

RESEARCH ARTICLE

Empowering future entrepreneurs: Testing a strengths-based mindset intervention in a quasi-experimental pilot study

DARIA A. ARDELEAN

Department of Psychology, West University of Timișoara, Romania

LUCA TISU*

Department of Psychology, West University of Timișoara, Romania

DELIA VÎRGĂ

Department of Psychology, West University of Timișoara, Romania

Abstract

As entrepreneurial education expands, psychological preparedness remains a critical yet often overlooked factor in ensuring the effective integration of training. This quasi-experimental pilot study investigated the effect of a brief positive psychology intervention on growth mindset and strengths use among 46 young adults in an entrepreneurial training program. The study used comparative between-subject (control vs. experimental) analyses to test the effect of the intervention, one day after the intervention, and comparative within-subject analyses to test the impact of the intervention at the two-week follow-up. Regression analyses were also performed to test whether strengths use predicts increased adherence to the entrepreneurial education program and higher entrepreneurial intentions. The results reveal that while the intervention did not significantly affect growth mindset, it led to a sustained increase in strengths use, as observed both immediately after the intervention and at a two-week follow-up. Additionally, follow-up strengths use scores predicted participants' adherence to the program and their entrepreneurial intentions. These findings underscore the potential value of integrating psychological training into entrepreneurial education, equipping participants with tools that foster enhanced engagement and long-term motivation.

Keywords

positive psychology interventions, growth mindset, strengths use, entrepreneurial education, quasi-experiment

Interest in entrepreneurial education is steadily rising among universities and governments globally, driving the creation of innovative programs and initiatives designed to empower and equip aspiring entrepreneurs for success (Martin et al., 2013). Beyond

formal educational efforts, experiential programs based on the lean startup methodology (Ries, 2011), along with pre-accelerators and accelerators, have emerged as key components of the entrepreneurial ecosystem. Despite their proliferation, the

* Correspondence concerning this article should be addressed to Luca Tisu (Orcid: 0000-0002-3181-1629), West University of Timișoara, Bv. Vasile Pârvan 4, 300223, Timișoara, Romania. Email: luca.tisu@e-uvvt.ro

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effectiveness of these programs remains largely uncharted, with evidence suggesting their impact on concrete outcomes, such as business creation, may be modest at best (Greenberg et al., 2003; Matricano, 2017). The primary aim of entrepreneurial education remains a matter of debate, though the literature reflects growing skepticism among researchers about viewing business creation as its sole purpose (Mwasalwiba, 2010). In their meta-analytic study, Bae et al. (2014) shift the focus toward cultivating entrepreneurial attitudes and skills, broadening the lens through which diverse interventions and programs can be evaluated.

While some studies evaluate entrepreneurial education programs based on design and participant demographics (e.g., Merguei, 2022), the influence of psychological factors on outcomes remains underexplored (Martínez-Gregorio et al., 2021). Even with expert mentorship, participants often struggle to absorb and apply insights effectively, suggesting that psychological preparedness plays a crucial role in their ability to navigate challenges in such entrepreneurial education programs. Indeed, research by Tisu and Virgă (2022a) suggests that entrepreneurial education can become a stressor if individuals lack the psychological tools to integrate and apply the knowledge provided effectively. These findings underscore the need for interventions that enhance participants' ability to internalize and apply entrepreneurial training. This study develops and tests a positive psychology intervention designed to strengthen participants' psychological and professional resources by fostering a growth mindset (Dweck, 2006) and encouraging the proactive use of strengths (Van Woerkom et al., 2016). Specifically, we examine whether a brief micro-intervention focused on these psychological constructs leads to enhanced growth mindset and increased strengths use over time, and whether it improves adherence to the program and increases entrepreneurial intentions of young adults by its conclusion.

