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Changes in social, emotional, and behavioral skills are associated with changes in secondary school students' important outcomes

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Abstract

Evidence across the social sciences suggests the importance of social, emotional, and behavioral (SEB) skills for a wide variety of youth outcomes. However, most of this work is cross-sectional. We know little about how patterns of change in adolescents' SEB skills may be related to commensurate patterns of change in important outcomes across an academic year. Drawing from a sample of American secondary school students (N = 942), this longitudinal study employs latent change score models to fill that gap. We report four key findings. We find that (1) a short version of the Behavioral, Emotional, and Social Skills Inventory (BESSI) is psychometrically suitable for longitudinal analyses. We further find that (2) SEB skills are highly stable, on average, but also (3) characterized by significant between-person variation in change. Centrally, we find that (4) positive changes in SEB skills are related to changes in academic engagement, friendship quality, anxiety, depression, life satisfaction, as well as other measures of social and emotional competencies. Taken together, the results suggest that SEB skills are malleable, but future work is needed to identify patterns of change and develop and test targeted interventions.

Plain Language Summary

Why do some adolescents succeed? What can researchers, practitioners, and policymakers do to make sure that more can? One important part of success seems to be adolescents' social, emotional, and behavioral (SEB) skills, which include things like leadership, stress management, empathy, organization, and creativity. There has been a great deal of work recently on these SEB skills, but we don't know much about how they change across an academic year, or if that change also predicts change in important outcomes in academics, social life, and adolescents' health. Filling those gaps was the aim of this study. We collected three questionnaires from a starting sample of 942 US American high school students. In that questionnaire, we asked them about their SEB skills, as well as important outcomes like their levels of anxiety, depression, academic engagement, and peer acceptance. We found that most adolescents SEB skills don't change much across an academic year. But some adolescents did improve in their SEB skills, and when they did, they also tended to improve in those important outcomes. These results give us more confidence that SEB skills can change and improve, and that helping students improve in their SEB skills could be an important part of helping them succeed.

Keywords

SEB skills, socioemotional skills, social and emotional learning, adolescence, achievement

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Introduction

Why do some adolescents succeed and thrive? What can researchers, practitioners, and policymakers do to ensure that more can? In recent years, a growing chorus across the social and behavioral sciences has suggested that a broad array of socioemotional skills, most sensitive to development across the first two decades of life (Heckman & Kautz, 2012; Kautz et al., 2014), are vital for youth thriving (Cipriano et al., 2023; Duckworth et al., 2007; Nagaoka et al., 2015; National Research Council, 2012; OECD, 2015; Taylor et al., 2017). The burgeoning literature on the associations between these skills and youth thriving is, however, primarily based on cross-sectional research. Given this critical gap, the purpose of the present study was

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to investigate (a) patterns of stability and change in adolescents' social, emotional, and behavioral skills (Soto et al., 2021) across an academic year, and (b) whether these patterns were associated with change across important youth thriving outcomes, such as school grades, academic engagement, life satisfaction, peer acceptance, and friendship quality.

Social, emotional, and behavioral (SEB) skills during adolescence

Adolescence has been termed an "age of opportunity" (Steinberg, 2014), a period when young people explore their identities, form close relationships with others, and begin to chart their life course by setting and striving for long-term goals (Napolitano et al., 2011). Though the field has largely moved beyond the deficit-based perspectives that characterized youth as "problems to be managed" (e.g., Lerner et al., 2021; cf. Twenge, 2020), adolescents still face numerous challenges across this developmental period. Therefore, a useful way to understand how adolescents thrive is to look at how they balance the new *opportunities* and new *challenges* that come with their development. For example, consider a ninth-grade student struggling with Algebra. They could cheat by looking at another student's work. Instead, they ask their teacher if they could stay after school for additional help. In this case, the student met their academic challenge by, at least in part, leveraging their developmentally afforded opportunity to resist impulses and remain ethical (i.e., not cheating), regulate their emotions (i.e., managing stress), and socially engage (i.e., speaking with the teacher).

