Check for updates

Empirical Paper

EUROPEAN JOURNAL OF Personality

European Journal of Personality
2026, Vol. 40(3) 599–613
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/08902070251392639
journals.sagepub.com/home/ejop
Sage

Practice makes perfect: A behavioral challenge intervention to develop social, emotional, and behavioral skills

Christopher J. Soto[1], Nathan W. Hudson[2], Christopher M. Napolitano[3], Madison N. Sewell[4], Hee Jun Yoon[5] and Brent W. Roberts[5,6]

Abstract

The present research tested whether a behavioral challenge intervention could facilitate the volitional development of social, emotional, and behavioral (SEB) skills, and whether changes in perceived skills were linked with positive life outcomes. A total of 470 young adults participated in a 16-week intervention, in which they (a) identified the SEB skills that they would most like to change, (b) set weekly behavioral challenge goals designed to practice those skills, and (c) evaluated their success in pursuing each challenge goal. Results suggest that the intervention promoted development of four major skill domains: self-management, social engagement, emotional resilience, and innovation skills. Moreover, gains in perceived skills during the intervention were linked with positive changes in outcomes including social relationships, academic and civic engagement, health, and well-being. These findings provide initial support for a low-cost, highly scalable intervention for promoting skill development.

Plain Language Summary

Why was the study done? The researchers wanted to see if a behavioral challenge intervention could help young adults improve their social, emotional, and behavioral (SEB) skills. These skills include managing emotions, engaging with others, handling responsibilities, and learning from experience. They also wanted to know if improving these skills would lead to positive life changes, such as better relationships, academic success, and well-being. What did the researchers do? The study involved 470 university students who participated in a 16-week program. At the start of the program, each student selected SEB skills that they would like to develop. Then, each week, they selected small, actionable challenges to practice those skills, and reported their success in completing the challenges. What did the researchers find? The results showed that the intervention helped participants improve four key skill areas: self-management (like organizing tasks, meeting deadlines), social engagement (like initiating conversations, building relationships), emotional resilience (like handling stress, staying positive), and innovation (like exploring new ideas, solving problems). However, intending to improve a skill was not always enough; consistent effort and practice were often key. Additionally, participants who improved their skills experienced other benefits such as better friendships, academic and civic engagement, mental and physical health, and overall life satisfaction. What do the findings mean? The study suggests that people can actively develop their SEB skills through structured practice and reflection. Unlike school-based programs, this intervention gave participants control over their own development, making it more flexible and accessible. The findings also reinforce the idea that improving SEB skills can lead to real-life benefits. This approach could be a cost-effective way to help people improve important life skills that contribute to their long-term success.

Keywords

non-cognitive skills, psychological interventions, social and emotional learning, volitional change

Received 11 February 2025; Revised 25 September 2025; accepted 10 October 2025

[1]Department of Psychology, Colby College, Waterville, ME, USA
[2]Department of Psychology, Southern Methodist University, Champaign, IL, Dallas, TX, USA
[3]Department of Educational Psychology, University of Illinois Urbana-Champaign, IL, USA
[4]Department of Psychology, Williams College, Williamstown, MA, USA
[5]Department of Psychology, University of Illinois Urbana-Champaign, Champaign, IL, USA
[6]Hector Research Institute of Education Sciences and Psychology, University of Tübingen, Tübingen, Germany

Corresponding author:
Christopher J. Soto, Department of Psychology, Colby College, 5550 Mayflower Hill, Waterville, ME 04901, USA.
Email: cjsoto@colby.edu

Success in life is influenced by many factors, including a person's individual characteristics (such as their abilities, traits, attitudes, beliefs, motives, and values) and life circumstances (such as their social, cultural, academic, and employment opportunities). One factor that has received growing attention from researchers, practitioners, and policymakers is social, emotional, and behavioral (SEB) skills: people's capacities to maintain social relationships, regulate emotions, manage goal-directed behaviors, and learn from experience (Soto et al., 2021). Individuals with higher SEB skill levels tend to

experience better outcomes across a range of life domains including social relationships, academic performance, occupational prospects, physical health, and psychological well-being (Casillas et al., 2015; Duckworth et al., 2007; Farrington et al., 2012; Kautz et al., 2014; Nagaoka et al., 2015; National Research Council, 2012; OECD, 2015).

One aspect of SEB skills that appeals to many practitioners and policymakers is the intuition that people may be able to improve their skills through practice and feedback, and thereby improve their life outcomes (Feraco et al., 2025). To test this possibility, research in economics, education, and psychology has shown that social and emotional learning (SEL) programs can positively affect children's and adolescents' outcomes (Durlak et al., 2010, 2011, 2022; Taylor et al., 2017). To date, most of this research has focused on primary and secondary school students, and has tested the effects of SEL programs administered in structured curricular and cocurricular contexts such as schools and afterschool programs. Much less is known about whether skills interventions can be successfully implemented at an individual (rather than institutional) level, and with adults (rather than children) as learners. Therefore, the present research extended previous work on SEB skills, interventions, and life outcomes by addressing two key questions. First, can a behavioral challenge intervention facilitate the development of young adults' social, emotional, and behavioral skills? Second, are gains in perceived skills linked with positive life outcomes?

Social, emotional, and behavioral skills

Social, emotional, and behavioral skills represent how someone is capable of behaving when they want or need to do so (Soto et al., 2021). Many models of SEB skills have been proposed (Berg et al., 2017), but there is now growing consensus that many specific skills can be organized within a taxonomy of five broad domains (Abrahams et al., 2019; Casillas et al., 2015; Kautz et al., 2014; OECD, 2015; Soto et al., 2022): self-management skills (used to pursue goals and complete tasks), social engagement skills (used to actively engage with other people), cooperation skills (used to maintain positive social relationships), emotional resilience skills (used to regulate emotions and moods), and innovation skills (used to engage with novel ideas and experiences).

SEB skills are distinguished from other kinds of personal characteristics by their focus on behavioral capacities (how well someone is capable of enacting a particular behavior, when needed), rather than attitudes (how much someone likes or dislikes enacting the behavior) or traits (how often someone tends to enact the behavior). For example, someone might tend to behave in a relatively quiet and reserved manner, and not be very motivated to seek out social interactions. However, if they have strong social engagement skills, then they may still be highly capable of starting conversations, communicating their thoughts and feelings to others, and even stepping into a group leadership role when needed—such as to achieve a goal or meet the demands of a particular situation. Conversely, another person might greatly enjoy social situations, actively seek them out, and be very talkative within them, but without demonstrating much social skill or tact. Previous research supports this distinction by showing that, although skills and traits are substantially correlated, individuals' skills often change more than their traits over time (Napolitano et al., in press), and that skills can provide incremental validity beyond traits when predicting consequential outcomes (e.g., Soto et al., 2023, 2024; Yoon et al., 2024; Ringwald et al., in press).

Prospects for a behavioral challenge intervention

Two key sources of evidence suggest that a behavioral challenge intervention may help facilitate the development of SEB skills. First, research findings from education, psychology, and economics indicate that well-designed social and emotional learning (SEL) programs can promote the development of children's and early adolescents' social and emotional skills (Durlak et al., 2010, 2011, 2022; Kautz et al., 2014; Taylor et al., 2017). Much of this research has focused on structured programs implemented in schools or cocurricular settings such as afterschool programs. SEL curricula such as Second Step, PATHS, and RULER typically involve psychoeducation in the form of readings and lessons led by a classroom teacher or other instructor, as well as structured activities focused on specific skills (Brackett et al., 2012; Greenberg & Kusché, 2006; Low et al., 2015). Such programs often require a considerable investment of time, staffing, and other institutional resources. They can therefore be challenging and costly to deploy at scale. Moreover, SEL programs tend to have larger effects on children than on adolescents and adults, who may be less receptive to institutionally delivered programs (Durlak et al., 2011; Kautz et al., 2014; Yeager, 2017).

Second, research on volitional personality change has shown that most people would like to change some of their personality traits (Hudson & Roberts, 2014), and that having such change goals predicts subsequent personality change (Hudson et al., 2020). Moreover, recent studies have begun to test the effects of behavioral challenge interventions on volitional personality change. In these interventions, participants identify one or more personality traits they would like to focus on changing, create or select behavioral challenges relevant to those traits, and evaluate their degree of success in completing each challenge. Encouragingly, their findings indicate that such interventions can facilitate change in personality traits, especially for individuals who consistently complete behavioral challenges (Hudson et al., 2019; Hudson & Fraley, 2015; Stieger et al., 2021, 2024).

Such interventions seem well suited for facilitating SEB skill development by guiding participants through an iterative process of interconnected stages. First, participants set personal goals by nominating specific skill domains for practice and improvement, thereby signaling their intention and motivation to change. Next, they select specific behavioral challenges related to their targeted skills. This helps translate general goals into specific intentions, thereby focusing attention and mobilizing effort (Deci & Ryan, 2000; Locke & Latham, 2002).