The intervention is rooted in the Job Demands-Resources (JD-R) theory (Bakker & Demerouti, 2017), which has proven effective in analysing how demands, resources, and

workplace performance intersect. This framework is not only applicable in entrepreneurial research (Tisu et al., 2023), but also particularly relevant to lean startup-based entrepreneurship programs, where participants engage in a real-world entrepreneurial setting, iterating repeatedly to refine their business models (Shepherd & Gruber, 2021). Although JD-R theory has gained traction in educational research (e.g., Pap et al., 2021; Siu et al., 2014), its value in the entrepreneurial domain has not yet been fully recognised. Some studies have applied the JD-R model to explore psychological dynamics in entrepreneurial contexts (e.g., Liu et al., 2023; Tisu & Virgă, 2022a, 2022b; Tisu et al., 2023), yet experimental interventions in entrepreneurial education programs, accelerators, or pre-accelerators are scarce. Aligned with novel propositions of the JD-R theory, which posits that developable individual factors (i.e., personal resources and proactive strategies; Bakker et al., 2023; Demerouti et al., 2019) can help leverage existing resources (e.g., better relations with business mentors) and buffer against demands (e.g., coming up with innovative ideas), we argue that the proposed positive psychology intervention (PPI; Seligman et al., 2005) aimed at enhancing positive beliefs (Van den Heuvel et al., 2010) and proactive strategies (Demerouti et al., 2019) will improve program adherence and entrepreneurial intentions, offering both theoretical and practical insights for program design.

Positive psychology interventions in the context of Job Demands-Resources theory

The Job Demands–Resources (JD-R) theory integrates motivational perspectives to explain how job demands and resources influence performance through employee well-being and proactive behavior (Bakker & Demerouti, 2017; Bakker et al., 2023). This framework provides a valuable lens for entrepreneurial training by offering: 1) insights into how demands and resources drive performance, 2) guidance for adapting to business challenges, and 3) strategies for acquiring or developing essential resources. Within the JD-R model,

personal resources—such as beliefs in one’s ability to influence the environment (Van den Heuvel et al., 2010)—interact dynamically with professional resources (Bakker et al., 2023). Entrepreneurs with strong personal resources are more likely to build networks, attract partners, and secure funding. Similarly, proactive behaviors, such as leveraging existing resources effectively (Demerouti et al., 2019), increase the likelihood of achieving goals and addressing challenges.

In entrepreneurial contexts, personal resources build confidence, helping individuals respond more effectively to obstacles and opportunities (Tisu & Virgă, 2022a; Tisu et al., 2023). At the same time, proactive behaviors help identify and capitalize on critical assets, supporting long-term success (Tisu & Virgă, 2022b). Both are malleable and can be developed through targeted interventions (Lupşa et al., 2019; Virgă et al., 2023). Positive Psychology Interventions (PPIs) are particularly suited to this purpose, as they aim to cultivate positive experiences and traits to support growth and optimal functioning (Seligman & Csikszentmihalyi, 2000; Seligman et al., 2005). In an entrepreneurial education context, a PPI can both enhance understanding of positive subjective experiences and foster the personal resources and strategies critical for thriving in a lean start-up environment. This study focuses on growth mindset (Dweck, 2006) as the personal resource and strengths use (Van Woerkom et al., 2016) as the individual strategy—both supported by empirical evidence for their developmental potential, especially among young adults (Burnette et al., 2023; Virgă et al., 2023).

Growth mindset in the context of entrepreneurial education programs

Recent trends emphasize interventions fostering a growth mindset, extending beyond academics to address broader challenges (Burnette et al., 2023). Dweck (2006) defines a growth mindset as the belief that abilities and skills can be developed through effort, thereby increasing resilience and persistence. Such interventions typically introduce this concept

through real-world success stories, reinforcing the link between effort and achievement (Dweck, 2006). Research associates a growth mindset with enhanced learning, openness to feedback, resilience, and long-term performance (Blackwell et al., 2007; Yeager & Dweck, 2020). In entrepreneurial training, fostering a growth mindset could help participants refine skills, integrate mentor feedback, and reframe failure as a learning opportunity. Though impact varies (Yeager & Dweck, 2020), these interventions offer a cost-effective way to enhance entrepreneurial drive (Li et al., 2023). Beyond mindset shifts, they promote proactive strategies like strengths use (Dweck, 2012; Miglianico et al., 2020), equipping future entrepreneurs to navigate challenges with adaptability and confidence. As such, we expect growth mindset to also help with and sustain the integration of strengths use. Those who believe their abilities are developable (cognitive shift) should be more open to discovering and using strengths in the learning program (behavioral change) (Miglianico et al., 2020).