The above example illustrates the consensus that intelligence and circumstances alone do not predict a young person's thriving. Instead, thriving also requires adolescents to develop, coordinate, and deploy a variety of skills to leverage developmental opportunities and meet developmental challenges (Napolitano et al., 2021). In the present research, we focus on social, emotional, and behavioral (SEB) skills (Soto et al., 2021), which provides more conceptual and operational precision.

SEB skills build upon, but are distinct from, personality traits

Our work on SEB skills is based on two positions. First, those skills are conceptually distinct from (the also important categories of) traits, beliefs, attitudes, and values (see Soto, Napolitano et al., 2022b). Second, the Five Factor Model of Personality (John et al., 2008) provides the most empirically robust higher-order framework for taxonomizing a person's skills, even if that framework was originally developed for traits.

SEB skills. There are many existing terms used to describe the positive qualities or characteristics linked to a person's thriving, including *noncognitive*, *soft*, or *socioemotional* skills (Abrahams et al., 2019; Berg et al., 2017). Regardless of the general term scholars employ, these qualities or characteristics are all thought to be advantageous for both the person and their social connections, expressed in relevant situations, and separate from intelligence (Duckworth & Yeager, 2015). Moreover, these skills are somewhat stable, but also malleable, as demonstrated by meta-analyses examining youth in both educational and informal settings (e.g., Cipriano et al., 2023; Durlak et al., 2010). Broadly, the development of noncognitive, soft, or socioemotional skills is thought to be non-linear, with rapid changes early in the life span and significant between-person variability (Cantor et al., 2019; Chatterjee Singh and Duraiappah, 2020; Steponavičius et al., 2023). However, these are generalizations; understanding the specific developmental patterns, trajectories, and consequences of these skills is challenging because they encompass an unwieldy theoretical space that includes a person's skills, traits, beliefs, attitudes, and values.

We take a narrower approach and define the focal construct of this research—SEB skills—explicitly as *skills*. SEB skills are as a person's *functional capacities* to maintain social relationships, regulate emotions, and manage goal- and learning-directed behaviors (Soto et al., 2021). Example SEB skills include how well a person can make conversation, set goals, manage stress, and control impulses. This conceptualization builds on earlier skills research from personality psychology that focused on how *well* a person can respond to a situation (Paulhus & Martin, 1987; Wallace, 1966, 1967), as well as economics work on non-cognitive skills (Cunha et al., 2010).

Despite this intellectual heritage, SEB skills are not personality traits, or a person's patterns of thinking, feeling, and behaving, averaged across diverse situations (Allport, 1937; Fleeson & Jayawickreme, 2021). Distinguishing traits from skills is similar to distinguishing between a worker's or athlete's regular and peak performance (Sackett et al., 1988). Or, to ground this discussion in adolescence, imagine a generally disorganized (i.e., low trait conscientiousness) secondary school student developing a detailed spreadsheet as they prepare for college applications (i.e., high organizational skill when needed). Some recent empirical research supports this distinction: SEB skills were related to, but distinct from personality traits, and provided incremental validity over personality traits in cross-sectionally predicting academic achievement and other outcomes (Soto et al., 2023; Yoon et al., 2024). We note that traits also clearly matter for adolescents' thriving (Shiner & Caspi, 2003; Soto & Tackett, 2015), and these relations are already well established in the literature. But there is a need for more research examining how SEB skills—when conceptualized and measured as skills—contribute to youth thriving.

The five-factor model provides a robust framework for taxonomizing SEB skills. To build on this conceptualization of SEB skills as functional capacities, a taxonomic framework is needed to organize skills, develop measures, and generate and test hypotheses. Many such frameworks for SEB skills or related concepts have been proposed (for an interactive database, see https://exploresel.gse.harvard.edu), and while they differ in their terminology, several reviews of the most prominent frameworks (e.g., Abrahams et al., 2019; Casillas et al., 2015; Kautz et al., 2014; National Research

Council, 2012; OECD, 2015; Soto et al., 2021) have come to a similar conclusion. Namely, that SEB skills can be effectively organized into major domains that resemble the "Big Five" personality traits—Extraversion, Agreeableness, Conscientiousness, Emotional Stability (vs. Neuroticism), and Openness to Experience (e.g., John et al., 2008)—in terms of their behavioral content, but are defined in terms of functional capacities (skills) rather than average behavioral tendencies (traits).