Third, participants attempt to complete their challenges by seeking out situations that afford opportunities to behave

in particular ways (Gibson, 1977). Once in these situations, they engage in deliberate practice, which helps facilitate skill acquisition and improvement (Ambrose et al., 2010; Ericsson et al., 1993). Moreover, they can receive feedback on their efforts in the form of self-perceived success or failure, reactions from social partners, and the natural consequences of their behavior. Such feedback serves to reinforce successful actions and highlight areas for further improvement (Bandura, 1997; Hattie & Timperley, 2007). Crucially, this entire process can recur multiple times over the course of the intervention. By repeatedly enacting the target skills through varied behaviors across different contexts, participants accumulate experience and practice, potentially leading to sustained skill development.

This volitional change cycle of setting goals, selecting challenges, practicing behaviors, and receiving feedback may be even better suited for facilitating skill development than for changing traits. This is because intention, practice, and feedback are crucial for developing skills of all kinds, and because recent research indicates that people often consider it more desirable, feasible, and impactful to improve their SEB skills than to change their personality traits (Feraco et al., 2025). Moreover, as compared with traditional SEL programs delivered in academic and cocurricular settings, behavioral challenge interventions offer more choice and autonomy to individual participants. They may therefore be effective for older adolescent and adult populations that have proven less responsive to institutionally delivered programs (Yeager, 2017). To our knowledge, however, no previous research has tested the effects of behavioral challenge interventions on the development of SEB skills.

Links between SEB skills and life outcomes

Increasing one's own social, emotional, and behavioral skills may be intrinsically valuable as a means of self-improvement or self-actualization (Kaufman, 2021; Maslow, 1971). Skill gains can also hold instrumental value as a step towards attaining better life outcomes. Indeed, previous research has shown robust links between SEB skills and consequential life outcomes. For example, higher self-management skills have been linked with greater academic engagement and workplace performance; social engagement skills with social status; cooperation skills with relationship quality; emotional resilience skills with cognitive and affective well-being; and innovation skills with civic engagement and academic performance (Chen et al., 2024; Feraco et al., 2024; Postigo et al., 2024; Ringwald et al., in press; Sewell et al., 2023; Soto et al., 2022, 2024; Yoon et al., 2024).

Moreover, research on SEL programs has found that school-based and cocurricular interventions can improve student outcomes, such as improved attitudes toward oneself and others, more frequent prosocial behaviors, reduced conduct problems and emotional distress, and improved academic performance (Durlak et al., 2010, 2011, 2022; Taylor et al., 2017). However, this research has been criticized for rarely testing whether longitudinal changes in SEB skills are linked with changes in life outcomes, leaving such direct skill-outcome links uncertain (Ura et al., 2020).

Overview of the present research

The present research goes beyond previous studies of social, emotional, and behavioral skills, interventions, and life outcomes by addressing two open research questions. First, can a behavioral challenge intervention facilitate the development of individuals' perceived SEB skills? Our preregistered hypothesis was that successfully completing behavioral challenges would predict positive changes in the targeted skill domains over time. Second, are gains in perceived skills linked with positive life outcomes? We generally hypothesized that gains in skills would be accompanied by positive changes in outcomes.

More specifically, we preregistered 21 expected skill-outcome links (see Table 1). We hypothesized that gains in perceived self-management skills would be linked with increases in academic engagement, civic engagement, informal helping, and life satisfaction; gains in social engagement skills with social status, friendship quality, civic engagement, activism, volunteering, exercise, affective well-being, and life satisfaction; gains in cooperation skills with friendship quality, social status, civic engagement, and informal helping; gains in emotional resilience skills with affective well-being, life satisfaction, and academic engagement; and gains in innovation skills with civic engagement and activism.

Method

Participants

Participants were 470 young adults enrolled as students at Colby College or the University of Illinois Urbana-Champaign. They ranged in age from 17 to 34 years old ($M = 19.96$, $SD = 1.34$); 79% identified as female and 18% as male, with 2% reporting another gender identification and less than 1% not reporting gender. Participants could report one or more racial and ethnic identifications; 59% identified as White/Caucasian, 20% as Asian/Asian-American, 16% as Hispanic/Latino, 7% as Black/African-American, 5% as Asian Indian/South Asian, 2% as Middle Eastern, 1% as Pacific Islander, and less than 1% as American Indian/Native American, with 1% reporting another identification and less than 1% not reporting any identification. Participants were recruited in exchange for research credit or extra credit in a course. The study was approved by the Colby College Institutional Review Board.

Procedure

Participants completed up to 16 weekly waves of a behavioral challenge intervention designed to facilitate the development of social, emotional, and behavioral skills. The intervention was administered online through a noncommercial, advertisement-free website developed and maintained by the second author. After providing informed consent at wave 1, each participant completed an assessment of their initial SEB skills and life outcomes. They were then presented with brief descriptions of five major SEB skill domains—self-management skills, social engagement skills, cooperation skills, emotional resilience skills, and

Table 1. Hypothesized links of social, emotional, and behavioral skills with life outcomes.

	Self-management Skills	Social engagement Skills	Cooperation Skills	Emotional resilience Skills	Innovation Skills
Social status		+	+		
Friendship quality		+	+		
Civic engagement	+	+	+		+
Activism		+			+
Informal helping	+		+		
Volunteering		+			
Academic engagement	+			+	
Exercise		+			
Affective well-being		+		+	
Life satisfaction	+	+		+	

Note. + Hypothesized positive relationship.

innovation skills—and asked to nominate one or more domains that they would like to focus on developing over the next few months.

The participant was then presented with a list of behavioral challenges (see Supplemental Table S1), and asked to select one to four of these challenges to attempt in the coming week. The challenges were phrased as specific, concrete actions that participants could take to practice particular SEB skills. For example, "show up 5 min early for every class, meeting, appointment, or activity on your daily schedule" (self-management), "tell a group of friends, classmates, or coworkers an interesting or funny story that happened to you" (social engagement), "give a friend or family member a genuine compliment" (cooperation), "when you feel overwhelmed, stop and take several deep breaths" (emotional resilience), and "find something you're curious about in your everyday life and find the answer online" (innovation). The challenges were adapted from a previous study of volitional change (Hudson et al., 2019) and revised to focus on the five SEB skill domains. To ensure content validity, we developed a total of 50 challenges per domain, with each set of 50 including some challenges focused on each BESSI skill facet included in that domain (although not necessarily all of the individual BESSI items). After finalizing the challenge sets, the first two authors rated all challenges on a 10-point difficulty scale, with discrepancies resolved through discussion. To avoid overwhelming the participant, they were first shown a list of eight "suggested challenges," which were randomly selected from the set of moderately difficult challenges relevant to the domains they had nominated as a focus for development. However, the participant could follow a link to view the entire list of challenges for their selected domains if desired. After selecting their behavioral challenges for the week, the participant was sent an email reminder with their list of selected challenges.

In wave 2 and subsequent waves, each participant again completed an assessment of their current SEB skills and life outcomes. Then, for each challenge selected in the previous wave, they indicated how many times they had successfully completed that challenge during the past week (0 = *I did not complete this challenge*, 1 = *once this past week*, 2 = *twice this past week*, 3 = *at least three times but not every day*, 4 = *every single day this past week)*. They could then select challenges for the upcoming week. These could be new challenges from the list of suggestions (which was automatically updated each week with easier or more difficult challenges, similar to a computerized adaptive test, depending on the participant's history of completing or failing to complete previous challenges, plus random selection of challenges near the target difficulty level), or repeated challenges that they had already selected one to three times. If participants chose to repeat a previously successful challenge, the challenge was automatically reworded to increase its frequency (e.g., from "at least one time this week…" to "at least twice per week…", and up to "at least once per day this week…").

Due to their differing academic calendars, Colby College participants could complete up to 14 waves of the intervention, and University of Illinois participants up to 16 waves. At each wave, the intervention website recorded each participant's number of accepted behavioral challenges for each skill domain, as well as the number of times that they successfully completed each challenge from the previous wave. To increase engagement through gamification, participants could earn digital bronze, silver, gold, or diamond medals by completing challenges multiple times at increasingly greater frequencies—similar to the achievement or trophy systems used by many video games. After the conclusion of the study, all participants received a report showing their skill levels and trajectories, thereby providing insight without biasing their responses during the study itself.

As shown in Supplemental Table S2, emotional resilience (selected by 62% of participants) and self-management skills (57%) were the most commonly nominated domains for change. They were followed by social engagement skills (47%), with innovation (26%) and cooperation skills (23%) nominated less often. On average, participants completed 8.36 waves of the intervention (SD = 5.38), with 89% completing multiple waves. Participants who completed more intervention waves began the study with higher self-management skills (r = .19, p < .001) and academic engagement (r = .10, p = .046), but did not differ on any other initial skill or outcome variables.