Strengths use in the context of entrepreneurial education programs

Linley et al. (2009, p. 9) define strengths as “a pre-existing capacity for a particular way of behaving, thinking, or feeling that is authentic and energising to the individual and enables optimal functioning, development, and performance.” Building on this, Miglianico et al. (2020) highlight how tailored interventions that help individuals identify and apply their strengths—such as leadership or empathy—can unlock potential in meaningful ways. Strengths-use interventions have been shown to enhance well-being, personal resources, and short-term performance (Virgă et al., 2023), while also boosting positive affective states like enthusiasm and confidence (Meyers & van Woerkom, 2017). In entrepreneurial training, encouraging strengths use may help participants overcome challenges and maximize their potential. For example, entrepreneurs who recognize creativity as a strength might develop innovative solutions or optimize resource management, thus gaining a

competitive edge. Ultimately, strengths-based approaches offer not only immediate psychological benefits but also potential support for long-term entrepreneurial success.

The present study

This quasi-experimental pilot study aims to assess the effectiveness of a brief positive psychology intervention designed to enhance (a) growth mindset and (b) strengths use among participants in a lean startup-based entrepreneurial training program. To examine these effects in an applied setting, we conducted the study within “Startup Survivor”, an established local entrepreneurial program. As a result, we did not have control over the sample size and aligned our study parameters with the program’s requirements. Sensitivity analyses conducted in G*Power suggest that based on the number of participants included in the program, the expected effect size is strong, with Cohen’s $d = .98$ for the between-subjects comparison, Cohen’s $d = .76$ for the within-subjects comparison, and $f^2 = .62$ for the regression analyses examining the predictive effect of the independent variables on program adherence and future entrepreneurial intentions.

Given the previous arguments and existing evidence highlighting the effectiveness of growth mindset (Burnette et al., 2023) and strengths use interventions (Virgă et al., 2023), we expect that:

H1) Participants in the experimental group will exhibit significantly greater (a) growth mindset and (b) strengths use at post-test compared to the control group, after controlling for pre-test scores.

H2) The effect of the intervention on (a) growth mindset and (b) strengths use will remain significant at the two-week follow-up, at the conclusion of the entrepreneurial training program.

Lastly, we aim to examine whether the intervention is associated with increased program adherence and greater entrepreneurial intentions. As participants engage in the training, they will have

opportunities to apply a growth mindset and leverage their strengths. We anticipate that these psychological factors will contribute to higher adherence (i.e., participants will perceive the intervention as valuable in navigating program challenges) and stronger entrepreneurial intentions (i.e., a stronger wish to start their own business).

H3) Growth mindset scores at follow-up will predict (a) greater program adherence and (b) higher entrepreneurial intentions, after controlling for baseline and post-intervention scores.

H4) Strengths use scores at follow-up will predict (a) greater program adherence and (b) higher entrepreneurial intentions, after controlling for baseline and post-intervention scores.

Method

Participants and Procedure

This study included 46 participants enrolled in the entrepreneurial program, aged 18 to 47 ($M = 22.63$, $SD = 0.7$), of whom 41.3% were women. Regarding educational background, 67.4% had completed high school, 28.3% held a Bachelor's degree, and 4.3% had a Master's degree. Only 26% reported prior entrepreneurial experience. Thus, the sample primarily consists of young individuals (82.6% of whom are students) with limited entrepreneurial experience.

The intervention was conducted within the “Startup Survivor” entrepreneurial education program, organized by Timișoara Startups. Participants were recruited through an online questionnaire. Of 98 applicants, 25 were selected for the entrepreneurial training program and psychological intervention, while 21 were assigned to a control group. Selection for the experimental group was conducted solely by the Startup Survivor organizing team, and the researchers were not involved in the decision-making process. The control group consisted of applicants who were not selected for the training program but chose to participate in the study voluntarily. As an incentive, individuals in the control group were granted priority consideration for

selection in the program's next cohort. The intervention group consisted of 8 women and 17 men ($M = 21.76$, $SD = 2.88$), with 28% having completed university education and 32% possessing entrepreneurial experience. The control group consisted of 11 women and 10 men ($M = 23.67$, $SD = 6.33$), with 38% holding university-level education and 19% reporting entrepreneurial backgrounds. The intervention was designed and implemented in compliance with the Declaration of Helsinki to ensure the well-being, confidentiality, and voluntary participation of all individuals involved. Prior to participation, all individuals provided informed consent, confirming their understanding of the study's purpose, procedures, and their right to withdraw at any time without consequence.

