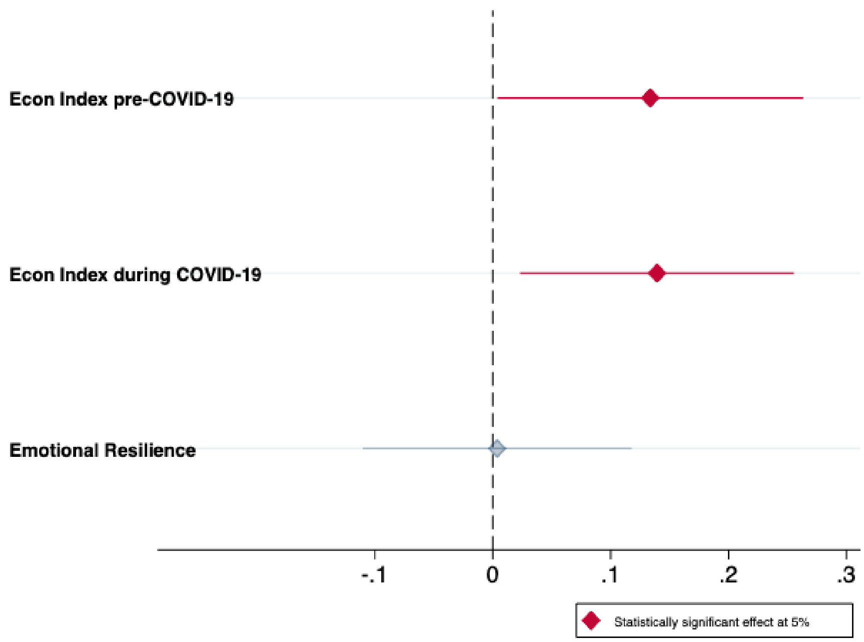
8.1.2 The impact of imagery training on downstream outcomes

In this section, we show that imagery training improves economic outcomes, both before and after the start of the Covid-19 pandemic. We first review a set of results for condensed outcomes, where we combine our psychological outcomes into a single index measuring emotional resilience and combine our economic outcomes to create two indices: economic outcomes before the Covid-19-induced national lockdown and economic outcomes during the lockdown.

Figure 6 shows the difference-in-means between the imagery and placebo training for the condensed outcomes with 95% confidence intervals.

Relative to the placebo group, those who received the imagery treatment score 0.13 standard deviations better on average ($p = 0.044$) on our combined pre-Covid-19 economic index. Moreover, during the Covid-19 pandemic, the imagery group score 0.14 standard deviations higher on average ($p = 0.019$) on our combined economic outcomes relative to the placebo group. In contrast, we observe no difference in emotional resilience measured at the time of the surveys (0.004 standard deviations; $p = 0.950$). Overall, the results are broadly consistent with our hypotheses that the use and quality of mental imagery is malleable and that imagery can improve economic outcomes.

Figure 6: Effects of receiving the imagery training on downstream outcomes



Notes: Markers indicate the difference-in-means on our standardised condensed outcome measures between the imagery and placebo training, with 95% confidence intervals. Red markers indicate statistical significance at the 5% level. We combine our psychological outcomes into a single index measuring emotional resilience, and combine our economic outcomes to create two indices: pre-Covid-19 economic outcomes and economic outcomes during the Covid-19 pandemic. Higher values of all variables indicates better outcomes. The sample consists of people who confirmed participation in the training. We average across our two follow-up surveys and collapse the data to the household level, the unit of randomisation. Standard errors are clustered at the household level and we control for survey wave and subdivision-wave interaction fixed effects. Monetary variables are winsorised at the 99th percentile.

Table 4 shows the full set of results for the economic and psychological outcomes, reporting both the p-values and sharpened q-values. Individuals receiving the imagery training report higher earnings, both before and after the start of the Covid-19 pandemic. Relative to the placebo group, imagery participants report on average a 0.19 standard deviations increase in pre-Covid-19 earnings ($p = 0.022$) and a 0.14 standard deviations increase in earnings during the Covid-19 pandemic ($p = 0.020$). Both earnings results survive correcting for multiple hypothesis testing across our seven primary economic outcomes at the 10% level of significance ($q = 0.082$ for both results).

Imagery participants report significantly higher business survival of 0.048 standard deviations ($p = 0.058$) on average during the Covid-19 pandemic relative to the placebo group. In contrast, there is no observed difference in the average rate of business survival before the Covid-19 pandemic started ($p = 0.455$). Moreover, imagery participants report higher average levels of investment (0.066 standard deviations) and a more pro-active business behavioural response to the Covid-19 pandemic (0.084 standard deviations), although these results are not statistically significant with $p = 0.218$ and $p = 0.148$ respectively. There is no effect on the safety net index ($p = 0.669$). These broader set of results mirror the condensed results presented in Figure 6 above. Lastly, when we look at our pre-specified outcomes that make up the condensed emotional resilience index, we observe no difference in the Kessler Psychological Scale of Distress and general psychological resilience index between the imagery and placebo group.

Table 4: Imagery vs Placebo Training: Effect on Downstream Outcomes

	Pre-COVID		COVID					COVID	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Earnings	Business survival	Earnings	Business survival	Safety nets	Business behaviour	Investment	Kessler	Psych resilience
Imagery training	0.191**	0.020	0.141**	0.048*	0.024	0.084	0.066	0.017	-0.035
	(0.083)	(0.027)	(0.060)	(0.025)	(0.057)	(0.058)	(0.053)	(0.057)	(0.063)
FDR q-values	0.082	0.349	0.082	0.107	0.402	0.174	0.212	1.000	1.000
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R-squared	0.073	0.181	0.045	0.106	0.043	0.026	0.058	0.052	0.021
Mean DV (Placebo)	-0.20	0.72	-0.14	0.65	0	-0.07	-0.05	0	-0.03
Total N	1,045	1,071	1,757	1,804	1,784	1,799	1,826	1,780	1,783
N in Placebo	380	392	642	659	650	657	667	647	649
N in Imagery	665	679	1,115	1,145	1,134	1,142	1,159	1,133	1,134

Notes: The table presents difference-in-means for downstream economic and psychological outcomes when comparing the imagery to the placebo training arm. Standard errors clustered at the household level are presented in parenthesis. False discovery rate q-values over the family of economic outcomes and the family of psychological outcomes are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We average across the two follow-up surveys and collapse the data to household level (the unit of randomisation) in the case where more than one household member participated in the training. We control for survey wave and subdivision-wave interaction fixed effects. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

We conduct an exploratory analysis to shed light on which behaviours might be driving the increase in earnings. Table 5 reports difference-in-means results for a range of secondary outcomes when comparing the imagery to the placebo training. We first observe that imagery participants have better access to financial resources in the pre-Covid-19 period.[29] For instance, we note that, relative to the placebo group, imagery participants are 6% more likely to obtain credit ($p = 0.043$) and conditional on obtaining credit, acquire 0.13 standard deviations higher amounts ($p = 0.036$). Moreover, imagery participants reported a 4.7% higher perception of having enough savings at the start of the pandemic ($p = 0.094$), but they were not significantly more likely to save before the pandemic started ($p = 0.185$). Similarly, imagery participants appear to be more resourceful with their time. Consistent with the observed higher rates of business survival, we see that the imagery group worked 2.15 fewer hours for a wage ($p = 0.066$), although not in general. These results support the notion that the increase in earnings could have been driven by business improvements. We do not observe statistically significant differences in any other behaviour or outcomes of interest, including hiring more employees.

Table 5: Imagery vs Placebo Training: Effect on Secondary Outcomes

	(1) Credit > 0	(2) Credit	(3) Savings > 0	(4) High savings perception	(5) Hours worked	(6) Hours for wage	(7) Workers > 0
Imagery training	0.061**	0.131**	0.031	0.047*	-0.413	-2.150*	0.025
	(0.030)	(0.062)	(0.023)	(0.028)	(1.483)	(1.168)	(0.027)
Strata Controls	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓
Mean DV in Placebo	0.28	-0.14	0.84	0.46	31.25	14.97	0.54
R-squared	0.030	0.031	0.036	0.030	0.108	0.062	0.159
Total N	1,051	1,051	1,032	1,697	1,788	1,778	1,579
N in Placebo	382	382	384	623	653	647	562
N in Imagery	669	669	648	1074	1135	1131	1018

Notes: The table presents difference-in-means results on secondary outcomes when comparing the imagery training to the placebo training. Standard errors clustered at the household level are presented in parenthesis. We average across the two follow-up surveys and collapse the data to household level (the unit of randomisation) in the case where more than one household member participated in the training. We control for survey wave and subdivision-wave interaction fixed effects. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. We measure the secondary outcomes as follows. Credit > 0 (column 1) is a dummy variable indicating whether the household borrowed money from any formal or informal contacts to start or grow their business in the six months prior to the Covid-19 pandemic. The credit amount obtained is standardised and reported in column 2. Savings > 0 (column 3) is a dummy variable indicating whether a household saved in the six months prior to the start of the pandemic-induced lockdown. Participants were also asked to reflect on whether they had an adequate amount of personal savings to ensure their safety for the first two months of the lockdown; high savings perception (column 4) indicates an above-median response on a 5-point Likert agreement scale. Column 5 and 6 show total hours worked and hours worked for a wage for another person, winsorised at the 99th percentile. A dummy variable indicating whether the business has hired any employee post-intervention.
* p<0.10, ** p<0.05, *** p<0.01

[29]We only measured access to financial resources for the period before the start of the national lockdown and not during the lockdown itself.