All 250 behavioral challenges were selected by at least one participant. The most frequently selected challenges for

each skill domain included "when you feel like giving up on a task, take a several-minute break to clear your head, but then return to the task and finish it" for self-management (selected 4.5% of the time), "during a time that you would normally relax at home, go out and do something active (e.g., go to a coffee shop, do something athletic, meet friends)" for social engagement (5.3%), "genuinely tell a friend why you appreciate them" for cooperation (4.6%), "when you notice a negative thought, acknowledge the negative thought, but think 3 true positive thoughts about the same topic" for emotional resilience (4.1%), and "ask a friend or family member a deep question about their life, and honestly seek to understand their answer" for innovation skills (4.3%). Thus, participants collectively selected a broad range of challenges for each domain.

Measures

Social, emotional, and behavioral skills. Social, emotional, and behavioral skills were assessed at each wave using the 45-item short form of the Behavioral, Emotional, and Social Skills Inventory (BESSI-45; Soto et al., 2022; Sewell et al., in press). The BESSI assesses five major domains of SEB skills: self-management, social engagement, cooperation, emotional resilience, and innovation skills. Its items are short phrases describing a specific behavior (e.g., "Plan out my time," "Lead a group of people"), and respondents rate how well they can enact each behavior on a scale from 1 = *not at all well* to 5 = *extremely well*.

Life outcomes. Social, academic, health, and well-being outcomes were assessed using a battery of survey measures. Social status was measured using two items assessing popularity, prominence, respect, and influence within one's social group that were adapted from the Behavior Report Form (Paunonen, 2003) and a previous study of social status (Anderson et al., 2001). Friendship quality was measured using 15 items from the Friendship Qualities Scale (Bukowski et al., 1994). Informal helping and civic engagement skills were measured using a total of 10 items from the Youth Civic and Character Measures Toolkit (Syvertsen et al., 2015). Volunteering was measured by three items that asked participants how many hours in the past month they had spent volunteering, whether they planned to volunteer in the next month, and the likelihood that they would volunteer with a community service program if asked; due to their differing response scales, these items were standardized and then averaged (Carlo et al., 2005). Activism was measured by two items assessing the number of hours in the past month spent participating in political or social movements, either in person or online. Academic engagement was measured using 12 items from the Engagement versus Disaffection with Learning measure (Skinner et al., 2008). Exercise was measured using the Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985), physical and mental health using the PROMIS Global Health Scale v1.2 (Hays et al., 2009), affective well-being using the Affect Balance Scale (Bradburn, 1969), and life satisfaction using the Satisfaction With Life Scale (Diener et al., 1985). To prevent response fatigue, social status, friendship quality, informal helping, civic engagement, volunteering, activism, and life satisfaction were assessed in odd-numbered waves, whereas academic engagement, exercise, physical and mental health, affective well-being, and life satisfaction were assessed in even-numbered waves.

Analytic strategy

Descriptive statistics and correlations between all variables are presented in Supplemental Table S2. Effects of the behavioral challenge intervention on SEB skills and life outcomes, as well as effects of skills on outcomes, were analyzed using multilevel models (MLMs). Due to the study's longitudinal design, these models nested timepoints within individuals, thereby allowing us to model both between-person differences and within-person changes while accounting for dependencies in the data. MLMs make use of all available data, similar to full information maximum likelihood estimation of structural equation models. In a longitudinal context such as the present study, MLMs minimize attrition bias by modeling within-person change using each participant's available data, rather than comparing group means across study waves.

To test effects of the behavioral challenge intervention on SEB skills and life outcomes, nominating each SEB skill domain as a focus for development was dummy coded (1 = *domain nominated*, 0 = *domain not nominated*), and current time within the study was scaled to range from 0 (the day that a participant completed the first assessment wave) to 1 (16 weeks later). Each participant's mean weekly number of behavioral challenges accepted and number of behavioral challenges successfully completed for each skill domain, as well as their current SEB skills and life outcomes across all waves, were standardized across the full sample.

To test the effects of between-person differences and within-person changes in SEB skills on life outcomes, participants' initial skill levels (i.e., at the first assessment wave) were standardized across participants to represent between-person differences. (Note that this was separate from the full-sample standardization used to examine intervention effects in the previous analyses.) Each participant's current skill levels were then centered around their initial skill levels to represent within-person changes. This standardization approach allowed us to examine within-person changes while also preserving information about between-person differences and moderators of change (Ackerman et al., 2011).

To control for demographic factors, gender was effect coded (0.5 = *female*, −0.5 = *male*, 0 = *another identification*) and age at the beginning of the study was centered at 20 years old. A statistical significance level of $\alpha = .05$ was used for all analyses. These analyses involved a large number of statistical tests to assess intervention effects on skill development, as well as links between skill development and life outcomes. Thus, our analyses entail a risk of obtaining one or more Type I errors (i.e., false positives). Rather than applying a family-wise correction that would substantially increase the risk of Type II errors and potentially obscure meaningful patterns (Rothman, 1990), our interpretation of findings instead focuses on identifying consistent results across tests. In line with current

recommendations to move beyond dichotomous significance testing (Cumming, 2014), this approach relies less on the statistical significance of any single coefficient and more on the overall pattern of effects. We also report all results transparently so that readers can evaluate the evidence for themselves (Simmons et al., 2011). Taken together, this approach allows for a more holistic understanding of the findings, while still guarding against over-interpreting isolated results that do not fit within a broader, coherent pattern. Even so, readers should bear in mind that, in the absence of any true effects, approximately one of the 15 intervention interactions (five skill domains × interactions of time with domain nominated, challenges accepted, and challenges completed), as well as one of the 21 hypothesized skill-outcome associations, would be expected to be statistically significant at the $\alpha = .05$ level by chance alone.

Transparency and openness

The design, hypotheses, and planned analyses were preregistered at https://osf.io/cfyq5/, and we follow JARS (Appelbaum et al., 2018). Sample size was selected based on power analyses and previous research, which generally suggests small volitional change effects over time (Hudson et al., 2020), as well as small to large relations between SEB skills and outcomes (Soto et al., 2024). In the standardized correlation metric, the present sample size provides statistical power of .80 to detect true effects of $\rho = .13$, and power of .95 to detect effects of $\rho = .16$. Moreover, Monte Carlo simulations ($k = 1000$ per domain) based on the present study design and observed results from a previous mega-analysis (Hudson et al., 2020) suggest power of 94%, 58%, 42%, 12%, and 7% to detect volitional change interactions equivalent to those observed for Big Five emotional stability (equivalent to Cohen's $d = .15$), extraversion ($d = .12$), conscientiousness ($d = .08$), agreeableness ($d = .04$), and openness to experience ($d = .03$), respectively, in that analysis. Thus, the present research was well powered to detect small-to-medium-sized main effects and interactions, but underpowered to detect some very small interactions.

Data were analyzed using IBM SPSS Statistics, version 29. De-identified data, analytic code, materials, and supplementary tables are publicly available at https://osf.io/x3zjw/.

Results

Can a behavioral challenge intervention facilitate SEB skill development?

Our first set of preregistered analyses tested whether participating in the behavioral challenge intervention helped people improve their perceived SEB skills. To investigate this, we fit a series of MLMs that nested timepoints within individuals. Specifically, for each SEB skill domain, we predicted an individual's current skill level from their gender; age at the beginning of the study; time within the study; whether they nominated that skill domain as a focus for development; the mean weekly number of behavioral challenges that they attempted to complete for that domain during the intervention; the mean weekly number of these challenges that they successfully completed; interactions of time with domain nomination, number of challenges attempted, and number of challenges completed; and fixed and random intercepts. This approach parallels a conceptual model in which practicing skill-relevant behaviors accumulates over time, thus predicting gradual skill change.[1]

The coefficients from these analyses are presented in Table 2. Additional results (including standard errors, *p*-values, and results without demographic controls) are presented in Supplemental Table S3. The key coefficients in these analyses are the interactions of time with aspects of the behavioral challenge intervention. These coefficients indicate whether the perceived development of each skill was either helped (as indicated by positive interaction coefficients) or hindered (as indicated by negative interactions) by nominating a particular skill domain for development (time × domain nominated for change), accepting behavioral challenges for that domain (time × mean weekly challenges accepted), and successfully completing these challenges (time × mean weekly challenges completed).

The results of these analyses suggest that the intervention facilitated volitional skill development for four of the five SEB skill domains. Specifically, nine of the 15 interactions between time and aspects of the intervention were statistically significant (as compared with less than one of 15 interactions that would be expected to be significant by chance alone). The overall pattern was that (a) nominating a domain for intervention positively predicted change, (b) successfully completing many challenges related to a domain positively predicted change, and (c) accepting—but failing to complete—many challenges related to a domain negatively predicted change. Each of these interactions was statistically significant for three of the five skill domains, although the specific pattern of significant interactions varied somewhat across domains.

As one example, for social engagement skills, the significant positive interaction of time with domain nomination ($b = .186$, $p = .010$) indicates that individuals who focused on this domain perceived larger improvements in their social engagement skills over time than did those who focused on other domains. Moreover, the small, nonsignificant interactions of time with number of behavioral challenges attempted and completed suggest that this effect generalized across individuals who successfully completed few or many weekly challenges.

