

# Non-cognitive skills, psychological well-being and learning outcomes among college students

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**A** light-touch discussion highlighting the merits of effort, perseverance and learning from failures leads to immediate improvement in quality of academic goals and sustained improvement in 'Grit' among students. A change in mindset is not accompanied by an improvement in test scores, suggesting the need for reinforcement for positive mindset to affect learning outcomes.

## Introduction

Improving student learning and well-being has long been an important concern for development policy. Enrollment rates and adults' years of schooling have increased dramatically, with enrolment rate over 90% in many countries in Africa and South Asia; but student performance remains poor (Filmer and Rogers, 2018, Andrabi et al., 2007).<sup>1,2</sup> A similar situation exists in higher education at the undergraduate and intermediate level in Pakistan - despite a significant increase in enrollment rates at the intermediate and undergraduate level in Punjab, pass rates are low - approximately 50 % of the total female students appeared in public degree colleges at undergraduate level in 2019 and 73 % of the total female intermediate students who appear in standardized exams

passed the exams in 2017. Out of the total female candidates appearing for end-of-year examination at undergraduate level in 2019, less than a fifth scored more than 60%.<sup>3</sup> Among the total female students appearing for annual board examinations in their first and second year of intermediate study, only 13 percent score 70% or higher marks (PDS, 2018).<sup>4</sup> Evidence suggests that a learning crisis can perpetuate inequalities later in life, determining access to work and household income levels.

Non-cognitive skills and positive psychology, such as grit, perseverance, self-belief and self-control, have been shown to be instrumental in influencing various outcomes in life. Grit, in particular, can be a crucial determinant of task perseverance and retention in difficult jobs - traits that can be valuable, particularly in academic and labor market settings (Duckworth and Duckworth, 2016).<sup>5</sup> We partner with 10 public, women's-only colleges in Lahore, Punjab to test if a light-touch, easily scalable intervention can engender positive psychology among students and, ultimately, change behavior that reflect in students' test scores.

## Intervention

We develop a soft-touch and low cost intervention, building from similar studies conducted with primary school children in Turkey (Alan and Ertac, 2019) and

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<sup>1</sup>Filmer, D., Rogers, H. (2018). Learning to realize education's promise. World Development Report. The World Bank.

<sup>2</sup>Andrabi, T., Das, J., Khwaja, A. I., Vishwanath, T., Zajonc, T. (2007). Learning and Educational Achievements in Punjab Schools (LEAPS): Insights to inform the education policy debate. World Bank, Washington, DC.

<sup>3</sup>For details, see <http://www.pu.edu.pk/>.

<sup>4</sup>Punjab Development Statistics. (2018). Bureau of Statistics. Government of the Punjab

<sup>5</sup>Duckworth, A., Duckworth, A. (2016). Grit: The power of passion and perseverance (Vol. 234). New York, NY: Scribner.

secondary school children in Argentina (Ganimian, 2020), using visual aids and one-to-one discussions that highlight the role of effort in enhancing skills, being able to improve performance without being limited by the innate ability.<sup>6,7</sup> We use examples and vignettes to reinforce the message of interpreting failures constructively, stressing the importance of perseverance to achieve personal goals.

We randomly select students in each sample college to become part of a 'treatment' group that takes part in the positive psychology discussions; and a placebo group with whom we conduct discussions that recount factual information about the human brain. The placebo discussion has no elements common with the treatment discussion but provides us with a comparison group with whom we had a discussion of similar length as the treated group. Both treatment and placebo last 15-20 minutes and are implemented individually by trained enumerators. Before conducting the treatment and placebo discussions, the enumerators administer a brief baseline survey with all sample students.

## Methodology

We conduct the experiment with 366 students enrolled in first, second and third year of undergraduate studies, out of which 187 students participated in 'treatment' discussions. The main advantage of randomly allocating students to receive the treatment or placebo discussions is that it allows us to understand causal impacts of the treatment discussions in a fairly straightforward manner. Since treatment allocation was random, treated and placebo students were similar at baseline. Differences in outcomes between the groups after the intervention discussions can be attributed to the difference in the nature of the discussions they were exposed to. Statistical tests of joint significance show that, on average, treatment status is unrelated to respondent level characteristics measured at baseline and the treatment and placebo groups are balanced on observed characteristics.

Baseline interviews conducted with treatment and placebo groups in March 2019 collect demographic information on sample students, such as parental education levels, household income and motivation for studying. We also collect information on student

cognitive skills, using Raven's matrices - a non-verbal test of abstract reasoning.