SEB skills can be validly and reliably measured and are related to important life outcomes

A growing body of evidence supports these two positions: that skills should be conceptualized and operationalized as skills (rather than traits), and that the Five Factor Model can be adapted to taxonomize the wide array of specific SEB skills. For example, the Behavioral, Emotional, and Social Skills Taxonomy (BESST; Soto et al., 2021) uses the Big Five to organize and categorize SEB skills. The Behavioral, Emotional, and Social Skills Inventory (BESSI; Soto, Napolitano et al., 2022a) is the measurement tool for this taxonomy of SEB skills. The BESST organizes 32 specific SEB skills (termed skill facets) across five broad categories (termed skills domains) that closely resemble the Big Five personality traits in terms of their behavioral content. The five skills domains are:

1. Social Engagement (Extraversion) Skills: capacities used to actively engage with other people;
2. Cooperation (Agreeableness) Skills: capacities used to maintain positive social relationships;
3. Self-Management (Conscientiousness) Skills: capacities used to effectively pursue goals and complete tasks;
4. Emotional Resilience (Emotional Stability) Skills: capacities used to regulate emotions and moods;
5. Innovation (Openness) Skills: capacities used to engage with novel ideas and experiences.

The BESST is presented in Figure 1.

Initial research on the BESSI has found that 1) it has strong psychometric properties, 2) SEB skills are consistently associated with a diverse array of important life outcomes during adolescence; and 3) SEB skills can be empirically differentiated from personality traits (Soto, Napolitano et al., 2022a). Research focused on developing a German translation of the BESSI (BESSI-G; Lechner et al., 2022) found strong psychometric properties (including strong test-retest reliability) and additionally demonstrated that participants' responses to the BESSI-G were largely independent of crystallized and fluid intelligence. Italian and Spanish translations of the BESSI were similarly psychometrically sound (Feraco et al., 2024; Postigo et al., 2024).

SEB skills are likely important for adolescents' thriving. The biological, cognitive, and social transitions that characterize adolescence make the development and refinement of SEB skills both possible and critical (Napolitano et al., 2021). There is considerable literature suggesting that socioemotional skills, broadly speaking, are related to youth success and thriving and that interventions and programs can effectively promote these skills (Durlak et al., 2022). However, we know considerably less about the characteristics of adolescent socioemotional skill development outside these interventions and programs. The present research addresses this limitation in the literature. More recently, a developing line of work has begun to demonstrate that SEB skills, in particular, are important for adolescents' thriving (Napolitano et al., 2021). For example, cross-sectional research has demonstrated that adolescents' SEB skills are associated with their academic achievement and engagement, occupational interests, social relationships, civic engagement, and well-being, beyond the effect of personality traits (Soto et al., 2022b). A key aim of the present research is to examine whether these same associations between SEB skills and important life outcomes hold when assessing change through longitudinal analyses.

SEB skills have also been related to other important aspects of youth thriving. For example, secondary school students who report higher levels of SEB skills (relative to their trait levels) tend to experience more positive outcomes than do those who report higher trait levels than skill levels (Ringwald et al., 2025). In addition, in the academic achievement realm, recent work showed that SEB skills provided incremental validity and showed stronger associations with academic test scores than personality traits (Yoon et al., 2024). In an even stricter test using items that had the exact same behavioral content and varied only in their response scale (i.e., SEB skills items used "how well" phrasing, whereas personality trait items used "how often" phrasing), SEB skills provided a modest but statistically significant degree of incremental validity over traits when predicting performance on the ACT standardized test (Soto et al., 2023). These effects go beyond the classroom: in a study of university students, the SEB skills of perspective taking, abstract thinking, and stress regulation were associated with more time spent volunteering during the COVID-19 pandemic (Sewell et al., 2023).