To illustrate these effects, Figure 1(a) shows model-predicted skill levels for three hypothetical individuals: an *intervention non-participant* who did not nominate social engagement skills as a focus for development (and therefore did not accept or complete social engagement challenges); an *unsuccessful intervention participant* who nominated this domain for development and accepted an average number of challenges each week, but did not successfully complete these challenges; and a *successful intervention participant* who nominated this skill domain for development, accepted an average number of challenges, and successfully completed these challenges at a high rate (i.e., 1.5 times the average success rate). This figure shows that relatively successful and unsuccessful intervention

Table 2. Effects of the behavioral challenge intervention on perceived social, emotional, and behavioral skill development.

	Self-management Skills	Social engagement Skills	Cooperation Skills	Emotional resilience Skills	Innovation Skills
Intercept	.067/.067 [−.082, .217]	.213*/.212* [.066, .361]	.095/.112 [−.022, .211]	.221*/.222* [.068, .375]	.002/.020 [−.114, .119]
Gender	.149/.154 [−.061, .359]	−.202/−.202 [−.415, .010]	−.110/−.113 [−.322, .103]	−.427*/-.415* [−.634, −.219]	−.162/-.176 [−.366, .043]
Age	.076*/.071* [.014, .137]	.048/.048 [−.014, .110]	.028/.026 [−.033, .089]	.024/.034 [−.034, .083]	.085*/.084* [.026, .143]
Time within the study	−.013/−.092 [−.113, .087]	.165*/.169* [.077, .253]	−.101*/-.154* [−.178, −.024]	.083/.057 [−.020, .186]	.231*/.236* [.166, .297]
Domain nominated for change	−.376*/−.380* [−.555, −.196]	−.474*/−.473* [−.692, −.256]	−.069/−.117 [−.273, .135]	−.255*/−.262* [−.441, −.069]	−.147/-.209* [−.332, .038]
Mean weekly challenges accepted	−.368*/−.366* [−.562, −.174]	−.170/−.161 [−.397, .056]	−.187/−.160 [−.451, .076]	−.177*/−.169* [−.341, −.013]	−.186*/−.185* [−.349, −.023]
Mean weekly challenges completed	.319*/.316* [.133, .504]	.183/.179 [−.027, .393]	.187/.171 [−.062, .436]	.158*/.160* [.009, .306]	.167*/.180* [.012, .321]
Time × domain nominated for change	.021/.165 [−.136, .179]	.186*/.208 [.045, .328]	.118/.255 [−.092, .328]	.151*/.210 [.013, .290]	.189*/.237 [.014, .364]
Time × mean weekly challenges accepted	−.236*/−.300* [−.364, −.108]	.004/−.071 [−.140, .149]	−.013/−.084 [−.205, .179]	−.223*/−.282* [−.326, −.119]	−.121*/−.079 [−.204, −.038]
Time × mean weekly challenges completed	.267*/.282* [.146, .387]	.015/.073 [−.124, .154]	.022/.071 [−.146, .189]	.274*/.267* [.173, .375]	.080*/.045 [.002, .158]

Note. *$p < .05$. Values before the forward slash are coefficients from MLMs with fixed slopes, with 95% confidence intervals in brackets. Values after the forward slash are coefficients from MLMS with fixed and random slopes. Additional results are reported in Supplemental Table S3. Gender was coded as 0.5 = *female*, −0.5 = *male*. Age in years at the beginning of the intervention was centered at 20. Time within the study was scaled to range from 0 to 1. Domain nominated for change was coded as 1 = *domain nominated*, 0 = *domain not nominated*. All other variables were standardized across the full sample.

participants both improved their social engagement skills faster than did intervention non-participants.

As illustrated in Figure 1(b), self-management skills showed a somewhat different pattern of intervention effects. For this domain, the interaction of time with domain nomination was modest and non-significant. However, the positive interaction of time with number of behavioral challenges completed ($b = .267$, $p < .001$) indicates that individuals who followed through by successfully completing challenges perceived larger skill gains than did those who completed fewer challenges. By contrast, the negative interaction of time with number of challenges accepted ($b = -.236$, $p < .001$) indicates that accepting—but failing to complete—many challenges hindered perceived skill development.

As illustrated in Figures 1(c) and 1(d), emotional resilience and innovation skills showed intervention effects of both domain nomination and behavioral challenges. That is, individuals who focused on these domains tended to show greater perceived skill gains than did those who focused on other domains (emotional resilience $b = .151$, $p = .033$; innovation $b = .189$, $p = .035$), and these gains could be further accelerated if they successfully completed many behavioral challenges (emotional resilience $b = .274$, $p < .001$; innovation $b = .080$, $p = .045$). As shown in Figure 1(e), only cooperation skills did not show any significant intervention effects. Overall, then, the results presented in Table 2 and Figure 1 indicate that a behavioral challenge intervention can facilitate the perceived development of many social, emotional, and behavioral skills.[2] The pattern of significant and non-significant intervention effects varied somewhat across skill domains, but we caution against over-interpreting these differences without additional evidence.

Exploratory analyses including random slopes

As an alternative, exploratory approach, we also fit models that included a random slope for the effect of time within the study. This approach allows for the modeling of individual differences in skill development during the intervention. However, modeling these individual differences also introduces additional complexity and uncertainty, especially with multiple predictors and variability in the number of time points per participant, which can therefore reduce statistical power (Matuschek et al., 2017).

Coefficients from these exploratory random slope models are also reported in Table 2, and additional results (including standard errors, *p*-values, 95% confidence intervals, and results without demographic controls) are reported in Supplemental Table S3. Compared with the results of the preregistered analyses described above, adding random slopes generally increased the strength of the intervention effect coefficients (from a mean of .128 to a mean of .175 across the 15 key interactions). However, fewer of these effects were statistically significant, reflecting the random slope models' greater complexity and uncertainty. Synthesizing the results of the preregistered and exploratory models (including models both with and without demographic controls), the effects of accepted challenges and completed challenges on changes in self-management and emotional resilience skills were most robust across analyses. Thus, these intervention effects should be considered most robust to the inclusion vs. exclusion of random slopes.

Are SEB skill gains linked with positive life outcomes?

Our second set of preregistered analyses tested whether perceived gains in social, emotional, and behavioral skills were linked with positive changes in life outcomes,