Participants were followed over 5 weeks. Consistent with prior research practices (Bakker & Van Wingerden, 2021), a pre-test assessment for all participants was conducted three weeks before the program started (T1), followed by the intervention for the experimental group, a post-test for all participants one day after the intervention (T2), and a follow-up for the experimental group only at the end of the entrepreneurial program, two weeks after the intervention (T3). Figure 1 illustrates the timeline of the intervention and assessment moments. The initial online questionnaire was integrated into the registration form and announced via email, which included instructions and details on data confidentiality. During selection interviews and on the program's opening day, participants received further information about the intervention's structure and content.

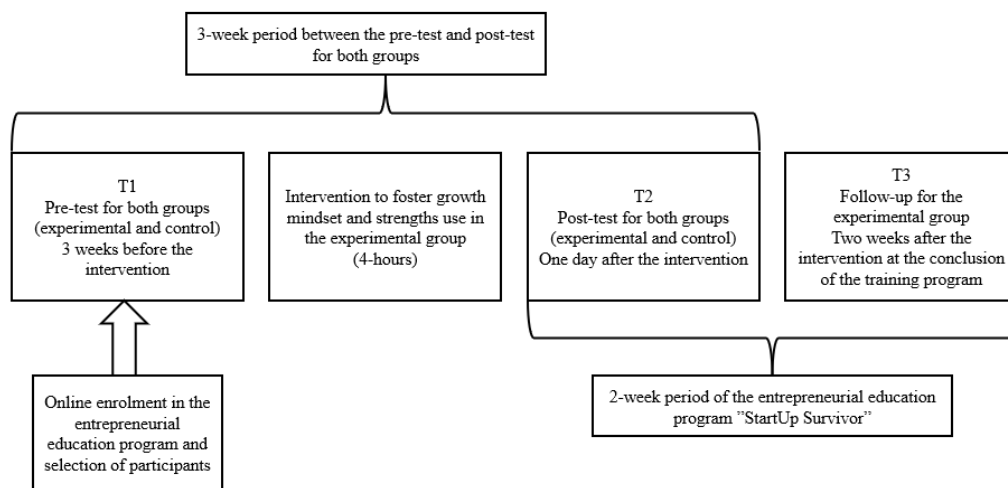


Figure 1. Timeline of the intervention

Instruments

Growth mindset was measured using the three-item Growth Mindset Scale (Rammstedt et al., 2024). Each item was rated on a 6-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). An example item is "You can always substantially improve your abilities." The total score is the average of the items, with higher scores reflecting a higher level of the studied variable. This scale exhibits good internal consistency, with

Cronbach's alpha values of .73 (T1), .86 (T2), and .92 (T3).

Strengths use was measured using nine items from the Strengths Use and Deficit Correction in Organizations Scale (SUDCO; Van Woerkom et al., 2016). Response options ranged from 1 (*almost never*) to 7 (*almost always*). Since this questionnaire was applied to a sample largely composed of students who are not employed, we adapted items referring to the workplace. An example modified item

is “I use my strengths in daily activities,” initially “I use my strengths at work.” The total score is the average of the items, with higher scores indicating greater strengths use. The scale exhibits excellent internal consistency ($T1\alpha = .93$, $T2\alpha = .95$, $T3\alpha = .97$).

To measure program adherence, we developed a scale consisting of four items, with response options rated on a 6-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*). An example item is: “The positive psychology intervention helped me successfully cope with the two weeks of training.” The total score was calculated as the mean of the item responses, with higher scores indicating a greater program adherence. The scale's internal consistency is adequate, with a Cronbach's alpha coefficient of .68. The wording of all items is presented in the Appendix.

Entrepreneurial intention was assessed using a subscale of the Astee Measurement Tool (Moberg et al., 2014). This subscale comprises three items, rated on a 7-point Likert scale, from 1 (*strongly disagree*) to 7 (*strongly agree*). An example item is: “I often think about starting a business.” The total score was computed as the mean of the item responses, with higher scores indicating a stronger entrepreneurial intention. The scale's internal consistency is good, with a Cronbach's alpha coefficient of .80.

Intervention

Participants in the experimental group attended a training session led by trained professionals, designed to foster a growth mindset, identify personal strengths, and apply these strengths throughout the entrepreneurial program to enhance program adherence. The intervention, lasting four hours, was conducted on the second day of the program and structured in two parts: (a) promoting the adoption of a growth mindset and (b) providing tools for identifying and leveraging strengths within the training context. The session began with an overview of objectives and an open discussion to identify participants' concerns about the program. This initial reflection encouraged introspection, allowing facilitators to tailor discussions and

exercises to real-world challenges that participants might encounter.