How the present study contributes to the literature

Much of the existing work on SEB skills—during adolescence or otherwise—has been based on cross-sectional data, and the few longitudinal studies that do exist have not explored developmental patterns of change and/or stability in SEB skills during adolescence. Relatedly, we are not aware of any research that tests the associations between the development of SEB skills and stability and change in adolescents' important life outcomes (e.g., academic achievement, mental health, and well-being). Therefore, the core purposes of this research are to (a) describe adolescents' patterns of development in SEB skills across an academic year, and (b) report how these patterns may be related to stability or change in important life outcomes for American secondary school students, such as academic engagement, friendship quality, peer acceptance, maternal and paternal relationship quality, anxiety, depression, life satisfaction, and vocational interests. We structured this work across four research questions (RQ1-RQ4).

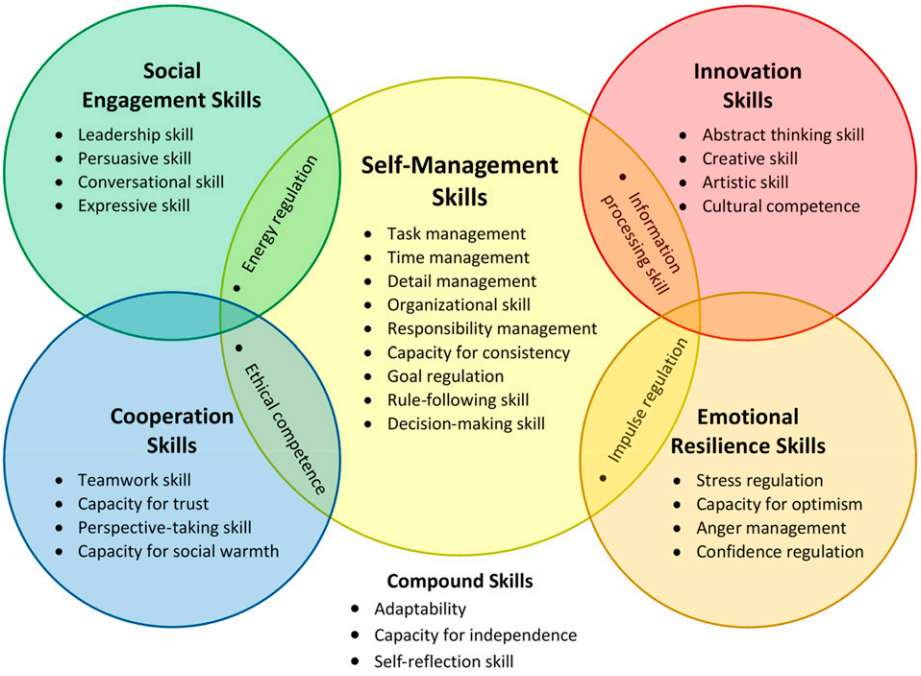

Figure 1. A visual depiction of the five domain Behavioral, Emotional, and Social Skills Taxonomy.

RQ1: Are adolescents' responses to the BESSI characterized by measurement invariance across a secondary school academic year?. A necessary initial step for longitudinal analyses is to test for longitudinal measurement invariance (Van de Schoot et al., 2015). Achieving at least partial strong (or intercept) longitudinal measurement invariance for SEB skills domain constructs is a prerequisite for subsequent analyses in this research to examine mean-level change, individual differences in change, and correlates of change. Moreover, assessing whether the BESSI is suited for longitudinal analyses is important for future researchers and practitioners interested in assessing change in SEB skills.

RQ2: On average, how stable are secondary school students' SEB skills across an academic year?. An aspect often mentioned when describing SEB skills is their potential malleability, at least when compared to personality traits and cognitive abilities (and, implicitly at least, opportunity structures). However, little previous research has directly tested the stability or malleability of SEB skills over time. To help address this gap, here we aim to investigate normative patterns of mean-level stability and change in SEB skills among secondary school students across an academic year. Consistent with the high levels of eight-month test-retest reliability observed in a recent adult sample (Lechner et al., 2022), we anticipate that adolescents' SEB skills will be, on average, fairly stable across this time span, but may show some positive mean-level change.

RQ3: Is there significant between-person variability in within-person change in SEB skills?. Sample averages do not paint the full picture of the patterns of stability and change in SEB skills. Instead, we think it is possible that some youth report more change in their SEB skills than others. Observing such significant between-person variation in SEB skills change, even if there is no normative mean-level change, would indicate that SEB skills can change substantially across an academic year for some youth.