Immediately after the intervention and placebo discussions, we conduct a small goal setting exercise to test if the quality of goals set differ across treatment groups. Students are asked to set academic goals for themselves. We then inform them about SMART - Specific, Measurable, Ambitious, Realistic and Time bound - goals, explaining that evidence shows SMART goals are easier to track, prompting follow-through and execution of plans (Dobronyi, Oreopoulos and Petronijevic, 2019).<sup>8</sup>

Approximately three months after the intervention was first delivered, in June 2019, students appeared for the end-of-year, standardized examinations.<sup>9</sup> One year after the intervention and baseline interviews, we also conduct psychometric tests in a follow-up survey. We use these data to determine immediate treatment effects on goal-setting performance, intermediate treatment effects on test scores and long term impacts on student mindset.

## Sample characteristics and motivations

The average respondent is 19 years of age, spends about 3 hours per week studying at home and spends 6 hours per week doing household chores. They come from lower- and middle-income households where parents have low levels of education - on average, parents have 8 years of education. Fathers are main earners and usually salaried workers.<sup>10</sup> A third of our sample is enrolled in the first year of their undergraduate degree. Our sample is also highly motivated to continue studying after their undergraduate degree and do not report being constrained in doing so by social norms. We ask a series of questions to determine motivation for study, plans after graduation and community perceptions.

Student plans after graduation are summarized in Figure 1. Four out of every five students in our sample report they will like to enrol in graduate

<sup>6</sup>Alan, S., Boneva, T., Ertac, S. (2019). Ever failed, try again, succeed better: Results from a randomized educational intervention on grit. *The Quarterly Journal of Economics*, 134(3), 1121-1162.

<sup>7</sup>Ganimian, A. J. (2020). Growth-Mindset Interventions at Scale: Experimental Evidence From Argentina. *Educational Evaluation and Policy Analysis*, 42(3), 417-438.

<sup>8</sup>Dobronyi, C. R., Oreopoulos, P., Petronijevic, U. (2019). Goal setting, academic reminders, and college success: A large-scale field experiment. *Journal of Research on Educational Effectiveness*, 12(1), 38-66.

<sup>9</sup>The annual end-of-year exams in our sample colleges are administered by the Board of Intermediate and Secondary Education (BISE) Lahore for first- and second-year students, and by the University of Punjab for third year students enrolled in 2 years Associate Degree or a 4 year BS degree.

<sup>10</sup>The average monthly income of a typical urban household in Punjab, Pakistan is PKR 43,000 (Household Integrated Economic Survey 2018-19). Households in our sample earn PKR 36,000 per month on average.

studies. Almost a tenth of the sample (13%) would like to apply for work immediately after graduation. A relatively small proportion of the sample intends to start a business after graduation (2.5%), enrol in a vocational skills training programme (3.3%), get married (1.4%) or do nothing (1.4%) is reported by relatively small proportion of the population.

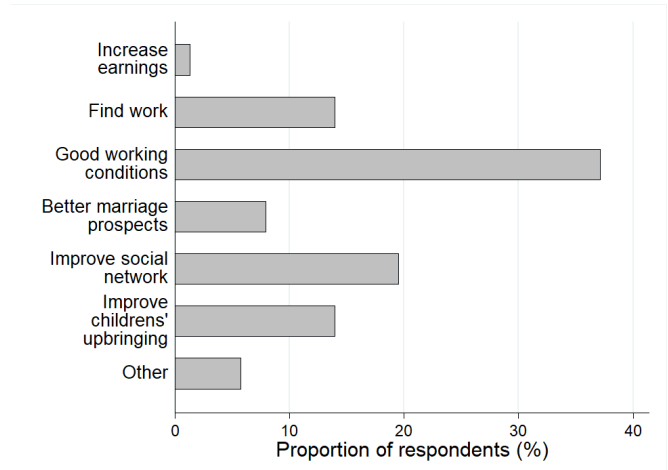


Note: Each bar shows the proportion of students who report a specific plan, detailed along the y-axis, after their undergraduate studies at baseline.

Figure 1: Student plans after graduation

For most students in this sample, an important benefit of education is to be able to get a job afterwards. Figure 2 summarizes the main motivators reported by the sample. For most, an education is the means to getting a job with 'good' working conditions, suited to the applicants' preferences. For a fifth of the sample, schools and colleges are a way of making friends and developing a social network. 14% report an education will be a way of improving the well-being of (future) children and 8% report improved marriage prospects to be a key motivator. It is important to note that the motivation for studying is rarely financial - only 1% of the sample report an education is important for being able to get higher paid jobs. As such, these motivations may be expected to effect academic choices, such as choice of study majors, performance.