The first part of the intervention introduced the concept of a growth mindset, emphasizing its role in learning and behavioural adaptation (Dweck, 2012; Miglianico et al., 2020). To ensure effectiveness, the session was structured based on Burnette et al.'s (2023) meta-analysis, incorporating key elements: credible information, scientific evidence of change potential, respect for participant autonomy, content designed to prevent self-blame while fostering self-compassion, and clear relevance to both personal and program-related goals. Participants then engaged in a “saying is believing” exercise (Aronson et al., 2002), identifying specific fears (e.g., “My solution won't work”) and reframing them into constructive affirmations (e.g., “I don't yet know if my solution will work, but this program will help me improve it.”).

The second part of the intervention transitioned from theory to practice through an interactive strengths-based session, structured after the guidelines proposed by Miglianico et al. (2020) – (1) strengths identification and (2) strengths use. The third direction suggested by Miglianico et al. (2020) – strengths development was not included, given that the aim of the study was to elicit using existing strengths, rather than developing latent ones. Participants identified their strengths using a multi-method approach, as combining different techniques offers a more comprehensive assessment (Miglianico et al., 2020). The process began with an exercise inspired by Johnson's (2018) three-question method for strengths identification, followed by a team-based activity exploring the 24-character strengths from Peterson and Seligman's (2004) taxonomy. Finally, participants completed the online Values in Action Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004), compared their results with initial self-assessments, and mapped their most relevant strengths.

In the action phase, participants developed action plans to apply their strengths within the program. This involved setting three SMART goals (Doran, 1981) and identifying potential obstacles. They then created implementation

intentions (Gollwitzer & Sheeran, 2006) using an “if-then” framework to pre-emptively plan adaptive responses to challenges, based on existing strengths. Examples included: “If I struggle to convince a mentor, then I will use my zest and enthusiasm to present my passion for the project to another mentor” or “If I encounter a creative block, then I will tap into my creativity to brainstorm new ideas or approaches.” Participants refined their statements based on facilitator feedback and reinforced their intentions through repetition. These implementation intentions were designed to help participants harness their specific strengths—such as zest, leadership, and creativity—to proactively address obstacles, build resilience, and maintain focus on their goals within the program. The session concluded with a brief Q&A session.

Analytical approach

All statistical analyses were performed using IBM SPSS Statistics version 23. To assess the

immediate effects of the intervention (H1a and H1b), we performed analyses of covariance (ANCOVA), controlling for pre-test scores to account for baseline differences. Due to feasibility constraints, the control group was not assessed at follow-up; therefore, we conducted repeated-measures analyses of variance (ANOVA) only within the experimental group to examine the sustainability of intervention effects over time (H2a and H2b). Lastly, to examine the predictive role of the intervention on program adherence (H3a and H4a) and entrepreneurial intentions (H3b and H4b), linear hierarchical regression analyses were employed. Prior to conducting parametric analyses, we tested and confirmed that the necessary statistical assumptions were met.

Results

Table 1 contains descriptive statistics indicators for the study’s variables.

Table 1. *Descriptive statistics and reliability coefficients for the study’s variables*

Variables	T1 – baseline		T2 – post-intervention		T3 – follow-up
	Experimental (n = 25)	Control (n = 21)	Experimental (n = 25)	Control (n = 21)	Experimental (n = 19)
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Growth mindset	5.49 (.50)	5.24 (.58)	5.48 (.62)	5.14 (.50)	5.44 (.47)
Strengths use	5.32 (1.04)	5.16 (1.00)	5.92 (.62)	5.35 (1.08)	5.95 (.76)
PA					5.09 (.59)
EI					6.15 (.76)

Note. N for T1 and T2 = 46, and for T3 = 19; PA = Program adherence; EI = Entrepreneurial intentions

Importantly, there are no statistically significant differences between the experimental and control group at baseline (growth mindset: $t(44) = -1.60, p = .12$; strengths use: $t(44) = -.52, p = .61$). As such, potential differences post-intervention can be attributed to the experimental manipulation.