RQ4: Is change in SEB skills associated with change in other psychological constructs and outcomes?. An implicit component of most research programs on SEB skills (or related concepts) is that because such skills seem related to important outcomes, it follows that when a person reports improvement in these skills, they should also report improvement in relevant outcomes. This assumption is the impetus behind most skills interventions, but it is rarely tested. We test that assumption here by investigating patterns of correlated change between SEB skills and important outcomes, as well as between SEB skills and related psychological constructs such as personality traits and other social and emotional competencies. If changes in SEB skills do correlate with changes in these outcomes and related constructs across an academic year, then it would further suggest the potential of SEB skills interventions for adolescents' positive development. Expanding prior cross-sectional work (Soto et al., 2022b), we selected a wide array of constructs and outcomes to test 58 pre-registered hypotheses about their patterns of correlated change with SEB skills. These constructs and outcomes included other measures of socio-emotional skills, vocational interests, grades, academic engagement, life satisfaction, peer acceptance, friendship quality, anxiety, and depression.

Method

Participants and procedure

Participants were 942 students from secondary schools in the United States. They completed online surveys on the Qualtrics platform in October 2021 (T1), January 2022 (T2), and May 2022 (T3) as part of the Character Lab Research Network, a consortium of schools across the

country that worked collaboratively with scientists to advance scientific insights that help kids thrive. At the beginning of the study, most participants (99.1%) were 14–18 years old (M = 15.55, SD = 1.16) and the sample was 51.0% female, 40.1% male, 3.9% another gender, and 5.0% not reported. The sample was diverse in terms of grade level (26.6% 9th grade, 26.9% 10th grade, 27.2% 11th grade, 14.5% 12th grade, and 4.8% not reported) and race/ethnicity (56.5% White/Caucasian, 36.6% Hispanic/Latino, 19.9% Black/African American, 7.9% Asian/Asian American, 1.2% another race, 1.9% multiracial, and 12.6% not reported, with some participants reporting multiple identifications). Potential participants were excluded from analysis of each survey if they completed it in less than one third of the median completion time. Within each survey block, participants were excluded if they failed either of two attention-check items. Within each measure, participants were excluded if they answered less than 90% of the items. Unless otherwise noted, each measure was collected identically across each time of measurement. Data collection was approved by the Advarra Institutional Review Board.

A total of 838 participants completed the focal measure of SEB skills at Time 1. These data were analyzed in a previous paper (Soto et al., 2022), and the present research represents a longitudinal extension of that work.[1] This subsample's size was in line with the targeted sample of 900 participants, based on power analyses to detect change in SEB skills. However, reflecting disruptions in the US education system during the COVID-19 pandemic, and thus decreased willingness by schools to devote time to research activities, this participation number declined to 296 at Time 2 and 245 at Time 3. Compared with participants who completed at least one follow-up assessment, those who only participated at Time 1 were less likely to be Asian/Asian-American (7% vs. 12% of the subsamples; $t(821) = -2.53$, $p = .012$) and more likely to be Black/African-American (28% vs. 15%; $t(821) = 4.18$, $p < .001$), but did not differ significantly on any other demographic characteristics, nor on their SEB skill levels at Time 1.

Measures

Self-report measures of skills, traits, and competencies

SEB skills. SEB skills were measured using the 45-item form of the Behavioral, Emotional, and Social Skills Inventory (BESSI-45; Sewell et al., 2024). Unlike the full BESSI-192, which provides scores on each of 32 SEB skill facets, the BESSI-45 is designed to efficiently measure the five major SEB skills domains: Self-Management, Social Engagement, Cooperation, Emotional Resilience, and Innovation Skills. Each item is a short phrase describing a thought, feeling, or behavior. Respondents rate how well they can perform that behavior on a scale from 1 = *not at all well* to 5 = *extremely well*. Table 1 provides scale means, standard deviations, and reliability values for all measures in this research. On average across three waves of measurement, participants' averaged responses were near the scale midpoint ($M_{average} = 3.22$; $SD_{average} = .73$), and the SEB skills domains were characterized by strong reliability ($\omega_{average} = .86$). On average, responses for each specific SEB skills domain were highly correlated across occasions ($r_{average}$ ranging from .78 to .84).