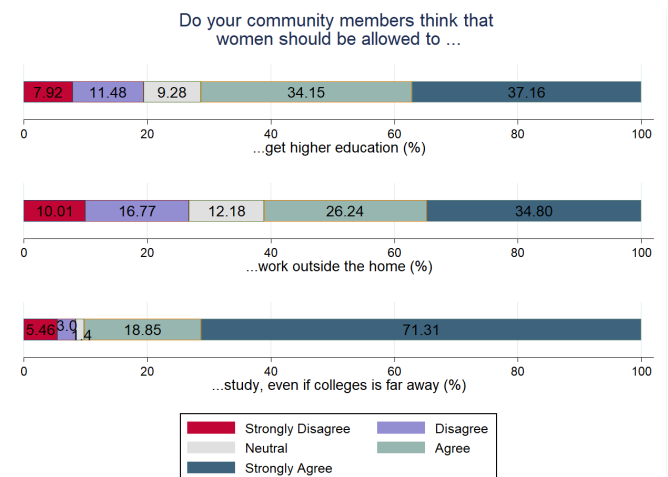
Finally, we record if students regularly face obstacles to their academic and career goals in the form of community organization. This opposition could act as a demotivating factor in academic performance and could be thought to be an important factor inhibiting student performance. However, we find opposition is generally low: 71% agree that community members think women should be allowed to get higher education, 90% believe they will be supportive of women attending college even if it is far



Note: Each bar shows the proportion of students who report the reason detailed on the y-axis for why education is important at baseline.

Figure 2: Reason for higher education

from home and 62% believe the community members agree with allowing women to work outside the home. Responses are shown in Figure 3.



Note: Each bar shows the the degree to which respondents agree, on a Likert scale, with community support of the statement provided under each bar diagram. Green areas represent agreement.

Figure 3: Student perception of community view regarding women's work and education

## Results

We look at the impact of the treatment discussion on the mindset of the students and their performance in annual exams.

### Impact of mindset discussions on individual exam performance

To estimate the short term effect of the intervention on student performance, we measure differences in

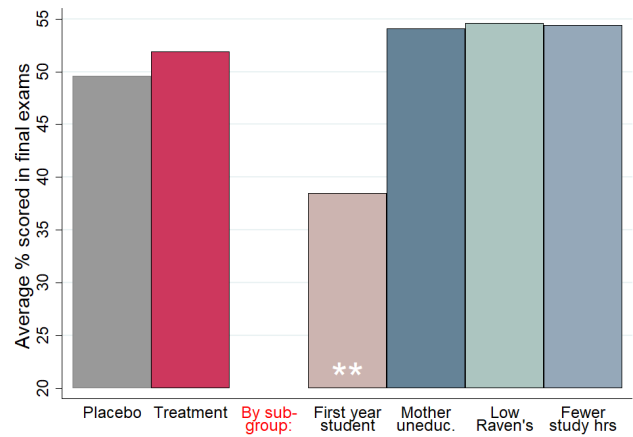
average treatment and placebo group student performance in standardized examinations at the end of the academic year.<sup>11</sup> On average, students in the placebo group score just under 50% in the end-of-year exams. Treated students score 2.3 percentage points more; however, this difference is not large and is statistically insignificant. These estimates are drawn from OLS regressions, with errors clustered at the individual level, and are robust to the inclusion of college level fixed effects. Results are summarized in Figure 4.

We next investigate heterogeneity in effects of the treatment when we split the sample by characteristics that could affect performance. Students with less educated mothers, those who score lower on the Raven's test and who devote less time to studying at home - all factors that can adversely affect performance - who took part in the treatment discussions score approximately 5 percentage points higher than their placebo counterparts.<sup>12</sup> These effects are large yet statistically insignificant. In Figure 4, average performance in test scores for these groups is given by the green and gray bars.

We do find significant effects for one sub group - the students who are enrolled in the first year of their undergraduate studies (given by the brown bar in Figure 4). Treated students in this group perform worse in the annual examination - their scores decrease by 11 percentage points, which is an effect both economically and statistically significant. We explore whether these subgroups also experience a corresponding deterioration in positive psychological mindset.

### Impact of mindset discussions on individual 'Grit'

We find that the light-touch treatment discussions were able to inculcate higher levels of grit and perseverance. Specifically, treated students score 1.7 points higher one year later on the Duckworth et al., (2007) Grit Scale, an increase of 4% over the average score of the placebo group<sup>13</sup>. These estimates are



Note: Each bar shows the average percentage scored in end-of-year exams by treatment groups and treatment effects by sub-samples defined by baseline characteristics. \*, \*\*, \*\*\* show statistical significance of the difference from placebo group at the 1%, 5% and 10%, respectively.