To test the effect of the intervention, ANCOVAs were conducted to compare T2 scores between the experimental and control groups while controlling for T1, separately for

growth mindset (H1a) and strengths use (H1b). As depicted in Table 2, there were no significant differences in terms of growth mindset ($F(1, 43) = 1.55, p = .22$) between the experimental and control group post-intervention. However, results showed a significant effect of the intervention for strengths use ($F(1, 43) = 5.04, p = .03, \eta p^2 = .11$), indicating that the experimental group had significantly higher strengths use scores at T2 compared to the control group. This

indicates that the strengths-based intervention led to improved strengths use among participants included in the program, with a medium-to-strong effect size (Cohen's $d = 0.65$).

Table 2. ANCOVA results for differences between the experimental and control group

Variable (post-intervention scores)	Experimental (n = 25)		Control (n = 21)		F (1, 43)	p	ηp^2
	M	SD	M	SD			
Growth mindset	5.48	.62	5.14	.50	1.55	.22	.04
Strengths use	5.92	.62	5.34	1.08	5.04	.03	.11

To test the effect of the intervention throughout the entrepreneurial education program, repeated-measures ANOVAs were conducted to examine changes in growth mindset (H2a) and strengths use (H2b) across three time points: baseline (T1), post-intervention (T2), and follow-up (T3), within the experimental group. While changes in growth mindset were not statistically significant ($F(2, 36) = .04, p = .96$), results indicate a significant main effect of time on strengths use ($F(2, 36) = 4.22, p = .02, \eta p^2 = .19$). Post hoc comparisons with LSD correction showed that strengths use increased significantly from baseline to post-

intervention and remained elevated at follow-up. See Table 3 for full descriptive and inferential statistics.

Lastly, given that growth mindset in the experimental group did not show any significant changes after the intervention or at follow-up, the hypotheses suggesting that growth mindset scores predict adherence to the entrepreneurial learning program (H3a) and entrepreneurial intentions (H3b) were discarded. As such, only two hierarchical regressions were conducted to examine whether strengths use scores predict program adherence at T3 (H4a) and entrepreneurial intentions at T3 (H4b).

Table 3. Descriptive statistics and post hoc comparisons for the repeated-measures ANOVA in the experimental group

Strengths use measurement moment	N	M (SD)	Comparison	P	D
T1	25	5.37 (.85)	to T2	.04	.63
T2	25	5.85 (.56)	to T3	.58	.12
T3	19	5.95 (.76)	to T1	.02	.59

For adherence (H4a), in Step 1, baseline and post-intervention strengths use (T1, T2) were entered, and in Step 2, the T3 strengths use score was added. The final model accounted for 27% of the variance in adherence to the program, with T3 strengths use emerging as the only significant predictor ($\beta = .57, p = .02$). This suggests that participants with higher strengths use at

follow-up were more likely to adhere to and better engage with the entrepreneurial education program.

The same process was used to predict entrepreneurial intentions (H4b). The final model accounted for 34% of the variance in entrepreneurial intentions, with T3 strengths use emerging as a positive predictor of entrepreneurial intentions ($\beta = .68, p = .01$),

suggesting that participants with higher strengths use at T3 were also more likely to exhibit greater entrepreneurial intentions at

the end of the training program. All details for the hierarchical regression analyses are included in Table 4.

Table 4. Results of the hierarchical regression predicting the study's outcome variables

Predictor	Program adherence		Entrepreneurial intentions	
	β		β	
<i>Step 1</i>				
Strengths use T1	.10		-.14	
Strengths use T2	.29		.15	
R ²	.01		.08	
F	.88		.32	
<i>Step 2</i>				
Strengths use T1	-.03		-.29	
Strengths use T2	.14		-.02	
Strengths use T3	.59*		.68**	
R ²	.28		.34	
F	3.30*		4.02*	
ΔR^2	.27*		.25*	

Note. N = 25 for T1 and T2, N = 19 for T3, * $p < .05$, ** $p < .01$

Discussion

This study aimed to evaluate the effectiveness of a pilot quasi-experimental positive psychology intervention in promoting growth mindset and strengths use among young adults in an entrepreneurial training program. With many entrepreneurial education initiatives failing to produce significant outcomes (Greenberg et al., 2003; Matricano, 2017), this research explored whether a PPI could support mindset development and equip participants with strategies to navigate both training and real-world business challenges. The results indicated that, while the intervention did not significantly impact growth mindset, it led to a sustained increase in strengths use. Additionally, strengths use predicted greater program adherence and increased entrepreneurial intentions. These findings emphasize the importance of leveraging strengths in entrepreneurial learning to

enhance participants' ability to integrate knowledge and build confidence in launching new ventures.