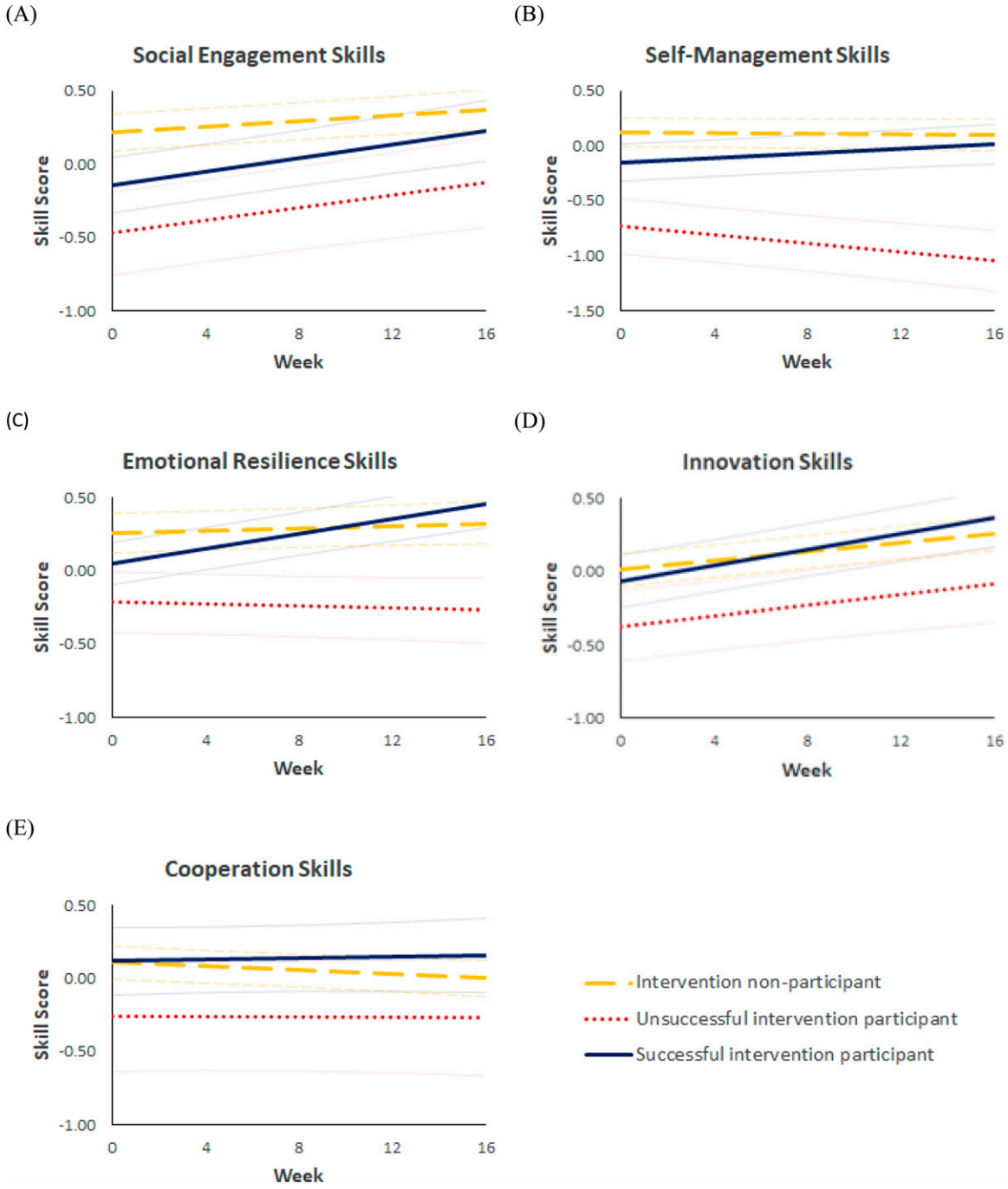

Figure 1. Illustrated effects of the behavioral challenge intervention on perceived social, emotional, and behavioral skill development. Note. Intervention non-participants did not nominate the skill domain as a focus for development. Unsuccessful intervention participants nominated the skill domain for development and accepted an average number of weekly challenges, but did not successfully complete any challenges. Successful intervention participants nominated the skill domain for development, accepted an average number of weekly challenges, and successfully completed these challenges at 1.5 times the average rate. Faded lines represent the upper and lower limits of 95% confidence bands.

including 21 hypothesized skill-outcome associations. To do this, we fit an MLM for each combination of an outcome variable with an SEB skill domain. Specifically, we predicted an individual's current outcome level from their age; gender; time within the study; between-person skill level (i.e., skill level at the beginning of the intervention); within-person skill changes (i.e., current skill level minus skill level at the beginning of the intervention); and fixed and random intercepts. This approach reflects a conceptual model in which skill development gradually translates into improved outcomes over time. As a robustness check, we also fit a model for each outcome variable that included between-person and within-person skill levels for all five skill domains simultaneously (thereby controlling for overlap between the domains).

The between-person and within-person effects of skills on outcomes in these analyses are presented in Table 3. Additional results (including standard errors, *p*-values, confidence intervals, and results without demographic controls) are presented in Supplemental Tables S5 to S8. The key coefficients in these analyses are the effects of between-person skill levels (which indicate skill-outcome

Table 3. Effects of between-person differences and within-person changes in social, emotional, and behavioral skills on life outcomes.

	Self-management Skills	Social engagement Skills	Cooperation Skills	Emotional resilience Skills	Innovation Skills
Social status					
Between-person differences	.216*/−.003	**.487*/.402***	**.351*/.157***	.329*/.072	.202*/−.024
Within-person changes	.103*/−.012	**.159*/.082***	**.133*/.063***	.138*/.051	.144*/.065*
Friendship quality					
Between-person differences	.194*/.060	.219*/.076	**.357*/.301***	.196*/−.003	.140*/−.008
Within-person changes	.206*/.137*	.086*/−.073*	**.208*/.163***	.128*/.018	.125*/.018
Civic engagement					
Between-person differences	**.376*/.157***	**.574*/.433***	.353*/.040	.356*/−.042	**.476*/.265***
Within-person changes	**.274*/.083***	**.353*/.204***	.243*/.057	.188*/−.058	**.364*/.228***
Activism					
Between-person differences	−.085/−.141*	.044/.024	.032/.013	−.006/−.025	.196*/.228*
Within-person changes	.035/.031	.045/.051	.005/−.016	.022/.008	−.003/−.032
Informal helping					
Between-person differences	.200*/.105*	.272*/.202*	.208*/.081	.155*/−.043	.155*/.031
Within-person changes	.151*/.041	.137*/.010	.144*/.052	.173*/.077	.188*/.110*
Volunteering					
Between-person differences	.118*/.050	.114*/.045	.206*/.175*	.120*/.021	.022/−.076
Within-person changes	.113*/.075*	.098*/.043	.070*/.013	.092*/.034	.067*/−.007
Academic engagement					
Between-person differences	**.404*/.275***	.248*/.049	.229*/−.017	**.404*/.224***	.272*/.106*
Within-person changes	**.248*/.209***	.144*/.017	.136*/.007	**.175*/.082***	.122*/−.012
Exercise					
Between-person differences	.217*/.140*	**.197*/.143***	.152*/.037	.221*/.114	.014/−.121*
Within-person changes	−.003/−.066	**.101*/.116***	.035/−.009	.049/.016	.050/.014
Physical health					
Between-person differences	.303*/.191*	.240*/.124*	.172*/.001	**.367*/.272***	.007/−.184*
Within-person changes	.097*/.009	.109*/.017	.122*/.048	**.147*/.101***	.110*/.022
Mental health					
Between-person differences	.347*/.105*	.407*/.213*	.242*/−.056	**.609*/.522***	.125*/−.138*
Within-person changes	.136*/−.026	.197*/.045	.182*/.037	**.328*/.290***	.175*/.032
Affective well-being					
Between-person differences	.353*/.177*	.364*/.208*	.194*/−.079	**.483*/.361***	.117*/−.107*
Within-person changes	.215*/.060	.236*/.062	.215*/.037	**.315*/.223***	.220*/.059
Life satisfaction					
Between-person differences	.282*/.061	**.387*/.247***	.208*/−.064	**.530*/.438***	.114*/−.114*
Within-person changes	.077*/−.031	**.134*/.056***	.106*/.033*	**.184*/.143***	.121*/.041*

Note. *$p < .05$. Coefficients from MLMs that include each skill domain individually are left of the forward slash; coefficients from MLMs that include all five skill domains simultaneously are right of the forward slash. Exact p-values and 95% confidence intervals are reported in Supplemental Table S5. Hypothesized skill-outcome associations are italicized, and skill-outcome associations that were statistically significant in the same direction across all analyses are printed in boldface. All effects control for gender, age, and time within the study. SEB skills and life outcomes are standardized across the full sample.

relations at the beginning of the study), and especially within-person skill changes (which indicate whether changes in SEB skills were linked with changes in outcomes).

When skill-outcome links were analyzed individually, the between-person effects indicated that, for 20 of the 21 hypothesized skill-outcome links, individuals with higher perceived skill levels at the beginning of the study tended to experience more positive life outcomes. Even more importantly, the within-person effects indicate that, for 19 of the 21 hypothesized links, individuals who improved their perceived skills over time also tended to attain more positive outcomes.[3]

However, these skill-outcome links might not be robust to controlling for overlap between the skill domains themselves, or may not be specific to the initially hypothesized associations. To help address these possibilities, our robustness checks indicated that a total of 14 skill-outcome links were positive and statistically significant at both the between-person and within-person levels across all four sets of analyses (i.e., when analyzing skill domains individually or simultaneously, and including or excluding demographic controls). Specifically, higher initial levels and subsequent increases in perceived self-management skills predicted greater academic and civic engagement; social engagement skills predicted greater social status,

civic engagement, exercise, and life satisfaction; cooperation skills predicted greater friendship quality and social status; emotional resilience skills predicted greater physical health, mental health, affective well-being, life satisfaction, and academic engagement; and innovation skills predicted greater civic engagement. Twelve of these 14 robust skill-outcome links were included in our set of preregistered hypotheses. The other two involved measures of physical and mental health, for which we did not preregister any hypotheses because they had not been included in previous research using the BESSI.[4] Taken together, these results indicate that perceived gains in social, emotional, and behavioral skills were often linked with corresponding gains in relevant life outcomes, and that the most robust links closely mirrored our preregistered hypotheses, while also suggesting two new additions to the nomological network of SEB skills.

Discussion

The present research addressed two main questions. First, can a behavioral challenge intervention facilitate the development of social, emotional, and behavioral skills? We found intervention effects for four major skill domains. In general, individuals who nominated a domain as a focus for development perceived larger skill gains than those who did not. Moreover, those who successfully completed many behavioral challenges perceived even greater improvements. By contrast, individuals who accepted—but failed to complete—many challenges perceived less positive skill change.

Second, are gains in perceived skills linked with positive life outcomes? Yes. For almost all the hypothesized skill-outcome links, individuals who began the intervention with high skill levels experienced more positive life outcomes, and those who subsequently improved their skills attained even more positive outcomes. Most of these skill-outcome links remained robust even when controlling for demographic variables and overlap between skill domains.