8.2 Comparison with the no-intervention group

We compared results from the imagery and placebo interventions to isolate the effect of imagery training on economic outcomes. We now explore the impact of business training more generally by comparing the no-intervention group to both the imagery and placebo interventions. Figure 7 illustrates the difference in means and confidence intervals for our pre-specified standardised primary outcomes between imagery training and the no-intervention group, whereas Figure 8 shows the difference in means between the placebo training and no-intervention group. Appendix Tables A8 and A9 tabulate these results.

The results from the imagery training relative to the no-intervention group are much smaller in size and we cannot reject that these treatment effects are statistically significantly different from zero across all outcomes of interest. Nevertheless, we observe small positive effects on business imagery and several economic outcomes during the Covid-19 lockdown period, including earnings, business survival, safety nets and investment. Similarly, we mostly do not observe statistically significant differences between the placebo and no-intervention group, with the exception of earnings. Relative to the no-intervention group, the placebo group report lower earnings on average, both in the six months before the start of the Covid-19 pandemic and during the pandemic itself. Specifically, the placebo group earned 0.222 standard deviations less in the pre-Covid-19 period ($p = 0.020$) and 0.144 standard deviations less during the pandemic ($p = 0.043$), relative to the no-intervention group.[30]

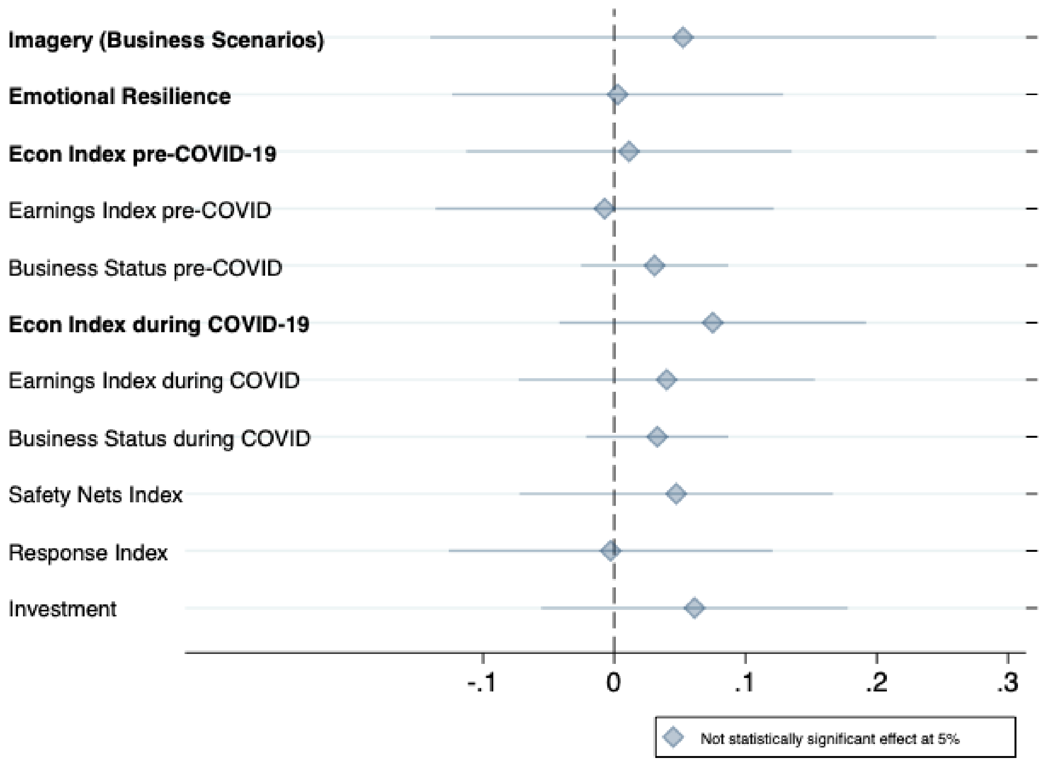
There are several reasons that might explain these surprising results. The first reason is the selective attrition we observe between the no-intervention group and the two treatment groups in our follow-up surveys. In contrast, there is no differential attrition between the two training arms in our follow-up surveys. Although we took great care to distinguish the surveys from the interventions, the no-intervention group were less likely to respond to our second follow-up survey in November and December 2020, relative to the imagery and placebo groups.[31] The Covid-19 pandemic significantly impacted our sample of low-income micro-entrepreneurs and their livelihoods and there is reason to believe that the no-intervention group may have been more resistant to participating in surveys in the absence of government support. However, as noted in Table 2 above, there is little evidence to suggest that there is selective attrition on observable characteristics at endline.

To speak to the question of selective attrition on unobservable characteristics, Table 6 reports Lee bounds on the main imagery and economic results (Lee, 2009). This method relies

[30] The lower earnings in the placebo group withstands correcting for multiple hypothesis testing across the primary economic outcomes and winsorising at the 95th percentile.

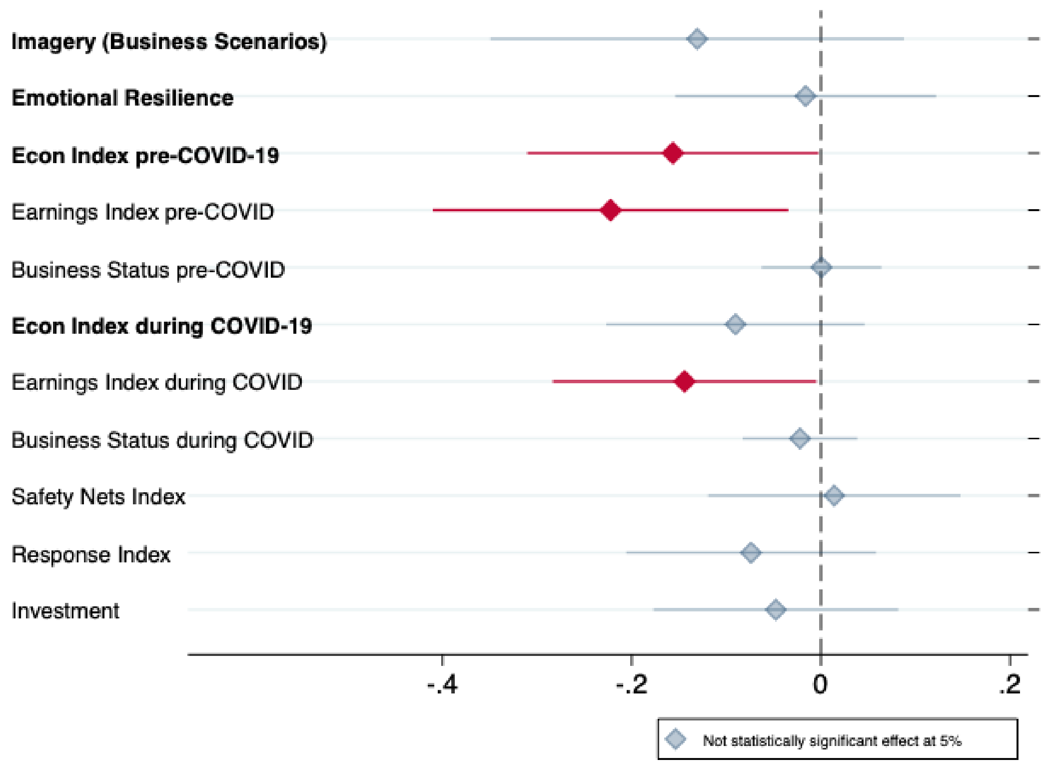
[31] Whereas 64% of participants from our imagery and placebo groups responded to our surveys, only 57% of the no-intervention group were interviewed in the second follow-up survey. The difference is statistically significant at the 10% level.

Figure 7: Effect of receiving the imagery training relative to the no-intervention group



Notes: Markers indicate the standardised mean treatment effect of receiving the imagery training on pre-specified outcomes (bold) and sub-indices (normal), with 95% confidence intervals shown. Solid markers indicate significance at the 5% level. Higher values of all variables indicates better outcomes. We use the panel dataset, collapsed to the household level. Standard errors are clustered at the household level. Sample consists of people who confirmed participation in the training. Monetary variables are winsorised at the 99th percentile.