SEB skills responses largely did not differ across participant grade level, except for Cooperation at T1 (r = .08)[2]. There were no significant differences between male and female students, except for males reporting lower Innovation Skills at T1, $t(767) = -4.23$, $p < .001$, $d = -.31$, higher Social Engagement Skills at T2 $t_{T2}(245) = 2.38$, $p = .018$, $d = .31$, and T3 $t_{T3}(203) = 2.08$, $p = .039$), $d = .30$, and higher Emotional Resilience skills at T1-T3, $t_{T1}(767) = 6.16$, $p < .001$, $d = .45$; $t_{T2}(245) = 4.60$, $p < .001$, $d = .60$; $t_{T3}(203) = 4.42$, $p < .001$, $d = .64$).

Big five personality traits. The Big Five personality traits were measured using the 15-item extra-short form of the Big Five Inventory-2 (BFI-2-XS; Soto & John, 2017). The BFI-2-XS items are short, descriptive phrases that respondents rate on an agreement scale ranging from 1 = *disagree strongly* to 5 = *agree strongly*. Across three waves, reliability for the domain scales was consistent with prior research ($\omega_{average} = .58$). These reliability values are low by some conventional standards, reflecting the brevity and intentionally broad content of the BFI-2-XS. Despite its brevity, previous research has shown that the BFI-2-XS retains approximately 85% of the full-length BFI-2's predictive power.

Social and emotional competencies (SECA). The CASEL core competencies were measured using the 17-item short form of the Social and Emotional Competency Assessment (SECA-SF; Davidson et al., 2018). The SECA is designed to assess the domains of Self-Awareness, Social Awareness, Self-Management, Relationship Skills, and Responsible Decision-Making. Respondents rate how easy or difficult it is for them to enact each competency on a scale coded as 1 = very difficult to 4 = very easy. Across three waves, reliability for the domain factors were low ($\omega_{average} = .66$), but consistent with prior research (Gordon et al., 2022).

Self-reported outcomes

Self-reported academic outcomes. Behavioral academic engagement and emotional academic engagement were assessed as two factors, using eight total items selected from the Engagement versus Disaffection with Learning measure (EDL; Skinner et al., 2008). Across three waves, reliability for the behavioral ($\omega_{average} = .76$) and emotional academic engagement ($\omega_{average} = .61$) scores was acceptable.

Self-reported social outcomes. Friendship quality was measured using seven items selected from the Friendship Qualities Scale (FQS; Bukowski et al., 1994)[3]. Across three waves, reliability was high ($\omega_{average} = .86$). Peer acceptance was measured using two items adapted from the Behavior Report Form (Paunonen, 2003) and a previous study of social status (Anderson et al., 2001); these two items were strongly intercorrelated across waves ($r_{average} = .52$).

Self-reported well-being outcomes. Anxiety and depression were measured using 10 items adapted from the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). Across three waves, reliability for the anxiety

Table 1. Scale Means, Standard Deviations, and Reliability for all Study Measures Across Three Waves.