Conceptual and practical implications

The present research has broader implications for researchers, practitioners, and policymakers. Most obviously, our findings provide initial support for the effectiveness of a behavioral challenge intervention for improving social, emotional, and behavioral skills, and indicate that perceived skill gains are linked with positive life outcomes. These findings go beyond previous work in multiple ways. First, previous research has found that SEL programs tend to be more effective for children and early adolescents than for older adolescents and adults (Durlak et al., 2011, 2022; Kautz et al., 2014; Yeager, 2017). By contrast, the present intervention predicted changes in SEB skills among young adults. Its effectiveness with this population may reflect the considerable degree of agency and choice afforded to participants. Each participant was free to nominate the skill domains that they most wanted to change, and to select each week from a variety of behavioral challenges related to their target skills. These choices may have encouraged participants to buy into the intervention, more so than a fixed SEL curriculum delivered by a teacher or other authority figure (Yeager, 2017). This intervention holds promise for reaching adolescent and adult populations that have proven resistant to classroom-based programs.

Second, research on SEL interventions has largely focused on structured programs delivered in person. Such programs typically require schools or other organizations to invest considerable staff and learner time for training and implementation. They can therefore be costly to deploy, especially at large scale. By contrast, the intervention tested here was administered remotely and flexibly. Participants only needed an internet-enabled device and an email account. Moreover, the flexible timing of the intervention allowed participants to follow their own schedule. Thus, in many settings this intervention could be deployed at scale with little or no cost.

Third, previous work on volitional change has focused on personality traits, whereas the present research adapted this approach to target SEB skills (Hudson et al., 2019; Hudson & Fraley, 2015; Stieger et al., 2021, 2024). Although previous work has found some encouraging results regarding trait change, a behavioral challenge approach—which encourages participants to practice enacting specific behaviors in specific situations—may be even better suited for developing SEB skills. This is due to the general importance of deliberate practice and feedback for improving skills of all kinds (Ambrose et al., 2010; Bandura, 1997; Ericsson et al., 1993; Hattie & Timperley, 2007), as well as the intuition that it may be more desirable, feasible, and impactful for people to improve their skills than to change their traits (Feraco et al., 2025). The present study provides some initial support for this hypothesis. However, it is the first of its kind to test a behavioral challenge intervention targeting SEB skills rather than personality traits, and more research is clearly needed. For example, future work could directly compare the effects of volitional change interventions framed in terms of skill development vs. trait change on participants' motivation, engagement, development, and outcomes. Such work could also investigate whether people's beliefs about the desirability, feasibility, and potential impact of skill development moderate the effects of behavioral challenge interventions.

A final implication concerns links between SEB skills and life outcomes. An appealing aspect of SEB skills is the intuition that improving people's skills could also improve their quality of life (Casillas et al., 2015; Duckworth et al., 2007; Farrington et al., 2012; Kautz et al., 2014; Nagaoka et al., 2015; National Research Council, 2012; OECD, 2015). Previous research has found associations between SEB skills and life outcomes (Feraco et al., 2024; Feraco et al., 2024; Postigo et al., 2024; Sewell et al., 2023; Soto et al., 2022; 2024; Yoon et al., 2024; Ringwald et al., in press), but much of this work has used cross-sectional designs that cannot test whether changes in skills are linked with changes in outcomes. Research on SEL programs has also shown associations with positive student outcomes (Durlak et al., 2010, 2011, 2022; Taylor et al., 2017). However, this work has been criticized for failing to consistently test whether changes in skills predict changes in outcomes (Ura et al., 2020). By contrast, the present research indicates that gains in

perceived skills over time were linked with positive changes in outcomes including social relationships, academic and civic engagement, health, and well-being. Skill-focused interventions may therefore promote both skill development and broader positive outcomes.

It is also important to consider the practical significance of these findings. The observed magnitudes of the intervention effects on perceived skills, which ranged from approximately .10–30 standard deviation units, would conventionally be characterized as modest. However, several considerations suggest that these effects are meaningful and practically significant. First, the magnitudes of these changes are similar to, or greater than, the effects typically observed in previous studies of volitional change interventions (e.g., Hudson et al., 2019; Stieger et al., 2021), and comparable to the effects sometimes observed in more intensive, therapist-led clinical interventions (Roberts et al., 2017). Second, small but steady gains in skills could continue to accumulate over longer periods than the four months observed here; indeed, successful participants in the present intervention showed monthly rates of skill development that were more than an order of magnitude faster than the normative rates of personality change typically observed across adulthood (Bleidorn et al., 2022). Third, even modest improvements in SEB skills can have cascading effects on an individual's life (Masten & Cicchetti, 2010). As shown by the present results, changes in SEB skills are linked with a broad range of positive outcomes. Thus, even modest skill development could serve as an initial catalyst for positive upward spirals, whereby skill development leads to better outcomes, which then further reinforce those skills.

Strengths, limitations, and future directions

The present research had some key strengths, including its novel application of a behavioral challenge intervention to SEB skill development, as well as its intensive longitudinal design that tracked changes in both skills and outcomes over time. However, this research also had limitations that highlight important directions for future work. For example, participants self-selected the SEB skill domains that they wished to target during the intervention, which raises the possibility of self-selection and demand effects on perceived skill development (Corneille & Lush, 2023; Orne, 1962). Some previous volitional change research argues against this interpretation. For example, individuals' beliefs about whether personality can change do not reliably predict their self-reported changes during a behavioral challenge intervention (Hudson et al., 2021). Similarly, individuals who are misled about what personality characteristic is being targeted by an intervention can still show change on the characteristic that is *actually* being targeted, rather than the one they *believe* is being targeted—at least for some characteristics (Hudson, 2021). However, future research using a randomized control group, random assignment to skill domains, or deception regarding the targeted skill domains is needed to further test the role of self-selection and demand effects during behavioral challenge interventions.

A related limitation was that SEB skills and life outcomes were both assessed through self-reports. This raises the possibility that some skill-outcome links may be inflated by shared-method bias (Podsakoff et al., 2012). We note that many skill-outcome links were robust across analyses that controlled for overlap between skill domains, as well as demographic characteristics. Such findings argue against a global self-efficacy or positivity effect whereby individuals whose lives were going well simply reported higher levels of all skills and outcomes. Moreover, previous studies have shown relations of self-reported SEB skills with observer-reported and objectively recorded outcomes (e.g., Breil et al., 2022; Chen et al., 2024; Soto et al., 2023, 2024; Yoon et al., 2024). However, future research using other data sources is needed to replicate and extend the present findings.

An additional limitation concerns the time scale and persistence of observed changes. The present research tracked participants for up to 16 weeks, and found changes in both perceived skills and life outcomes across this period. However, it is unknown whether these effects will be sustained over longer periods of time. One recent study of volitional trait change continued to find positive intervention effects 1 year later (Stieger et al., 2024). Future research can similarly investigate long-term effects of the present intervention on skills and outcomes.

One other limitation concerns generalizability. The present participants were all college and university students in the United States. Future research can compare the effects of behavioral interventions on skill development across different populations such as younger students, adult workers, and community samples, as well as in other cultural contexts.

Beyond addressing these limitations, another noteworthy future direction is further exploring the possibility of different intervention effects for different skill domains. The present findings suggest that the importance of intention and follow-through for volitional change may differ across skill domains. For example, the results illustrated in Figures 1(A) and 1(B) suggest that intention may be particularly important for developing social engagement skills, whereas follow-through may be more important for developing self-management skills. This pattern raises the broader question of whether pure intention effects (as in the present case of social engagement skills) should be considered evidence of a successful intervention. This issue parallels the well-established contrast between intent-to-treat and treatment-adherence effects in clinical research (Molero-Calafell et al., 2024). An intent-to-treat analysis estimates the effect of being assigned to a treatment, regardless of whether participants follow the protocol, thus providing a practical estimate of a treatment's real-world impact. In contrast, a treatment-adherence analysis estimates the effect of actually completing the treatment as designed, thereby providing a clearer test of the treatment's hypothesized causal mechanism. In the present research, the effects of nominating a skill domain for change are analogous to intent-to-treat effects, demonstrating that the act of identifying a goal can itself be psychologically impactful. By contrast, the effects of completing behavioral challenges parallel treatment-adherence effects and thus test whether

the process of practicing behaviors builds skills. Our view is that both intention and implementation can constitute successful intervention effects, because both goal-setting and follow-through can meaningfully contribute to volitional change—usually in tandem, but sometimes in isolation. That said, we caution against overinterpreting between-domain differences in intervention effects on the basis of a single study, and future research is needed to replicate these findings. If they prove robust (e.g., Hudson et al., 2020), then additional work could investigate their causes, consequences, and mechanisms.

Conclusion

The present research tested an intervention designed to facilitate the development of social, emotional, and behavioral skills. Intervention participants set weekly behavioral challenge goals designed to practice particular SEB skills, then evaluated their success in pursuing each challenge goal. Our findings suggest that this intervention promoted the development of four major skill domains: self-management, social engagement, emotional resilience, and innovation skills. Moreover, gains in perceived skills over time were linked with positive changes in outcomes including social relationships, academic and civic engagement, health, and well-being. These findings provide initial evidence that a low-cost, highly scalable intervention can help promote SEB skill development.

Author Note

The first, third, and sixth authors are copyright holders for the Behavioral, Emotional, and Social Skills Inventory (BESSI), which was used in this research. All versions of the BESSI are freely available for research use at https://www.sebskills.com/.