Figure 8: Effect of receiving the placebo training relative to the no-intervention group



Notes: Markers indicate the standardised mean treatment effect of receiving the imagery training on pre-specified outcomes (bold) and sub-indices (normal), with 95% confidence intervals shown. Cranberry markers indicate significance at the 5% level, whereas light red markers indicate significance at the 10% level. Blue markers indicate that the result is not statistically significant at conventional levels. Higher values of all variables indicates better outcomes. We use the panel dataset, collapsed to the household level. Standard errors are clustered at the household level. Sample consists of people who confirmed participation in the training. Monetary variables are winsorised at the 99th percentile.

on the monotonicity assumption that the likelihood of non-response is monotonically related to receiving the treatment. In our case, given that attrition is higher in the no-intervention group, the assumption implies that the treated observations who did not respond in the follow-up survey would also not have responded if they were in the no-intervention group. With this caveat in mind, we present lower and upper bounds for each pairwise comparison between experimental groups. The bounds are computed such that the additional percentiles of non-respondents in the relevant control group correspond to, respectively, the best and worst respective percentiles of observed outcomes in the treatment group. Table 6 shows that the treatment effects of the imagery training compared to the placebo arm are bounded away from zero, providing reassuring evidence that there is a positive impact of our imagery training compared to a traditional business training. Columns (4) and (6) of Table 6 tell a different story regarding the comparison between each training arm and the no-intervention group. For both sets of comparisons, the Lee bounds encompass zero for the great majority of outcomes. This implies that the negative results on earnings when comparing the placebo training with the no-intervention group is not robust to making weak assumptions on the non-respondent outcomes. These findings suggest that there could be differential attrition based on unobservables among the respondents in the no-intervention group.

The second reason for the negative results relates to demand effects in the survey measures, which may be causing the no-intervention group to diverge from the two training arms. Biased reporting may arise for two reasons. Firstly, the no-intervention group were not trained and obtained the knowledge that would enable them to respond accurately to our survey measures, such as reporting business sales. In contrast, record keeping and other business behaviours were taught and made salient to the imagery and placebo participants. Secondly, and more probable, the no-intervention group may have over-reported their success in order to attract greater financial support from the government.[32] However, the results in the comparison between the no-intervention group and the two training arms appear to move systematically across all outcomes of interest and it seems unlikely that there would be biased reporting in all survey measures.

A third reason may be that the placebo training actually had a negative impact on entrepreneurs (as seen in Oosterbeek *et al.* (2010) and Von Graevenitz *et al.* (2010)), but the imagery training mitigated the negative effects. Previous studies have discussed potential reasons explaining why traditional business training have had modestly positive results on economic outcomes at best, or at worst, null or even negative impacts (see, for instance, McKenzie, Woodruff, *et al.*, 2021). The increase in earnings arising from the imagery training relative to the placebo arm almost exactly mirrors the decrease in earnings arising from the

[32] Alternatively, the placebo group may have been incentivised to under-report their successes if they felt frustrated with the programme.

Table 6: Lee bounds to correct for differential non-response

	Imagery-Placebo		**Imagery-Control**		**Placebo-Control**	
	Standardised Mean Treatment Eff. [N]	Diff. Attrition Δ n-r = 0.8% [N]	Standardised Mean Treatment Eff. [N]	Diff. Attrition Δ n-r = 4.5% [N]	Standardised Mean Treatment Eff. [N]	Diff. Attrition Δ n-r = 5.4% [N]
Non-Business Imagery	0.000	-0.012/0.036	-0.001	-0.083/0.130**	-0.046	-0.131*/0.124*
	[1985]	[1977/1973]	[1805]	[1751/1743]	[1280]	[1243/1232]
Business Imagery	0.181**	0.181**/0.207***	0.057	0.009/0.178**	-0.140	-0.216**/0.045
	[1403]	[1403/1398]	[1290]	[1265/1252]	[893]	[870/863]
Kessler	0.004	0.004/0.031	-0.011	-0.046/0.094	-0.006	-0.069/0.106*
	[1967]	[1967/1956]	[1791]	[1760/1741]	[1266]	[1235/1231]
Psych. Resilience	-0.019	-0.019/0.028	-0.036	-0.102/0.110*	-0.046	-0.102/0.096
	[1970]	[1970/1957]	[1792]	[1742/1730]	[1268]	[1240/1226]
Earnings pre-COVID	0.208**	0.198**/0.208**	-0.010	-0.060/0.126**	-0.218**	-0.286***/0.125**
	[1157]	[1152/1157]	[1057]	[1028/1031]	[746]	[724/718]
Business pre-COVID	0.011	0.011/0.011	0.018	0.018/0.018	0.003	0.003/0.003
	[1187]	[1187/1187]	[1084]	[1084/1084]	[769]	[769/769]
Earnings during COVID	0.164***	0.158***/0.164***	0.036	0.002/0.138***	-0.141**	-0.185***/0.090
	[1942]	[1933/1942]	[1765]	[1716/1731]	[1255]	[1223/1211]
Business during COVID	0.033	0.033/0.033	0.016	0.016/0.016	-0.018	-0.018/-0.018
	[1993]	[1993/1993]	[1812]	[1812/1812]	[1285]	[1285/1285]
Safety Index	0.048	0.030/0.073	0.063	-0.003/0.169***	0.013	-0.056/0.120*
	[1971]	[1958/1963]	[1793]	[1737/1739]	[1270]	[1237/1232]
Business Response	0.082	0.037/0.121**	-0.016	-0.177***/0.134**	-0.081	-0.223***/0.094
	[1988]	[1978/1978]	[1808]	[1753/1749]	[1282]	[1248/1236]
Investment	0.036	0.022/0.036	0.030	-0.068/0.030	-0.037	-0.125**/-0.037
	[2020]	[2014/2020]	[1840]	[1793/1840]	[1308]	[1287/1308]

Notes: Lee (2009) bounds (lower/upper) for estimated treatment effects are shown for each pairwise comparisons across treatment arms. The number of observations included when calculating high and low bounds are shown in square brackets. * p<0.10, ** p<0.05, *** p<0.01

placebo training when compared to the no-intervention group.[33] When compared to the no-intervention group, the imagery training has a null treatment effect on pre-Covid earnings and we cannot reject that the 0.04 standard deviation increase in earnings during Covid-19 is statistically different from zero.

How could teaching imagery correct for such drawbacks in standard business training? On the one hand, imagery may stimulate participants' engagement with and attention to the content taught, leading to more effective learning. According to this view, imagery simply enhances the effectiveness of standard courses. On the other hand, imagery can be seen to appeal to completely different brain areas compared to standard teaching modes based on cognitive activation. The use of "as-if" experiences that activate all perceptions has an emotional effect on participants which is absent in structured programs based on planning or logical thinking. This is important given the high levels of trauma in our sample. Telling a depressed person logical reasons for why they need to do something will likely still make them feel depressed, unless there is also a way to act on their emotions through images. According to this latter view, imagery could unlock behavioral change in a completely different way compared to standard programs. For instance, imagery enables users to develop concrete plans and imagine the consequences of present behaviour, thereby ensuring that these plans are realistic and desirable. This may have been a critical component missing in the placebo training, leading to entrepreneurs set unrealistic goals and taking ill-informed risky decisions.

We currently do not have enough data to pin down the exact reason for the negative outcomes observed in the placebo group compared to the no-intervention control. However, we believe that differential attrition or a true negative impact of traditional training are the most likely explanations. We hope to shed more light on the differences across our three experimental groups through additional outcomes collected during a booster session to be completed in September 2021. Nevertheless, even in the worst case scenarios, our conclusion that imagery matters for economic outcomes still holds.

8.3 Heterogeneous treatment effects by trauma and gender

We hypothesise that imagery training should benefit people who have high costs to undertaking mental imagery or produce murky images when imagery is used. In this section, we provide evidence suggesting that the impact of the imagery treatment is heterogeneous

[33]When we compare the imagery training to the placebo training, we observe a 0.19 standard deviation increase in earnings in the six-month period before the Covid-19 pandemic and 0.14 standard deviations increase in earnings during the pandemic-induced lockdown. As shown in Table A9, when compared to the no-intervention group, the placebo group report a 0.22 standard deviations decrease in pre-Covid earnings and a 0.14 standard deviations decrease in earnings during the pandemic. We observe similar patterns for business survival, business behavioural response and investment during the Covid-19 pandemic.

across different groups, with strong positive treatment effects for those with high baseline trauma and women.[34]

8.3.1 Heterogeneity by trauma

Distressing past experiences can increase the cost of adopting mental imagery by inducing more vivid negative imagery and undermining the quality of imagery when it is used, especially of positive future imagery. We designed the curriculum with the intention of boosting positive future imagery among populations with high levels of past trauma. Thus, we assess whether the effect of the imagery treatment is different for individuals with high levels of trauma relative to the rest of the sample. We define participants with high levels of trauma as those having an Impact of Event Scale-Revised (IES-R) score above 33, the threshold above which symptoms become clinically concerning. Just under a quarter of the sample can be identified as showcasing high levels of trauma using this definition. Previous studies leveraging IES-R scores as a measure of trauma symptoms demonstrate this to be a high level.[35]

We observe that the imagery treatment boosts the quality of positive future imagery and mediates negative future imagery for high-trauma individuals. Table 7 reports the heterogeneous effects of the imagery treatment on the imagery index and its sub-components by trauma. We also report the perceived likelihood of positive and negative imagined future scenarios occurring in participants' lives. We first note that although the overall imagery indices are larger for high-trauma individuals for both business and non-business imagery, the interaction terms between imagery and trauma are not statistically different from zero. Nevertheless, when we analyse the imagery sub-components, we observe strong evidence in support of the notion that our imagery training addresses a deficit in positive future imagery. First, we note that, relative to low-trauma individuals in the placebo group, individuals with high trauma have significantly more vivid (0.48 SD; $p < 0.01$) and emotionally intense negative future imagery (0.48 SD; $p < 0.01$) and a very high perceived likelihood that these negative future scenarios could occur in their lives (0.63 SD; $p < 0.01$). High-trauma individuals also have less vivid positive imagery (-0.33 SD; $p = 0.135$) and they are less

[34] We pre-specified heterogeneity by trauma and defined high trauma as individuals with above 33 on the IES-R scale in our pre-analysis plan. We did not pre-specify gender; however, as we explain below, gender has a close relationship with trauma.