	T1 Mean (SD)	T1 ω	T2 Mean (SD)	T2 ω	T3 Mean (SD)	T3 ω
Self-management skills	3.33 (.72)	.85	3.33 (.70)	.87	3.26 (.68)	.85
Social engagement skills	2.98 (.81)	.86	2.93 (.81)	.88	2.89 (.76)	.85
Cooperation skills	3.57 (.65)	.84	3.48 (.67)	.87	3.48 (.68)	.88
Emotional resilience skills	3.09 (.78)	.86	3.09 (.77)	.88	3.06 (.75)	.89
Innovation skills	3.28 (.69)	.82	3.26 (.74)	.87	3.30 (.70)	.85
Conscientiousness	3.22 (.85)	.57	3.02 (.83)	.58	3.14 (.84)	.66
Extraversion	2.99 (.89)	.58	2.94 (.89)	.60	2.87 (.87)	.58
Agreeableness	3.57 (.78)	.51	3.58 (.79)	.58	3.55 (.78)	.57
Negative emotionality	3.16 (1.01)	.70	3.19 (.94)	.67	3.20 (.94)	.71
Openness	3.74 (.70)	.43	3.71 (.75)	.52	3.78 (.74)	.49
SECA self-management	2.61 (.57)	.77	2.65 (.54)	.76	2.57 (.55)	.78
SECA resp. Decision-making*	3.20 (.57)	.44	3.19 (.57)	.45	3.14 (.59)	.52
SECA relationship skills*	3.14 (.55)	.33	3.13 (.53)	.54	3.09 (.55)	.58
SECA self-awareness	2.83 (.63)	.73	2.85 (.61)	.76	2.79 (.58)	.72
SECA social awareness	3.07 (.54)	.62	3.03 (.55)	.68	2.99 (.54)	.68
B. Acad. Engagement	3.11 (.64)	.75	3.15 (.64)	.75	3.00 (.65)	.76
E. Acad. Engagement	2.46 (.61)	.65	2.54 (.58)	.62	2.45 (.56)	.56
Friendship quality	3.88 (.81)	.85	3.93 (.77)	.85	3.79 (.82)	.87
Peer acceptance*	5.93 (1.55)	.69	5.20 (1.48)	.61	5.19 (1.47)	.76
Anxiety	2.34 (.70)	.85	2.29 (.72)	.85	2.35 (.69)	.82
Depression	2.14 (.58)	.70	2.11 (.55)	.68	2.19 (.51)	.63
Life satisfaction	4.28 (1.45)	.88	4.47 (1.40)	.88	4.30 (1.54)	.91
Realistic interests	2.27 (.91)	.84	2.22 (.84)	.83	2.35 (.89)	.84
Investigative interests	2.70 (.99)	.84	2.70 (.98)	.84	2.66 (.94)	.85
Artistic interests	2.89 (1.03)	.82	2.86 (1.08)	.86	3.05 (1.03)	.84
Social interests	2.80 (.90)	.78	2.79 (.85)	.74	2.82 (.82)	.71
Enterprising interests	2.99 (.91)	.76	2.93 (.88)	.76	2.94 (.89)	.78
Conventional interests	2.26 (.85)	.80	2.16 (.81)	.81	2.26 (.86)	.82

Note. Resp. = Responsible, B. = Behavioral, E. = Emotional, Acad. = Academic. * = factor modeled using two indicators with reliability calculated using principal factor analysis. All other factors employ a confirmatory factor analysis approach to calculating reliability.

($\omega_{average}$ = .75) and depression factors ($\omega_{average}$ = .67) was acceptable. Life satisfaction was measured using the five-item Satisfaction With Life Scale (SWLS; Diener et al., 1985). Across three waves, reliability was high ($\omega_{average}$ = .89).

Self-reported occupational interest outcomes. Realistic, investigative, artistic, social, enterprising, and conventional occupational interests were measured using the 30-item O*Net Mini Interest Profiler (Rounds et al., 2016). Across three waves, reliability for the interest domain factors was high ($\omega_{average}$ = .81).

School-reported outcomes

School grades were provided by school districts and assessed as the average of 1) English and language arts; 2) math; 3) science; and 4) social studies grades during the fall 2021, winter 2021, and spring 2022 academic terms (corresponding to T1-T3). These grades were transformed onto a 0-100 scale. Average student grades were similar across T1 (M = 87.28; SD = 8.69), T2 (M = 87.33; SD = 8.63), and T3 (M = 85.60; SD = 10.30).

Preregistration, data, materials, and analyses

The study design and planned analyses were preregistered prior to data collection. All pre-registrations, data, analysis code, research materials, supplemental materials, and a description of deviations from the pre-registrations are available at https://osf.io/ce5kp/.

All latent analyses employed maximum likelihood estimation and were conducted using Mplus 8.5. Model fit was assessed using the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and root mean square error of approximation (RMSEA). Well-fitting models were expected to have CFI and TLI values close to .95, and RMSEA values close to .06; acceptable-fitting models had CFI and TLI values close to .90, and RMSEA values close to .08 (Hu & Bentler, 1999). We identified models using the marker variable approach. To reduce model complexity, we modeled some factors by parceling indicators with similar conceptual content. Where applicable, longitudinal models included parameters correlating item residuals across measurement occasions. Missing data, which were missing completely at random per Little's MCAR test (Little, 1988), were addressed using the full information maximum likelihood (FIML) method.