Detailing our main findings, we hypothesized that the intervention would enhance growth mindset in the experimental group relative to the control group. However, the findings did not support this expectation. While previous studies have demonstrated the effectiveness of growth mindset interventions (e.g., Burnette et al., 2020; Yeager et al., 2016), one possible explanation for our findings is that such interventions are most effective for individuals who are particularly susceptible to mindset shifts—such as those facing significant stress, belonging to at-risk groups, or having low initial growth mindset levels (Burnette et al., 2023; Yeager & Dweck, 2020). In this study, participants were young adults enrolled in an entrepreneurial training program and, as such, did probably not meet these conditions, which may have limited the

effectiveness of the intervention. Our choice to include growth mindset as a relevant personal resource followed suggestions made by Miglianico et al. (2020), who argued that strengths identification and use can be boosted by enhancing growth mindset. Individuals who trust that their abilities are developable will be more inclined to seek to develop their strengths. However, it appears that participants in such training programs already exhibit increased growth mindset and maybe other personal resources, such as psychological capital might be more directly influential in such settings (Bakker & van Wingerden, 2021).

Consistent with our expectations, the intervention significantly increased strengths use among participants in the experimental group. After engaging in the intervention, these participants demonstrated a greater ability to identify, develop, and apply their strengths compared to the control group. These findings align with prior research in organizational psychology, which suggests that strengths-based interventions promote the utilisation of personal resources and enhance performance outcomes (Bakker & van Wingerden, 2021; Meyers & van Woerkom, 2017; Van Woerkom et al., 2016; Virgă et al., 2023). Therefore, by engaging in a PPI, future potential entrepreneurs develop individualized strategies that enable them to overcome obstacles, integrate newly acquired information more effectively, and ultimately thrive in entrepreneurial training programs.

Furthermore, we expected that the intervention's effect on strengths use would persist throughout the entrepreneurial training program. The data confirmed this expectation, indicating that participants continued to apply and refine their strengths over time. This sustained effect aligns with previous findings demonstrating the short-term benefits of strengths-based interventions (Forest et al., 2012; Virgă et al., 2023). Additionally, the person-activity fit may have contributed to these outcomes, as in-person interventions are generally more effective than online formats, particularly for individuals who may not be highly self-motivated (Duan et al., 2014; Ghielen et al., 2018). The interactive nature of the intervention likely enhanced engagement,

reinforcing strengths-based behaviors beyond the initial intervention period.

Significantly, the increase in strengths use also predicted enhanced program adherence and greater entrepreneurial intentions. As participants progressed through the entrepreneurial education program, the active application of their strengths facilitated better integration of the learning material and reinforced their belief in their ability to launch their own businesses. By leveraging their strengths, participants demonstrated greater resilience and confidence, which are crucial for navigating the challenges of entrepreneurship programs (Tisu & Virgă, 2022a). These findings underscore the pivotal role of strengths-based interventions in fostering not only immediate engagement in the learning program but also harnessing stronger entrepreneurial aspirations.

Limitations and future directions

As with any study, certain limitations are worth noting. First, although the study examined a causal relationship, it employed a quasi-experimental design, as random assignment was not feasible due to constraints imposed by the entrepreneurial program organizers. Consequently, future research should aim to conduct randomised controlled trials with an active control group to strengthen causal inferences. Second, the reliance on self-report measures may limit the accuracy of the findings, as participants' responses might not entirely reflect their actual mindset or the extent of their strengths use (Podsakoff et al., 2012). Incorporating observational methods or behavioral assessments in future studies could provide a more objective evaluation of these constructs. Third, the study's small sample size and limited statistical power may restrict the generalizability of the results. While sensitivity analyses suggested strong effect sizes for the study, we obtained only medium-to-strong effects. This suggests that while the intervention demonstrated meaningful impacts, the findings should be replicated using a larger sample size, which could provide more robust statistical power, increasing confidence in the observed effects

and their applicability to broader populations. Additionally, replication in diverse settings would help determine whether the effects are consistent across different participant groups (e.g., seasoned entrepreneurs) and contexts (e.g., entrepreneurial development programs).