[35] Relative to the general population, our sample's experience of trauma is high. For example, Hunt *et al.* (2004) randomly sample 414 individuals (298 happen to report experience of a traumatic event) and find a mean IES-R score of 22.3. In the context of studies which deliberately target those with known trauma experience, our sample mean IES-R remains moderately high. Ohtani *et al.* (2004) survey victims, of the 1995 Sarin gas attack in Tokyo subway, five years after the attack finding a mean IES-R score of 16.4.[36]. Meanwhile, for a sample exclusively characterised by motor vehicle accident experience, Beck *et al.* (2008) report sample mean IES-R scores of 34.98 - above the threshold for common PTSD diagnosis.[37]

likely to use imagery at all (-0.065 SD, $p = 0.713$), although these effects are not statistically different from zero.

Second, high trauma participants who receive the imagery treatment report significantly more vivid positive imagery (a 0.56 standard deviations difference; $p = 0.032$) relative to low-trauma imagery participants and more likely to believe that these scenarios could occur in their lives (0.35 SD; $p = 0.112$). There are no observed differences in the emotional intensity of positive future scenarios imagined or in the frequency of imagery used. In contrast, relative to the placebo group, low-trauma imagery participants do not show improvements in the quality of positive imagery, but they do show enhanced vividness in imagining negative future scenarios of 0.27 standard deviations ($p < 0.01$). The imagery treatment appears to mediate the vividness and emotional intensity of negative future imagery for high-trauma individuals, but these results are noisier and we cannot reject the hypothesis that the imagery training reduces the quality of negative imagery, nor that the difference between high and low trauma imagery participants is different from zero. However, we do observe that high-trauma individuals who receive the imagery treatment are 0.496 standard deviations less likely to perceive the negative future scenarios probable in their lives relative to low-trauma imagery participants ($p = 0.015$). These results suggest that the imagery training could rebalance the disproportionate weight that traumatised populations place on negative future imagery and boost their deficit in positive future imagery.

Not only do high-trauma individuals report higher quality positive imagery, but they also appear to have better economic outcomes in the pre-Covid period. Figure 9 plots the linear prediction of the effect of the imagery treatment relative to the placebo training on the condensed economic indices before and after the Covid-19-induced lockdown, by baseline level of trauma. We observe that high-trauma individuals have on average 0.30 standard deviations higher economic outcomes in the imagery treatment, relative to the placebo training in the pre-Covid period. However, we cannot reject the hypothesis that there is no difference between the imagery and placebo training, except for individuals with moderate levels of trauma symptoms. During the Covid-19 pandemic, we cannot reject the hypothesis that the imagery treatment had a differential impact on the condensed economic index compared to the placebo training. Nevertheless, when we look more closely at the economic outcomes in Appendix Table A10, we observe a 0.36 standard deviation improvement in pre-Covid earnings ($p = 0.080$) and 0.096 standard deviations higher rate of business survival during Covid-19 ($p = 0.090$) for high-trauma individuals in the imagery group relative to the placebo groups. The results for pre-Covid business survival and earnings during Covid are qualitatively consistent in their direction, pointing towards a stronger effect for those participants with higher baseline trauma, but these effects are noisier and imprecisely estimated. Moreover, these effects for high-trauma individuals are larger than for low-trauma individuals

Table 7: Treatment effects on imagery, by trauma (business scenarios)

	Combined imagery index		Business-specific imagery sub-components					Perceived likelihood	
	(1) Imagery (non-business)	(2) Imagery (business)	(3) SUIS	(4) Positive PIT Vivid	(5) Positive PIT Emotion	(6) Negative PIT Vivid	(7) Negative PIT Emotion	(8) Positive Likelihood	(9) Negative Likelihood
Imagery training	-0.024	0.201*	0.142	-0.023	0.030	0.271***	0.150	-0.032	0.106
	(0.092)	(0.113)	(0.110)	(0.111)	(0.105)	(0.099)	(0.105)	(0.095)	(0.102)
High trauma	0.013	0.208	-0.065	-0.327	0.033	0.482***	0.476***	-0.146	0.628***
	(0.158)	(0.181)	(0.178)	(0.218)	(0.175)	(0.166)	(0.147)	(0.161)	(0.149)
High trauma*Imagery	0.209	0.080	0.124	0.556**	0.000	-0.211	-0.212	0.345	-0.496**
	(0.209)	(0.236)	(0.226)	(0.259)	(0.221)	(0.215)	(0.184)	(0.216)	(0.202)
Imag*Trauma+Imag=0 (p-value)	0.330	0.180	0.180	0.020	0.880	0.760	0.690	0.110	0.030
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV	-0.03	-0.14	-0.05	0.02	-0.06	-0.20	-0.10	0.02	-0.10
R-squared	0.046	0.057	0.047	0.068	0.027	0.046	0.059	0.054	0.059
Total N	820	697	696	691	691	688	688	690	689
N in Placebo	341	285	285	283	283	282	281	283	282
N in Treat	595	513	512	509	509	507	508	508	508

Notes: The table presents heterogeneous treatment effects for the standardised imagery measures by trauma, when comparing the imagery and placebo arms for the sub-sample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. We define high trauma as participants with an Impact of Event Scale-Revised score of above 33, the threshold above which symptoms become clinically concerning. Columns 1 and 2 present results for non-business and business-specific imagery respectively. Columns 3 to 7 decompose the overall business imagery index into its constituent parts and we calculate the false discovery rate q-values across these five hypotheses following the sharpened two-stage procedure of Benjamini *et al.* (2006). We also report the perceived likelihood of positive and negative imagined future scenarios occurring in participants' lives in columns 8 and 9 respectively. We average across the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

within the imagery treatment, but we cannot reject the hypothesis that there is no difference across the two sub-groups. The results for all other outcomes for high-trauma individuals in the imagery treatment are imprecisely estimated and statistically insignificant.

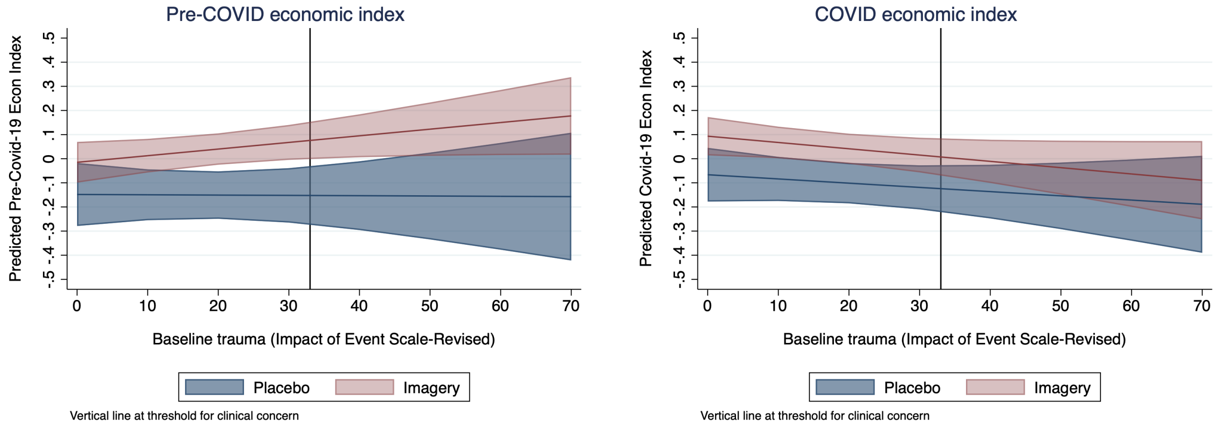
8.3.2 Heterogeneity by gender

We also present heterogeneous treatment effects of the imagery training for women relative to men. In general, women tend to experience higher levels of trauma (Holbrook *et al.*, 2002). This observation is also true of our sample, with 27% of women identified to have high trauma with an IES-R score above 33 compared to only 19% of men.[38] Moreover, women in our sample have less experience in business at baseline, with only 52.1% owning businesses when entering the programme compared to 55.6% of men (difference>0 with $p = 0.0443$). Of those with only a business idea, women were took 0.24 fewer steps towards starting a business than men ($p = 0.002$). We hypothesise that limited past experience in the domain of imagery may in turn produce less specific or more murky images, as fewer details can be drawn from memory.