This research was supported by faculty research grants from Colby College, Southern Methodist University, and the University of Illinois Urbana–Champaign.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

Open science statement

The study materials, data and analysis scripts used for this article can be accessed at https://osf.io/x3zjw/.

ORCID iDs

Christopher J. Soto https://orcid.org/0000-0002-2875-8919
Nathan W. Hudson https://orcid.org/0000-0001-6869-2910
Christopher M. Napolitano https://orcid.org/0000-0001-8626-2914

Notes

1. An alternative approach would be to analyze the number of challenges accepted, number of challenges completed, and skill changes, in terms of within-person weekly fluctuations. This approach would test a different hypothesis: that each individual shows larger skill gains during weeks in which they enact more successful practice than during weeks in which they practice less. However, this alternative approach would not be sensitive to cases in which an individual steadily accumulates successful practice, and therefore gradual skill gains, with little week-to-week fluctuation in the rate of practice and skill gain.
2. For exploratory purposes, we also measured the Big Five personality traits at each wave using the Big Five Inventory–2 short form (Soto & John, 2017). We then repeated these intervention analyses with personality traits rather than SEB skills as the outcome variables. In these analyses, we found stronger effects of the behavioral challenge intervention on skill development than on trait change (see Supplemental Table S4). This might suggest that the behavioral challenge intervention successfully targeted SEB skills rather than traits, or that skills are more amenable to volitional change than are traits.
3. We also repeated these MLMs while including whether the skill domain was nominated as a focus for change; the mean weekly number of domain-relevant behavioral challenges attempted over the course of the intervention; the mean weekly number of challenges successfully completed; and all two-way interactions of time, initial skills levels, and within-person skill changes with skill domain nomination, number of challenges attempted, and number of challenges completed as additional predictors, per our preregistration. The results of these analyses are presented in Supplemental Tables S9 and S10. Very few of the interactions between aspects of the intervention and time were statistically significant (i.e., 25 of 360 possible interactions). We therefore refrain from interpreting these additional interactions.
4. For exploratory purposes, we also conducted MLMs to examine between-person and within-person associations between the Big Five personality traits and life outcomes (see Tables S11 to S14). These results indicated that outcomes usually—but not always—showed similar associations with corresponding personality traits and SEB skills.

References

Abrahams, L., Pancorbo, G., Primi, R., Santos, D., Kyllonen, P., John, O. P., & De Fruyt, F. (2019). Social-emotional skill assessment in children and adolescents: Advances and challenges in personality, clinical, and educational contexts. *Psychological Assessment*, *31*(4), 460–473. https://doi.org/10.1037/pas0000591

Ackerman, R. A., Donnellan, M. B., & Kashy, D. A. (2011). Working with dyadic data in studies of emerging adulthood: Specific recommendations, general advice, and practical tips. In F. D. Fincham & M. Cui (Eds.), *Romantic relationships in emerging adulthood* (pp. 67–97). Cambridge University Press.

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). *How learning works: Seven research-based principles for smart teaching*. Jossey-Bass.

Anderson, C., John, O. P., Keltner, D., & Kring, A. M. (2001). Who attains social status? Effects of personality and physical attractiveness in social groups. *Journal of Personality and Social Psychology*, *81*(1), 116–132. https://doi.org/10.1037/0022-3514.81.1.116

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting

standards for quantitative research in psychology: The APA publications and communications board task force report. *American Psychologist*, *73*(1), 3–25. https://doi.org/10.1037/amp0000191

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.

Berg, J., Osher, D., Same, M. R., Nolan, E., Benson, D., & Jacobs, N. (2017). *Identifying, defining, and measuring social and emotional competencies*. American Institutes for Research.

Bleidorn, W., Schwaba, T., Zheng, A., Hopwood, C. J., Sosa, S. S., Roberts, B. W., & Briley, D. A. (2022). Personality stability and change: A meta-analysis of longitudinal studies. *Psychological Bulletin*, *148*(7–8), 588–619. https://doi.org/10.1037/bul0000365

Brackett, M. A., Rivers, S. E., Reyes, M. R., & Salovey, P. (2012). Enhancing academic performance and social and emotional competence with the RULER feeling words curriculum. *Learning and Individual Differences*, *22*(2), 218–224.

Bradburn, N. M., & Noll, C. E. (1969). *The structure of psychological well-being*. Aldine Publishing Company.

Breil, S. M., Mielke, I., Ahrens, H., Geldmacher, T., Sensmeier, J., Marschall, B., & Back, M. D. (2022). Predicting actual social skill expression from personality and skill self-concepts. *Journal of Intelligence*, *10*(3), 48. https://doi.org/10.3390/jintelligence10030048

Bukowski, W. M., Hoza, B., & Boivin, M. (1994). Measuring friendship quality during pre-and early adolescence: The development and psychometric properties of the friendship qualities scale. *Journal of Social and Personal Relationships*, *11*(3), 471–484. https://doi.org/10.1177/0265407594113011

Carlo, G., Okun, M. A., Knight, G. P., & de Guzman, M. R. T. (2005). The interplay of traits and motives on volunteering: Agreeableness, extraversion and prosocial value motivation. *Personality and Individual Differences*, *38*(6), 1293–1305. https://doi.org/10.1016/j.paid.2004.08.012

Casillas, A., Way, J., & Burrus, J. (2015). Behavioral skills. In W. Camara, R. O'Connor, K. Mattern, & M. A. Hanson (Eds.), *Beyond academics: A holistic framework for enhancing education and workplace success* (pp. 25–38). ACT.

Chen, L., Zhang, B., & Li, J. (2024). Social, emotional, and behavioral (SEB) skills in the workplace. *Collabra: Psychology*, *10*(1), Article 120531. https://doi.org/10.1525/collabra.120531

Corneille, O., & Lush, P. (2023). Sixty years after orne's American psychologist article: A conceptual framework for subjective experiences elicited by demand characteristics. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology, Inc*, *27*(1), 83–101. https://doi.org/10.1177/10888683221104368

Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, *25*(1), 7–29. https://doi.org/10.1177/0956797613504966

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

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), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Durlak, J. A., Mahoney, J. L., & Boyle, A. E. (2022). What we know, and what we need to find out about universal, school-based social and emotional learning programs for children and adolescents: A review of meta-analyses and directions for future research. *Psychological Bulletin*, *148*(11–12), 765–782. https://doi.org/10.1037/bul0000383

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, *82*(1), 405–432. https://doi.org/10.1111/j.1467-8624.2010.01564.x

Durlak, J. A., Weissberg, R. P., & Pachan, M. (2010). A meta-analysis of after-school programs that seek to promote personal and social skills in children and adolescents. *American Journal of Community Psychology*, *45*(3–4), 294–309. https://doi.org/10.1007/s10464-010-9300-6

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, *100*(3), 363–406. https://doi.org/10.1037/0033-295X.100.3.363

Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching adolescents to become learners: The role of noncognitive factors in shaping school performance—A critical literature review.* University of Chicago Consortium on Chicago School Research. https://files.eric.ed.gov/fulltext/ED542543.pdf

Feraco, T., Casali, N., Pellegrino, G., Soto, C. J., Napolitano, C. M., Carretti, B., & Meneghetti, C. (2024). The Italian behavioral, emotional, and social skills inventory (BESSI-I). *Journal of Personality Assessment*, *106*(6), 750–764. https://doi.org/10.1080/00223891.2024.2335912

Feraco, T., Hudson, N. W., & Soto, C. J. (2025). Differences in change goals between personality traits and social, emotional, and behavioral skills. *Personality and Individual Differences*, *241*(2), Article 113200. https://doi.org/10.1016/j.paid.2025.113200

Gibson, J. J. (1977). The theory of affordances. In R. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: Toward an ecological psychology* (pp. 67–82). Erlbaum.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences. Journal Canadien Des Sciences Appliquees au Sport*, *10*(3), 141–146.