Theoretical and practical implications

This study offers several important theoretical and practical contributions. To our knowledge, this is the first experimental study to examine a PPI within a lean startup-based entrepreneurial program, thereby making a significant contribution to both entrepreneurial education research and the application of the JD-R model in intervention studies. One key theoretical contribution is the fact that strengths use in entrepreneurial learning settings can be enhanced through targeted interventions, expanding the findings of Virgă et al. (2023), who show that such interventions yield fruitful results in organizational settings. Second, this study validates and expands the findings of Tisu and Virgă (2022a), who demonstrate that strengths use plays a pivotal role in the effectiveness of development opportunities among entrepreneurs. Our results indicate that strengths use can be effectively trained and leveraged to generate positive outcomes in entrepreneurial settings, yielding positive outcomes. As such, this study highlights a crucial yet often overlooked aspect of entrepreneurial education: the importance of psychologically preparing participants to effectively integrate knowledge and succeed in these programs. In doing so, this investigation also directly addresses Matricano's (2017) call for research on strategies to enhance engagement, adherence, and deeper assimilation of knowledge in entrepreneurial training. Future studies might include relevant personality traits that can enhance or encumber the learning process in such contexts. Of relevance might be conscientiousness. As studies show, conscientious individuals persist in attaining goals (Ștefan et al., 2023) and use it as a compensatory strategy in obtaining better performance (Corbeanu, 2023).

Our findings reinforce the importance of incorporating malleable psychological variables into research on the effectiveness of entrepreneurial education programs. Addressing this gap, as highlighted in the meta-analytic review by Martínez-Gregorio et al. (2021), could significantly advance the field by providing a more comprehensive understanding of the factors that contribute to entrepreneurial success. Importantly, while growth mindset did not increase after the intervention, probably because participants who enrol in such programs already have increased beliefs that they can grow and develop, other personal resources, such as psychological capital (Lupșa et al., 2019), might also be relevant in preparing participants to better cope with demands in entrepreneurial learning programs for young adults, and represent a potential avenue of investigation. As existing studies demonstrate, incorporating the development of both personal resource and individual strategies into PPIs leads to improved outcomes and should be considered together in such interventions (Bakker & van Wingerden, 2021; Meyers & van Woerkom, 2017). Furthermore, aligned with the propositions of JD-R theory (Bakker & Demerouti, 2017), our findings also demonstrate that PPIs can be effective across diverse educational and professional contexts, highlighting the pivotal role played by individual strategies in capitalizing on existing resources (Demerouti et al., 2019).

Beyond theoretical contributions, this study also has practical implications for entrepreneurial education program designers, startup incubators, and training facilitators. By demonstrating that individual strategies can be developed through a brief, four-hour micro-intervention, our findings suggest that entrepreneurial support programs for students and young adults could integrate psychological training alongside traditional business education. While the dominant focus in entrepreneurial education has been on refining business curriculum and improving instructional methods, our study highlights the critical role of psychological preparation in optimizing entrepreneurial success.

Program designers should carefully consider how business knowledge interacts

with psychological factors, ensuring that interventions strike a balance that aligns with the program's objectives (Merguei, 2022). Rather than viewing psychological training as a secondary component, integrating a PPI could enhance participants' ability to apply business knowledge effectively, ultimately improving long-term entrepreneurial outcomes. If entrepreneurial education programs for students and young adults were to systematically incorporate psychological training, success rates might increase, as participants would be better equipped to leverage personal strengths, adopt proactive behaviors, and navigate entrepreneurial challenges more effectively.

Conclusion

This study provides empirical evidence that a strengths-based intervention can enhance entrepreneurial education by fostering behavioral strategies among future entrepreneurs. The findings suggest that these interventions not only produce immediate benefits but also yield sustained effects throughout the duration of entrepreneurial training programs, as well as greater engagement with the program, and enhanced future entrepreneurial intentions. The results highlight the importance of incorporating psychological training into entrepreneurial education for young adults, underscoring that cognitive and behavioral strategies are equally crucial as technical business knowledge in achieving positive entrepreneurial outcomes.

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Appendix

Program adherence scale – item wording and response frequency for the experimental group at follow-up

Item wording	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
The positive psychology intervention helped me successfully navigate the two weeks of training.	0%	0%	10.5%	0%	57.9%	31.6%
During the program, I found myself using the strengths identified in the intervention.	0%	0%	5.3%	21.1%	52.6%	21.1%
My strengths enabled me to achieve the program goals set during the positive psychology intervention.	0%	0%	5.3%	21.1%	42.1%	31.6%
Throughout the two weeks of training, I approached challenges and difficulties by leveraging my strengths and a growth mindset.	0%	0%	0%	15.8%	31.6%	52.6%