Accordingly, it is reasonable to expect that women could respond differently to the

[38] We focus on imagery and placebo groups as the relevant sample for this discussion.

Figure 9: Linear prediction of imagery training on economic outcomes, by baseline trauma



Notes: This figure plots the linear prediction of the effect of the imagery treatment on economic outcomes, by baseline trauma. The figure on the left plots the predicted condensed pre-Covid economic index for the imagery treatment (in pink) and placebo group (in blue) by baseline trauma, measured using the Impact of Event Scale-Revised score. The figure on the right plots the predicted condensed economic index during the Covid-19 pandemic for both treatment arms. The vertical line at the score of 33 indicates the level above which trauma symptoms become a clinical concern.

imagery treatment. To assess this hypothesis, we present whether the effect on imagery differs between men and women in Table 8. In Columns 1 and 2, we show that the impact of the imagery training on the imagery index for non-business scenarios is larger for women than for men, although we cannot reject the hypothesis that men and women have the same size treatment effect. Nevertheless, we observe a 0.3 standard deviation improvement in the business imagery index for women in the imagery treatment relative to the placebo arm ($p = 0.020$). Looking more closely at the sub-components of the imagery index, we observe that women in the imagery treatment are significantly more likely to use imagery in their decision making (0.35 standard deviations; $p = 0.070$) compared to men. The measures proxying for imagery quality also move in the direction that suggests that women benefit more from imagery training relative to men, although these differences are imprecisely estimated and not statistically different from zero.

We then move to measures of economic performance and find that the imagery treatment has stronger effects on downstream outcomes for women compared to men, as shown in Table 9. On average, women in the placebo group have worse outcomes than men in the placebo group on most measures. In the pre-Covid-19 period (columns 1 and 2), we observe that women who receive the imagery treatment have 0.454 standard deviations higher earnings on average ($p = 0.000$). In contrast, men who received the imagery treatment see roughly the same earnings as those in the placebo group. We observe a similar result during the Covid-19 pandemic: women earn 0.337 standard deviations more than men who receive

Table 8: Treatment effects on imagery, by gender (business scenarios)

	Combined imagery index		Business-specific imagery sub-components					Perceived likelihood	
	(1) Imagery (non-business)	(2) Imagery (business)	(3) SUIS	(4) Positive PIT Vivid	(5) Positive PIT Emotion	(6) Negative PIT Vivid	(7) Negative PIT Emotion	(8) Positive Likelihood	(9) Negative Likelihood
Imagery training	-0.072	0.017	-0.116	0.009	-0.119	0.147	0.105	-0.066	0.025
	(0.134)	(0.148)	(0.127)	(0.137)	(0.133)	(0.131)	(0.136)	(0.118)	(0.127)
Female	0.101	-0.048	-0.212	-0.058	-0.016	-0.011	0.138	-0.202	0.062
	(0.135)	(0.157)	(0.140)	(0.156)	(0.146)	(0.140)	(0.148)	(0.126)	(0.136)
Female*Imagery	0.134	0.282	0.349*	0.080	0.277	0.046	0.090	0.152	0.002
	(0.168)	(0.191)	(0.179)	(0.190)	(0.175)	(0.175)	(0.176)	(0.164)	(0.169)
Test: Imag*Female+Imag=0 (p-value)	0.540	0.020	0.070	0.490	0.170	0.090	0.070	0.440	0.810
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (Placebo+Female)	-0.07	-0.07	0.09	-0.03	-0.05	-0.10	-0.10	0.08	-0.06
R-squared	0.039	0.050	0.039	0.056	0.028	0.023	0.037	0.047	0.035
Total N	936	798	797	792	792	789	789	791	790
N in Placebo	341	285	285	283	283	282	281	283	282
N in Imagery	595	513	512	509	509	507	508	508	508

Notes: The table presents heterogeneous treatment effects for the standardised imagery measures by gender, when comparing the imagery and placebo arms for the sub-sample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns 1 and 2 present results for non-business and business-specific imagery respectively. Columns 3 to 7 decompose the overall business imagery index into its constituent parts and we calculate the false discovery rate q-values across these five hypotheses following the sharpened two-stage procedure of Benjamini *et al.* (2006). We also report the perceived likelihood of positive and negative imagined future scenarios occurring in participants' lives in columns 8 and 9 respectively. We average across the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

the imagery treatment ($p < 0.01$). Relative to men, women in the imagery treatment also experience better safety nets (0.31 SD; $p < 0.01$).[39] Moreover, women benefit significantly more from the imagery training in boosting their psychological resilience relative to men, with a 0.315 standard deviation difference ($p < 0.019$).[40] It should be noted that this outcome is noisy, and we cannot reject the hypothesis that women do not see an increase in psychological resilience, with the difference across men and women created in part by a fall in psychological resilience for men.

9 Concluding remarks

The ability to imagine the future is not just an innate trait, but it is also a skill that can be trained and invested in. Using data on nearly 2,000 micro-entrepreneurs in Colombia, we show that there is heterogeneity in how well and how often people use imagery in their economic decision making. Those who invest the effort to imagine the future also have better economic outcomes in the short and medium term.

[39] Relative to women in the placebo group, women in the imagery treatment also report higher business survival rates during Covid-19 (0.06 SD; $p = 0.080$).

[40] The improvements in psychological resilience is partly driven by an increase in generalised self-efficacy: a difference of 0.26 standard deviations ($p = 0.036$) relative to men.

Table 9: Effect on downstream outcomes, by gender

	Pre-COVID		COVID					COVID	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Earnings	Business survival	Earnings	Business survival	Safety nets	Business behaviour	Investment	Kessler	Psych resilience
Imagery training	-0.076	-0.023	-0.058	0.031	-0.158*	0.086	0.051	-0.033	-0.220**
	(0.109)	(0.039)	(0.083)	(0.038)	(0.085)	(0.103)	(0.093)	(0.084)	(0.095)
Female	-0.481***	-0.113***	-0.402***	-0.055	-0.401***	0.073	-0.231**	-0.384***	-0.331***
	(0.139)	(0.041)	(0.098)	(0.040)	(0.091)	(0.095)	(0.090)	(0.088)	(0.097)
Female*Imagery	0.454***	0.073	0.337***	0.029	0.310***	-0.004	0.026	0.086	0.315**
	(0.162)	(0.053)	(0.118)	(0.050)	(0.114)	(0.123)	(0.113)	(0.114)	(0.126)
Test: Imag*Female+Imag=0 (p-value)	0	0.160	0	0.080	0.050	0.220	0.230	0.500	0.260
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (No-intervention)	0.08	0.78	0.10	0.67	0.24	-0.13	0.09	0.22	0.18
R-squared	0.081	0.182	0.050	0.106	0.048	0.026	0.058	0.052	0.025
Total N	1,045	1,071	1,757	1,804	1,784	1,799	1,826	1,780	1,783
N in Placebo	380	392	642	659	650	657	667	647	649
N in Imagery	665	679	1,115	1,145	1,134	1,142	1,159	1,133	1,134

Notes: The table presents standardised mean treatment effects of receiving the imagery training relative to the no-intervention group. Standard errors clustered at the household level are presented in parenthesis. False discovery rate q-values over the family of economic outcomes and the family of psychological outcomes are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

We conjecture that the ability to imagine the future is malleable and can be taught. To explore this hypothesis further, we design an entrepreneurship training programme that teaches would-be micro-entrepreneurs the ability to imagine the future with vividness and leverage emotions constructively. Through a randomised control trial, we observe results that are strongly supportive of our theory. We show that the imagery training increases the use and quality of business imagery when compared to a placebo entrepreneurship training. Moreover, those who increase their imagery skills also have better earnings than participants who learn similar concepts in more abstract or verbal thinking. However, we find little evidence in favour of business training in general. When we compare the imagery training to a group who receives no training, we find small to no results across all outcomes of interest. When we turn to the placebo training group, we find that placebo participants report significantly lower earnings relative to the no-intervention group.