Greenberg, M. T., & Kusché, C. A. (2006). Building social and emotional competence: The PATHS curriculum. In S. R. Jimerson & M. Furlong (Eds.), *Handbook of school violence and school safety: From research to practice* (pp. 395–412). Lawrence Erlbaum Associates Publishers.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, *77*(1), 81–112. https://doi.org/10.3102/003465430298487

Hays, R. D., Bjorner, J. B., Revicki, D. A., Spritzer, K. L., & Cella, D. (2009). Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *18*(7), 873–880. https://doi.org/10.1007/s11136-009-9496-9

Hudson, N. W. (2021). Does successfully changing personality traits via intervention require that participants be

autonomously motivated to change? *Journal of Research in Personality*, *95*(4), Article 104160. https://doi.org/10.1016/j.jrp.2021.104160

Hudson, N. W., Briley, D. A., Chopik, W. J., & Derringer, J. (2019). You have to follow through: Attaining behavioral change goals predicts volitional personality change. *Journal of Personality and Social Psychology*, *117*(4), 839–857. https://doi.org/10.1037/pspp0000221

Hudson, N. W., & Fraley, R. C. (2015). Volitional personality trait change: Can people choose to change their personality traits? *Journal of Personality and Social Psychology*, *109*(3), 490–507. https://doi.org/10.1037/pspp0000021

Hudson, N. W., Fraley, R. C., Briley, D. A., & Chopik, W. J. (2021). Your personality does not care whether you believe it can change: Beliefs about whether personality can change do not predict trait change among emerging adults. *European Journal of Personality*, *35*(3), 340–357. https://doi.org/10.1002/per.2289

Hudson, N. W., Fraley, R. C., Chopik, W. J., & Briley, D. A. (2020). Change goals robustly predict trait growth: A mega-analysis of a dozen intensive longitudinal studies examining volitional change. *Social Psychological and Personality Science*, *11*(6), 723–732. https://doi.org/10.1177/1948550619878423

Hudson, N. W., & Roberts, B. W. (2014). Goals to change personality traits: Concurrent links between personality traits, daily behavior, and goals to change oneself. *Journal of Research in Personality*, *53*, 68–83. https://doi.org/10.1016/j.jrp.2014.08.008

Kaufman, S. B. (2021). *Transcend: The new science of self-actualization*. Penguin.

Kautz, T., Heckman, J. J., Diris, R., Weel, B. T., & Borghans, L. (2014). Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. *National Bureau of Economic Research*, *20749*. Working Paper. https://doi.org/10.3386/w20749

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, *57*(9), 705–717. https://doi.org/10.1037/0003-066X.57.9.705

Low, S., Cook, C. R., Smolkowski, K., & Buntain-Ricklefs, J. (2015). Promoting social–emotional competence: An evaluation of the elementary version of Second Step®. *Journal of School Psychology*, *53*(6), 463–477.

Maslow, A. H. (1971). *The farther reaches of human nature*. Viking.

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and Psychopathology*, *22*(3), 491–495. https://doi.org/10.1017/S0954579410000222

Matuschek, H., Kliegl, R., Vasishth, S., Baayen, H., & Bates, D. (2017). Balancing type I error and power in linear mixed models. *Journal of Memory and Language*, *94*, 305–315. https://doi.org/10.1016/j.jml.2017.01.001

Molero-Calafell, J., Burón, A., Castells, X., & Porta, M. (2024). Intention to treat and per protocol analyses: Differences and similarities. *Journal of Clinical Epidemiology*, *173*, Article 111457. https://doi.org/10.1016/j.jclinepi.2024.111457

Nagaoka, J., Farrington, C. A., Ehrlich, S. B., & Heath, R. D. (2015). *Foundations for young adult success: A developmental framework*. University of Chicago Consortium on. https://eric.ed.gov/?id=ED559970

Napolitano, C. M., Soto, C. J., Sewell, M. N., Yoon, H. J., & Roberts, B. W. Changes in social, emotional, and behavioral skills are associated with changes in secondary school students' important outcomes. *European Journal of Personality*, https://doi.org/10.1177/08902070251328046. (in press).

National Research Council. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century*. The National Academies Press. https://nap.nationalacademies.org/read/13398/chapter/1

Organisation for Economic Co-Operation and Development [OECD]. (2015). Skills for social progress: The power of social and emotional skills. https://www.oecd.org/education/skills-for-social-progress-9789264226159-en.htm

Orne, M. T. (1962). On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications. *American Psychologist*, *17*(11), 776–783. https://doi.org/10.1037/h0043424

Paunonen, S. V. (2003). Big five factors of personality and replicated predictions of behavior. *Journal of Personality and Social Psychology*, *84*(2), 411–424. https://doi.org/10.1037/0022-3514.84.2.411

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*(1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Postigo, Á., González-Nuevo, C., García-Fernández, J., García-Cueto, E., Soto, C. J., Napolitano, C. M., Roberts, B. W., & Cuesta, M. (2024). The behavioral, emotional, and social skills inventory: A Spanish adaptation and further validation in adult population. *Assessment*, *31*(7), 1525–1547. https://doi.org/10.1177/10731911231225197

Ringwald, W. R., Napolitano, C., Sewell, M. N., Soto, C. J., Yoon, H. R., & Wright, A. G. More skill than trait, or more trait than skill? Relations of (mis)matches between personality traits and social, emotional, behavioral skills with adolescent outcomes. *European Journal of Personality*, (in press). https://doi.org/10.1177/08902070241309960

Roberts, B. W., Luo, J., Briley, D. A., Chow, P. I., Su, R., & Hill, P. L. (2017). A systematic review of personality trait change through intervention. *Psychological Bulletin*, *143*(2), 117.

Rothman, K. J. (1990). No adjustments are needed for multiple comparisons. *Epidemiology*, *1*(1), 43–46. https://doi.org/10.1097/00001648-199001000-00010

Sewell, M. N., Napolitano, C. M., Roberts, B. W., Soto, C. J., & Yoon, H. J. (2023). The social, emotional, and behavioral skill antecedents to college students' volunteering during the COVID-19 pandemic. *Journal of Research on Adolescence: The Official Journal of the Society for Research on Adolescence*, *33*(2), 618–631. https://doi.org/10.1111/jora.12830

Sewell, M. N., Yoon, H. J., Lechner, C. M., Napolitano, C. M., Rammstedt, B., Roberts, B. W., & Soto, C. J. Assessing social, emotional, and behavioral skills in just a few minutes: 96-, 45-, and 20-item short forms of the BESSI. *Assessment*, (in press).

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, *22*(11), 1359–1366. https://doi.org/10.1177/0956797611417632

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a

larger motivational dynamic? *Journal of Educational Psychology*, *100*(4), 765–781. https://doi.org/10.1037/a0012840

Soto, C. J., & John, O. P. (2017). Short and extra-short forms of the big five Inventory–2: The BFI-2-S and BFI-2-XS. *Journal of Research in Personality*, *68*, 69–81. https://doi.org/10.1016/j.jrp.2017.02.004

Soto, C. J., Napolitano, C. M., & Roberts, B. W. (2021). Taking skills seriously: Toward an integrative model and agenda for social, emotional, and behavioral skills. *Current Directions in Psychological Science*, *30*(1), 26–33. https://doi.org/10.1177/0963721420978613

Soto, C. J., Napolitano, C. M., Sewell, M. N., Yoon, H. J., & Roberts, B. W. (2022). An integrative framework for conceptualizing and assessing social, emotional, and behavioral skills: The BESSI. *Journal of Personality and Social Psychology*, *123*(1), 192–222. https://doi.org/10.1037/pspp0000401

Soto, C. J., Napolitano, C. M., Sewell, M. N., Yoon, H. J., Murano, D., Casillas, A., & Roberts, B. W. (2023). What I do and what I *can* do: Testing the convergence and incremental validity of social, emotional, and behavioral skills vs. traits for predicting academic success. *Journal of Research in Personality*, *104*(4), Article 104382. https://doi.org/10.1016/j.jrp.2023.104382

Soto, C. J., Napolitano, C. M., Sewell, M. N., Yoon, H. J., & Roberts, B. W. (2024). Going beyond traits: Social, emotional, and behavioral skills matter for adolescents' success. *Social Psychological and Personality Science*, *15*(1), 33–45. https://doi.org/10.1177/19485506221127483

Stieger, M., Flückiger, C., & Allemand, M. (2024). One year later: Longer-term maintenance effects of a digital intervention to change personality traits. *Journal of Personality*, *92*(5), 1424–1437. https://doi.org/10.1111/jopy.12898

Stieger, M., Flückiger, C., Rüegger, D., Kowatsch, T., Roberts, B. W., & Allemand, M. (2021). Changing personality traits with the help of a digital personality change intervention. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(8), Article e2017548118. https://doi.org/10.1073/pnas.2017548118

Syvertsen, A. K., Wray-Lake, L., & Metzger, A. (2015). *Youth civic and character measures toolkit*. Search Institute. https://www.search-institute.org/downloadable/Youth-Civic-Character-Measures-Toolkit.pdf

Taylor, R. D., Oberle, E., Durlak, J. A., & Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child Development*, *88*(4), 1156–1171. https://doi.org/10.1111/cdev.12864

Ura, S. K., Castro-Olivo, S. M., & d'Abreu, A. (2020). Outcome measurement of school-based SEL intervention follow-up studies. *Assessment for Effective Intervention*, *46*(1), 76–81. https://doi.org/10.1177/1534508419862619

Yeager, D. S. (2017). Social and emotional learning programs for adolescents. *The Future of Children*, *27*(1), 73-94. https://doi.org/10.1353/foc.2017.0004. https://www.jstor.org/stable/44219022

Yoon, H. J., Roberts, B. W., Sewell, M. N., Napolitano, C. M., Soto, C. J., Murano, D., & Casillas, A. (2024). Examining SEB skills' incremental validity over personality traits in predicting academic achievement. *PLoS ONE*, *19*(1), Article e0296484. https://doi.org/10.1371/journal.pone.0296484