Figure 4: Annual examination scores (%) by treatment group and sample sub-groups

drawn from OLS regressions, with errors clustered at the individual level, and are robust to the inclusion of college level fixed effects. Treatment effects are summarized in Figure 5.

In addition, we find interesting heterogeneity in the average treatment effects by above- mentioned sub-samples as defined by baseline characteristics. For instance, we find that grit increases significantly for treated students in the first year of their undergraduate degree. Grit is also higher among students with less educated mothers, students with poorer performance in the Raven's test and those who study few hours per week. These results suggest that the treatment may have been more effective in improving grit among students, who at baseline, may be expected to find it harder to exert sustained time and effort in their academic pursuits. In addition, these effects exist even a year after the initial discussions with treated students.

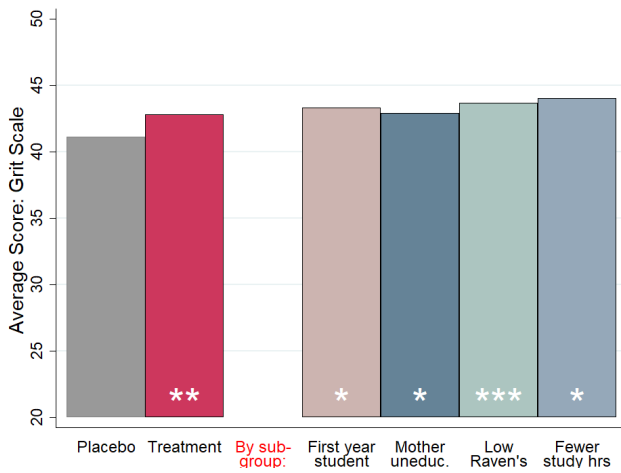
### The potential role of goal-setting and planning

We find that an increase in positive psychology is not accompanied by an improvement in student test performance. In fact, test scores of first year students in the treatment group are lower than their counterparts in the placebo group. It is possible that first year syllabus is less rigorous than the curriculum in more advanced years, and therefore students enrolled in this year perceive fewer obstacles. However, analyzing the sub-sample of first year students further yields important insights. It is also possible

<sup>11</sup>Note, these exams were conducted nearly 3 months after the baseline intervention. In follow-up work, we will analyze longer term impacts on next annual examination.

<sup>12</sup>We consider students with mothers who have less than the median 8 years of education. Similarly who score less than the median (4/10) in Raven's activity and those who study less than 3 median hours per week at home.

<sup>13</sup>Duckworth, A. L., Peterson, C., Matthews, M. D., Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of personality and social psychology*, 92(6), 1087



Note: Each bar shows the average Grit Scale score by treatment groups and treatment effects by sub-samples defined by baseline characteristics. \*, \*\*, \*\*\* show statistical significance of the difference from placebo group at the 1%, 5% and 10%, respectively.

**Figure 5:** Grit scores by treatment group and sample sub-groups

that the sample underestimates potential difficulties in achieving their goals and fail to plan for how to deal with obstacles, and that the treatment discussion exacerbates this underestimation.

We do not have data on the actual obstacles faced by our sample but we do see that, at baseline, the sub-sample of first-year students perceive fewer difficulties or obstacles to achieving their academic goals. Students enrolled in the first year were half as likely to report they face difficulty in retaining information provided in class than students enrolled in second or third year – 22% of the first years report this as a likely obstacle compared to 44% of the senior students. Only about a quarter of the first year students report managing time to study difficult, compared to half of all senior students.

In addition, findings from the goal setting exercise suggest that while grit may have increased among the first year cohort, they are less likely to feel the need to modify and state their academic goals in terms of SMART goals. On average, more than two-thirds of the placebo sample (69%) is willing to formulate SMART goals. First year treated students, on the other hand, were only likely to do so 51% of the times. This difference from the average propensity in the sample to set SMART goals is large and statistically significant. It is possible that while the discussion motivated first year students to persevere in their goals, it did not motivate them to think more clearly about how to formulate goals, recognize obstacles and effectively plan about dealing with potential obstacles to achieve their goals.

## Conclusion

Overall, our results show that a light-touch discussion highlighting key elements of effort, growth and perseverance is capable of bringing about long term improvements in grit. Sub-sample analysis suggests that the treatment discussions were effective in changing mindset, they are not sufficient on their own to prompt follow-through and bring about a change in academic performance. One possible reason is that a change in mindset may take time to bring about a change in behaviour - our measure of test scores at the 2-3 months mark may not have picked up potential improvements over the long term. This remains a possibility for future research. We show, however, that it is possible to bring about sustained improvements in positive psychological traits using a low-cost instrument that can be easily incorporated into school and college curriculum.

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