Our results also suggest that imagery training is particularly beneficial in addressing distortions about the way in which future scenarios are imagined. Several neuroscientific and psychology studies show that traumatic experiences can significantly impede the ability to imagine the future, by increasing the cost of using imagery and inducing overly negative future imagery. Indeed, we find that individuals with high levels of trauma symptoms have significantly more powerful negative imagery on average. We further conjecture that the programme focused on promoting positive imagery would be more effective for those exposed to significant past trauma. Consistent with this hypothesis, we find that those trained in imagery and who have experienced high baseline trauma have significantly more vivid positive future imagery, compared to the placebo group. Moreover, there is preliminary evidence that their negative imagery is mediated by the training. High trauma individuals also experience larger improvements in pre-Covid earnings compared to participants with similarly high levels of trauma in the placebo group. The results for the economic outcomes during Covid are again noisier and imprecisely estimated, but remain qualitatively consistent in terms of their direction, pointing towards a stronger effect for those participants who had experienced higher trauma. With higher baseline trauma and lower business experience, women are also more likely to benefit disproportionately from the imagery training, with significantly higher earnings both before and after the start of the Covid-19 pandemic.

Our paper presents evidence to suggest that imagery matters for economic decision making. Two open questions require further research. First, we are limited in our ability to shed light on the mechanisms and behaviours by which imagery affect earnings. The start of the Covid-19 pandemic at the launch of our in-person midline survey meant that we were constrained to using short phone surveys. To speak to these underlying mechanisms, we have implemented a short refresher session and collecting lab-in-the-field measures between July and September 2021, with the objective to capture the immediate-term effects of the training. Results will be available soon.

Second, further research is needed to understand why we observe limited and even negative effects for the business training when comparing the imagery and placebo training to the no-intervention control group. We currently do not have enough data to determine whether differential attrition, negative impacts of the placebo training or demand effects may be driving the results, although we have some reason to believe the first two explanations. More broadly, it would be useful to understand in which contexts imagery may be a useful complement to existing programmes, such as in schools. Imagery is most likely to be beneficial when used to make targeted future-oriented decisions, thereby motivating our decision to incorporate imagery within a training aimed to promote business performance. Similarly, imagery can be more easily scaled within the structure of group training or video interventions focused on promoting a common goal that is subsequently applied to one's own situation, such as career choice.

Imagining the future is foundational for making important economic decisions, ranging from human capital development to savings and investment. This is especially true in uncertain and risky domains, such as entrepreneurship. Our preliminary findings provide a strong proof of concept that investing the effort in imagining the future is a worthwhile endeavour and can be taught through public policies that can be scaled.

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Appendix figures and tables

Table A1: Breakdown of sample by subdivision and treatment status

Subdivision	Imagery training	Placebo training	No-intervention group	Total
Youth	557	300	264	1121
Territorial	234	136	131	501
LGBT	12	12	12	36
Disabilities	59	41	17	117
Formerly homeless	39	35	29	103
Elderly	55	34	0	89
Total	956	558	453	1967

Notes: The "Territorial" subdivision includes victims of conflict and Venezuelan migrants. SDIS were unable to recruit enough participants for the smaller sub-divisions in some waves to construct a no-intervention group. Hence, we include wave-subdivision fixed effects in all our analysis.

Table A2: Measurement: Imagery

Family 1: Imagery	
Index	**Question(s)**
a. Spontaneous Use of Imagery Scale (SUIS)	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: • When I need to go to a meeting, I picture the route in my mind before going. • When I think about a customer using my product or service, I imagine the customer’s experience through pictures and sensations in my mind. • When I think about the day ahead, I create mental pictures of all the tasks I must do. • When I am faced with difficult situations, I mentally experience the actions I could take and the consequences of those actions before reacting. • When I think about the type of business I want to have, I live the experience of running that business in my mind. • When I feel overwhelmed, I find a mental place or time where I feel safe and calm. • When someone is upset with me, I live that person’s experience in my mind to understand what might have caused the situation. • When I buy an asset for my business, an image of owning the asset pops up in my mind before buying it.
b. Adapted Prospective Imagery Task (PIT) Positive Emotional Valence	**Adapted Prospective Imagery Task (PIT) – positive statements and questions on emotional valence.** 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”? • 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. • Now I want you to imagine the COVID-19 pandemic is over and you spend quality time with your family and friends. • Now I want you to imagine that the COVID-19 pandemic is over, and your business is doing well.
PIT Negative Emotional Valence	**Adapted Prospective Imagery Task (PIT) – negative statements and questions on emotional valence.** 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”? • In the first scenario, I want you to imagine that the COVID-19 pandemic is over, and you are struggling to make ends meet. • 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. • Now, I want you to imagine that the COVID-19 pandemic is over and your business closes
PIT Positive Vividness	**Adapted Prospective Imagery Task (PIT) – positive statements and questions on vividness of image.** 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? • 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. • Now I want you to imagine the COVID-19 pandemic is over and you spend quality time with your family and friends. • Now I want you to imagine that the COVID-19 pandemic is over, and your business is doing well.
e. PIT Negative Vividness	**Adapted Prospective Imagery Task (PIT) – negative statements and questions on vividness of image.** 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? • In the first scenario, I want you to imagine that the COVID-19 pandemic is over, and you are struggling to make ends meet. • 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. • Now, I want you to imagine that the COVID-19 pandemic is over and your business closes.

Table A12: Attrition in the first follow-up survey

	(1) Imagery Treatment		(2) Placebo Treatment		(3) Pure Control		T-test Difference			F-test for joint
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(1)-(2)	(1)-(3)	(2)-(3)	orthogonality
Female	681	0.567 (0.019)	392	0.602 (0.025)	304	0.569 (0.028)	-0.035	-0.002	0.033	0.686
Age (18-28)	681	0.608 (0.019)	392	0.569 (0.025)	304	0.605 (0.028)	0.039	0.003	-0.036	0.853
Age (29-45)	681	0.223 (0.016)	392	0.258 (0.022)	304	0.276 (0.026)	-0.034	-0.053*	-0.019	1.852

Table A3: Measurement: Psychological resilience

Family 2: Psychological Resilience	
Index	**Question(s)**
a. Psychological Resilience	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". **Brief Resilient Coping Scale (Sinclair and Wallston, 2004)** • I am looking for creative ways to alter difficult situations. • Regardless of what happens to me, I am controlling my reaction to it. • I am growing in positive ways by dealing with difficult situations. • I am actively looking for ways to replace the losses I am encountering in life. **Brief Resilience Scale (adapted subset) (Smith et al., 2008)** • I believe that I will bounce back quickly after the COVID pandemic. **Self-efficacy (Chen et al., 2004)** • I will be able to achieve most of the goals that I have set for myself. • When facing difficult tasks, I am certain that I will accomplish them. • In general, I think that I can obtain outcomes that are important to me. • I believe I can succeed at any endeavor to which I set my mind. • I will be able to successfully overcome many challenges. • I am confident that I can perform effectively on many different tasks. • Compared to other people, I can do most tasks very well. • Even when things are tough, I can perform quite well.
b. Anxiety and Depression Scale	**Kessler Scale (Kessler et al. (2002)-** 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": • About how often during the past 30 days did you feel nervous? • About how often during the past 30 days did you feel hopeless? • About how often during the past 30 days did you feel restless or fidgety? • About how often during the past 30 days did you feel so depressed that nothing could cheer you up? • About how often during the past 30 days did you feel that everything was difficult? • About how often during the past 30 days did you feel worthless?

Table A4: Measurement: Economic Outcomes Pre-Covid

Family 3a: Economic Outcomes Pre-Covid	
Index	**Question(s)**
a. Business Status Pre-Covid	• Dummy equal to 1 if the person had a business pre-COVID, 0 otherwise
b. Index constructed as: (Sales + Income) if business + Income if no business	• 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. • How much income did you take home during a typical week in February this year?
c. Investment Pre-Covid	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) A. Tools and utensils for manual work B. Machinery and equipment for production C. Vehicles used in your business D. Land, space in a shop or building E. Other physical assets F. Training for yourself G. Software or computer programs

Table A5: Measurement: Economic Outcomes During Covid

Family 3b: Economic Outcomes During Covid	
Index	**Question(s)**
a. Business Status During Covid	• 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)
b. Earnings	Index constructed as: (Sales + Income) if business (currently open or temporarily closed) + Incomes if no business (permanently closed and/or no business pre-COVID) • 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. • In total, how much income did you personally take home last week?
c. Actual and perceived safety nets during COVID-19	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". • I had an adequate amount of personal savings to ensure my safety for the first two months of the lockdown (scale 1-5) • I have enough cash to cover my ongoing expenses for the next week (scale 1-5) • If I had to find $200,000 pesos in the next month, I would be able to obtain them with ease (scale 1-5) *Savings* • 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?
d. Business behavioural response to COVID-19	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) • Have you rearranged for yourself or workers to work from home? • 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? • Have you identified alternative ways to access raw materials or alternate suppliers, should there be disruptions in your supply chain? • Do you consult your suppliers and customers more regularly to assess their situations? • Do you work out your operational costs more frequently than before the lockdown (such as rent, supplies, among others)? • Have you identified new business opportunities for your main business that could increase sales, which still adhere with government regulations? • 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? • Have you had conversations with the people or institutions who have lent your credit to assess flexibility on loan requirements? • Have you collaborated or talked with other entrepreneurs like you to share health and safety practices, stock or equipment, among others? • Has your main business requested (or is benefiting from) any government measure, either local or national, issued in response to the COVID-19 outbreak? • If open: Have you started selling new products or services in your main business, since March 24, 2020? • 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? • Have you opened a new business since the lockdown started that is still operating, in other words, since March 24, 2020? **"Safe" working hours sub-index** *Sub-index of "safe" working hours constructed as the sum of total hours worked, multiplied by the share of hours worked in safety* • How many hours did you work specifically on your main business last week? • How many hours did you work specifically on your new business last week? • How many hours did you work in total last week for someone else, for a wage? • 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, 1/4, 1/2, 3/4, 1)

Table A6: Effect on non-business imagery for business sample

	(1) Imagery (non-business)	Non-business imagery sub-components (2) SUIS	(3) Positive PIT Vivid	(4) Positive PIT Emotion	(5) Negative PIT Vivid	(6) Negative PIT Emotion
Imagery training	0.007	-0.048	0.053	-0.012	0.034	-0.005
	(0.080)	(0.075)	(0.079)	(0.082)	(0.073)	(0.073)
Strata Controls	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓
Mean DV in Placebo	-0.01	-0.05	-0.03	0	0.08	-0.02
R-squared	0.038	0.033	0.038	0.044	0.044	0.030
Total N	936	929	929	931	931	935
N in Placebo	341	339	339	339	339	341
N in Imagery	595	590	590	592	592	594

Notes: The table presents standardised mean treatment effects on non-business imagery of receiving the imagery training relative to the placebo training for the subsample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns 1 present the treatment effect for the overall non-business imagery index. Column 2 presents the SUIS index, which captures the frequency with which people use imagery. Columns 3 and 4 present treatment effects for the self-reported vividness and emotion experienced in the PIT scale that captures the quality of imagery used, specifically for positive future business scenarios. Columns 5 and 6 report the quality of imagery used for negative future business scenarios. False discovery rate q-values for the three imagery sub-hypotheses are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status.
* p<0.10, ** p<0.05, *** p<0.01

Table A7: Effect on non-business imagery for entire sample

	(1) Imagery (non-business)	(2) SUIS	(3) Positive PIT Vivid	(4) Positive PIT Emotion	(5) Negative PIT Vivid	(6) Negative PIT Emotion
		Non-business imagery sub-components				
Imagery training	-0.006	-0.127**	0.022	0.013	0.029	0.047
	(0.061)	(0.058)	(0.062)	(0.059)	(0.056)	(0.056)
Strata Controls	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓
Mean DV in Placebo	0	0.01	-0.03	-0.01	0.05	-0.04
R-squared	0.017	0.020	0.018	0.018	0.023	0.040
Total N	1,796	1,795	1,788	1,788	1,790	1,790
N in Placebo	656	656	653	653	654	654
N in Imagery	1,140	1,139	1,135	1,135	1,136	1,136

Notes: The table presents standardised mean treatment effects on non-business imagery of receiving the imagery training relative to the placebo training for the sample, both with and without a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns 1 present the treatment effect for the overall non-business imagery index. Column 2 presents the SUIS index, which captures the frequency with which people use imagery. Columns 3 and 4 present treatment effects for the self-reported vividness and emotion experienced in the PIT scale that captures the quality of imagery used, specifically for positive future business scenarios. Columns 5 and 6 report the quality of imagery used for negative future business scenarios. False discovery rate q-values for the three imagery sub-hypotheses are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status.
* p<0.10, ** p<0.05, *** p<0.01

Table A8: Imagery vs No-intervention: Effect on Downstream Outcomes

			Pre-COVID		COVID					COVID	
	(1) Imagery non-business	(2) Imagery business	(3) Earnings	(4) Business survival	(5) Earnings	(6) Business survival	(7) Safety nets	(8) Business behaviour	(9) Investment	(10) Kessler	(11) Psych resilience
Imagery training	-0.013	0.052	-0.007	0.031	0.040	0.033	0.047	-0.003	0.061	0.011	-0.049
	(0.093)	(0.098)	(0.066)	(0.029)	(0.057)	(0.028)	(0.061)	(0.063)	(0.060)	(0.064)	(0.066)
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (No-int)	0	0	0	0.69	0	0.65	0	0	0	0	0
R-squared	0.042	0.056	0.056	0.187	0.031	0.098	0.030	0.020	0.054	0.037	0.016
Total N	873	753	988	1,012	1,654	1,697	1,680	1,693	1,723	1,678	1,679
N in No-int	278	241	323	333	539	552	546	551	564	545	545
N in Imagery	595	513	665	679	1,115	1,145	1,134	1,142	1,159	1,133	1,134

Notes: The table presents standardised mean treatment effects of receiving the imagery training relative to the no-intervention group. Standard errors clustered at the household level are presented in parenthesis. False discovery rate q-values over the family of economic outcomes and the family of psychological outcomes are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status.
* p<0.10, ** p<0.05, *** p<0.01

Table A9: Placebo Training vs No-intervention: Effect on Downstream Outcomes

			Pre-COVID		COVID					COVID	
	(1) Imagery non-business	(2) Imagery business	(3) Earnings	(4) Business survival	(5) Earnings	(6) Business survival	(7) Safety nets	(8) Business behaviour	(9) Investment	(10) Kessler	(11) Psych resilience
Placebo training	-0.045	-0.131	-0.222**	0.001	-0.144**	-0.022	0.014	-0.074	-0.048	-0.012	-0.052
	(0.099)	(0.111)	(0.096)	(0.032)	(0.071)	(0.031)	(0.068)	(0.067)	(0.066)	(0.070)	(0.072)
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (No-int)	0	0	0	0.69	0	0.65	0	0	0	0	0
R-squared	0.044	0.066	0.087	0.210	0.072	0.117	0.079	0.033	0.065	0.070	0.036
Total N	619	525	703	725	1,181	1,211	1,196	1,208	1,231	1,192	1,194
N in No-int	278	241	323	333	539	552	546	551	564	545	545
N in Placebo	341	285	380	392	642	659	650	657	667	647	649

Notes: The table presents standardised mean treatment effects of receiving the placebo training relative to the no-intervention group. Standard errors clustered at the household level are presented in parenthesis. False discovery rate q-values over the family of economic outcomes and the family of psychological outcomes are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status.
* p<0.10, ** p<0.05, *** p<0.01

Table A10: Effect on downstream outcomes, by trauma

	Pre-COVID		COVID					COVID	
	(1) Earnings	(2) Business survival	(3) Earnings	(4) Business survival	(5) Safety nets	(6) Business behaviour	(7) Investment	(8) Kessler	(9) Psych resilience
Imagery training	0.199*	0.012	0.109	0.064**	0.043	0.071	0.101	0.008	-0.026
	(0.105)	(0.032)	(0.075)	(0.031)	(0.070)	(0.070)	(0.066)	(0.066)	(0.076)
High trauma	-0.154	-0.012	-0.150	-0.021	-0.194*	0.025	-0.026	-0.504***	-0.032
	(0.199)	(0.053)	(0.121)	(0.052)	(0.110)	(0.112)	(0.107)	(0.116)	(0.127)
High trauma*Imagery	0.160	0.076	0.085	0.032	-0.020	-0.072	0.018	0.093	-0.039
	(0.229)	(0.066)	(0.147)	(0.064)	(0.139)	(0.140)	(0.134)	(0.144)	(0.161)
Test: Imag*Trauma+Imag=0 (p-value)	0.080	0.130	0.120	0.090	0.850	0.990	0.310	0.430	0.650
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (No-intervention)	-0.18	0.73	-0.090	0.65	0.05	-0.09	-0.04	0.13	-0.01
R-squared	0.079	0.184	0.046	0.109	0.051	0.025	0.068	0.079	0.030
Total N	907	929	1,530	1,569	1,552	1,564	1,588	1,549	1,551
N in Placebo	380	392	642	659	650	657	667	647	649
N in Imagery	665	679	1115	1145	1134	1142	1159	1133	1134

Notes: The table presents heterogeneous treatment effects on downstream economic and psychological outcomes by trauma, when comparing the imagery to the placebo training arm. Standard errors clustered at the household level are presented in parenthesis. We average across the two follow-up surveys and collapse the data to household level (the unit of randomisation) in the case where more than one household member participated in the training. We control for survey wave and subdivision-wave interaction fixed effects. The sample consists of people who confirmed participation in the training prior to knowing their treatment status. * p<0.10, ** p<0.05, *** p<0.01

Table A11: Attrition Acceptance

Variable	(1) Imagery Treatment N	Mean/SE	(2) Placebo Treatment N	Mean/SE	(3) Pure Control N	Mean/SE	T-test Difference (1)-(2)	(1)-(3)	(2)-(3)	F-test for joint orthogonality
Female	795	0.574 (0.018)	461	0.579 (0.023)	415	0.571 (0.024)	-0.006	0.003	0.008	0.032
Age (18-28)	795	0.591 (0.017)	461	0.573 (0.023)	415	0.629 (0.024)	0.019	-0.038	-0.056*	1.491
Age (29-45)	795	0.245 (0.015)	461	0.249 (0.020)	415	0.272 (0.022)	-0.004	-0.027	-0.023	0.548
Age (46-59)	795	0.096 (0.010)	461	0.119 (0.015)	415	0.094 (0.014)	-0.024	0.002	0.025	1.079
Years Education	657	13.157 (0.129)	387	13.035 (0.182)	327	13.366 (0.173)	0.122	-0.209	-0.331	0.877
Only Business Owner	795	0.245 (0.015)	461	0.245 (0.020)	415	0.236 (0.021)	0.000	0.009	0.009	0.070
Only Have a Business Idea	795	0.477 (0.018)	461	0.477 (0.023)	415	0.494 (0.025)	-0.000	-0.017	-0.017	0.182
Have Business and Business Idea	795	0.278 (0.016)	461	0.275 (0.021)	415	0.270 (0.022)	0.002	0.008	0.006	0.045
Income Strat: Sales $\leq$ 1 month salary	795	0.665 (0.017)	461	0.677 (0.022)	415	0.641 (0.024)	-0.011	0.024	0.036	0.655
Income Strat: Sales $>$ 1 month salary	795	0.238 (0.015)	461	0.221 (0.019)	415	0.248 (0.021)	0.016	-0.010	-0.027	0.455
Refused to Provide Income	795	0.097 (0.010)	461	0.102 (0.014)	415	0.111 (0.015)	-0.005	-0.014	-0.009	0.292
Assets Owned	657	11.661 (0.150)	387	11.894 (0.201)	327	11.835 (0.209)	-0.233	-0.175	0.058	0.508
Household size	657	3.452 (0.059)	386	3.609 (0.082)	326	3.650 (0.095)	-0.157	-0.197*	-0.041	2.143
Save Monthly Y/N	654	0.549 (0.019)	387	0.535 (0.025)	326	0.580 (0.027)	0.014	-0.031	-0.045	0.748
Had Access to Credit	654	0.153 (0.014)	386	0.150 (0.018)	326	0.138 (0.019)	0.003	0.015	0.012	0.195
No. of Traumatic Events	795	2.247 (0.083)	461	2.342 (0.110)	415	2.308 (0.125)	-0.095	-0.061	0.034	0.249
Reported Experiencing Trauma (Y/N)	657	0.826 (0.015)	387	0.837 (0.019)	326	0.844 (0.020)	-0.011	-0.017	-0.006	0.254
Impact of Event Score	649	17.645 (0.874)	386	17.142 (1.120)	324	17.785 (1.164)	0.503	-0.140	-0.643	0.091
Kessler Score	657	13.098 (0.160)	387	13.187 (0.202)	326	13.138 (0.220)	-0.090	-0.040	0.050	0.061
Wave 1 Participant	795	0.307 (0.016)	461	0.384 (0.023)	415	0.304 (0.023)	-0.077***	0.003	0.080**	4.655***

Table A13: Treatment effects on imagery, by trauma (non-business scenarios)

	Combined imagery index		Non-business imagery sub-components					Perceived likelihood	
	(1) Imagery (non-business)	(2) Imagery (business)	(3) SUIS	(4) Positive PIT Vivid	(5) Positive PIT Emotion	(6) Negative PIT Vivid	(7) Negative PIT Emotion	(8) Positive Likelihood	(9) Negative Likelihood
Imagery training	-0.024	0.201*	-0.016	-0.043	-0.170*	0.013	0.032	0.107	-0.061
	(0.092)	(0.113)	(0.096)	(0.090)	(0.087)	(0.084)	(0.087)	(0.086)	(0.087)
High trauma	0.013	0.208	0.094	-0.317*	-0.377**	0.456***	0.115	0.380***	-0.295*
	(0.158)	(0.181)	(0.159)	(0.166)	(0.160)	(0.144)	(0.133)	(0.132)	(0.169)
High trauma*Imagery	0.209	0.080	-0.011	0.436**	0.615***	-0.108	0.083	0.011	0.279
	(0.209)	(0.236)	(0.202)	(0.212)	(0.205)	(0.181)	(0.186)	(0.182)	(0.214)
Test: Imag*Trauma+Imag=0 (p-value)	0.330	0.180	0.880	0.040	0.020	0.560	0.490	0.470	0.270
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mean DV (Placebo+High Trauma)	-0.03	-0.14	-0.07	0.02	0.05	-0.10	0.04	-0.17	0.02
R-squared	0.046	0.057	0.035	0.053	0.051	0.067	0.050	0.075	0.039
Total N	820	697	813	813	813	815	815	815	819
N in Placebo	341	285	339	339	339	339	339	339	341
N in Imagery	595	513	590	590	590	592	592	592	594

Notes: The table presents standardised mean treatment effects on imagery of receiving the imagery training relative to the placebo training for the subsample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns 1 and 2 present treatment effects for non-business and business-specific imagery respectively. Columns 3 to 7 reports results for the five sub-components of the imagery index for non-business imagery. Column 3 presents the SUIS index, which captures the frequency with which people use imagery. Columns 4 and 5 present treatment effects for the self-reported vividness and emotion experienced when imagining positive future non-business scenarios in the PIT scale that captures the quality of imagery used. Columns (5) and (6) report the quality of imagery used for negative future non-business scenarios. False discovery rate q-values for the five imagery sub-hypotheses are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). Columns 8 and 9 report the perceived likelihood of the positive and negative future non-business scenarios imagined through the PIT occurring in the participant's life, which were not pre-specified outcomes of interest. We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training. The sample consists of people who confirmed participation in the training prior to knowing their treatment status.
* p<0.10, ** p<0.05, *** p<0.01

Table A14: Entire sample: Treatment effects on imagery (business scenarios)

	Combined imagery index		Business-specific sub-components				
	(1) Imagery (non-business)	(2) Imagery (business)	(3) SUIS	(4) Positive PIT Vivid	(5) Positive PIT Emotion	(6) Negative PIT Vivid	(7) Negative PIT Emotion
Imagery training	0.020	0.201**	0.093	0.075	0.061	0.189**	0.157*
	(0.078)	(0.092)	(0.089)	(0.092)	(0.085)	(0.082)	(0.080)
FDR q-values			0.399	0.399	0.399	0.119	0.119
Strata Controls	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓
Mean DV in Placebo	-0.04	-0.11	-0.05	-0.07	-0.07	-0.11	-0.01
R-squared	0.033	0.045	0.031	0.045	0.025	0.026	0.036
Total N	1,005	851	850	845	845	842	842
N in Placebo	367	304	304	302	302	301	300
N in Imagery	638	547	546	543	543	541	542

Notes: The table presents standardised mean treatment effects of receiving the imagery training relative to the placebo training for the subsample of participants with a business at baseline. Standard errors clustered at the household level are presented in parenthesis. Columns (1) and (2) present treatment effects for non-business and business-specific imagery respectively. Column (3) presents the SUIS index, which captures the frequency with which people use imagery. Columns (4) and (5) present treatment effects for the self-reported vividness and emotion experienced in the PIT scale that captures the quality of imagery used, specifically for positive future business scenarios. Columns (5) and (6) report the quality of imagery used for negative future business scenarios. False discovery rate q-values for the three imagery sub-hypotheses are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training.
* p<0.10, ** p<0.05, *** p<0.01

Table A15: Entire Sample: Treatment Effects on Downstream Outcomes

	Pre-COVID		COVID					COVID	
	(1) Earnings	(2) Business survival	(3) Earnings	(4) Business survival	(5) Safety nets	(6) Business behaviour	(7) Investment	(8) Kessler	(9) Psych resilience
Imagery training	0.208**	0.011	0.164***	0.033	0.048	0.082	0.036	0.004	-0.019
	(0.081)	(0.026)	(0.059)	(0.024)	(0.054)	(0.054)	(0.051)	(0.055)	(0.060)
FDR q-values	0.037	0.418	0.037	0.267	0.418	0.267	0.418	1.000	1.000
Strata Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey Wave FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wave-Subpop FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
R-squared	0.073	0.181	0.045	0.106	0.043	0.026	0.058	0.052	0.021
Mean DV (Placebo)	-0.23	0.71	-0.17	0.64	-0.02	-0.08	-0.05	0	-0.03
Total N	1,157	1,187	1,942	1,993	1,971	1,988	2,020	1,967	1,970
N in Placebo	423	436	716	733	724	731	744	721	723
N in Imagery	734	751	1226	1,260	1,247	1,257	1,276	1,246	1,247

Notes: The table presents standardised mean treatment effects of receiving the imagery training relative to the placebo training. Standard errors clustered at the household level are presented in parenthesis. False discovery rate q-values over the family of economic outcomes and the family of psychological outcomes are calculated following the sharpened two-stage procedure of Benjamini *et al.* (2006). We pool the two follow-up surveys and collapse the data to household level in the case where more than one household member participated in the training.
* p<0.10, ** p<0.05, *** p<0.01