Our core analyses proceeded in five main steps. In Step 1, we tested for longitudinal measurement invariance for SEB skills domains. Testing for configural invariance involved modeling the identical factor structure across measurement occasions. Testing for weak (or loading) invariance involved equating loadings across occasions, while testing for strong (or intercept) invariance involved

also equating indicator intercepts across occasions. Models were considered invariant when ΔCFI <.01 for each subsequent model (Cheung & Rensvold, 2002).

In Step 2, using the strong invariant models where applicable, we used autoregressive structural equation models to assess rank-order stability of each SEB skills domain factor separately. Step 3 involved fitting latent change score models (LCSMs) for SEB skills domain factors and saving the estimated factor scores. To maintain a consistent baseline, we estimated latent change scores from T1 to T2 and from T1 to T3. These models allowed us to examine group-level and individual-level changes in skills, traits, and outcomes, as well as correlated changes between these constructs, without assuming a constant rate of change over time.

In Step 4, we repeat the above analyses for the measures of personality traits, social and emotional competencies, and other outcomes, concluding again by generating estimated factor scores for these constructs. Finally, in Step 5, we tested for correlated change by creating a correlation matrix of SEB skills, personality traits, social and emotional competencies, and other outcomes using the residualized latent factor scores derived from the LCSMs.

Results

Step 1: Model-fitting and longitudinal measurement invariance for SEB skills domains

An initial step involved assessing whether each SEB skills domain had the same general factor structure across measurement occasions. We found that these configurally invariant latent models for SEB skills domains generally fit well. Four of five longitudinal configural invariance models for the SEB skills domains were characterized by good fit (e.g., $CFI_{average}$ = .96, $RMSEA_{average}$ = .04), with Emotional Resilience demonstrating acceptable fit (e.g., CFI = .91, RMSEA = .07). We next moved to test for weak (metric) and strong (scalar) longitudinal measurement invariance for all SEB skills domains models. Across all invariance test steps for all SEB skills domains factors, ΔCFI <.01. Thus, all SEB skills domain factors were characterized by strong longitudinal measurement invariance, supporting subsequent longitudinal analyses. Table 2 provides fit and invariance testing information for SEB skills domains factors.

Step 2: Rank-order stability for SEB skills domains

With measurement invariance for SEB skills domains established, we next moved to assess their patterns of stability. We found high levels of average rank-order stability for participants' assessments of their SEB skills across an academic year, controlling for participant grade and gender. Latent stability coefficients for SEB skills domains ranged from r = .83–.90 from T1 to T2 and r = .76–.88 for T1–T3. Cooperation Skills were characterized by the lowest average stability for both comparisons. A full depiction of the SEB skills domains rank-order stability results is provided in Table 3. These results indicate that, after accounting for measurement unreliability, SEB skills show considerable—but by no means perfect—rank-order stability across seven months, with 58% to 77% of the domain-level variance remaining stable across this period.

We next investigated whether participants' age and gender were associated with baseline levels of SEB skills, as well as their average patterns of stability. Female participants reported lower Emotional Resilience skills at baseline (β = −.24, p = .000), as well as lower Cooperation Skills (β = −.09, p = .044), Self-Management Skills (β = −.13, p = .047), and Social Engagement skills (β = −.08, p = .031) at T2, indicating modest mean-level gender differences in these skills domains. There were no significant differences by participant grade.

Step 3: Modeling between-person differences in within-person change in SEB skills domains

We next report results for the SEB skills domains' latent change score models controlling for participant grade and gender. These analyses provide several key types of results. We begin by briefly reporting differences in SEB skills' latent means across measurement occasions, which would indicate mean-level change over time. There was a general pattern such that latent means in SEB skills did not differ in comparisons between T1/T2 and T1/T3. There was only one exception: participants' Cooperation Skills were significantly higher at T1 than at T2 and T3. Full results for the latent change score models for SEB skills domains are reported in Table 4.

We next report patterns of between-person latent variance in SEB skills domains, to explore whether some people varied in their SEB skill change compared to the average pattern of high stability. First, all SEB skills domains were characterized by significant latent variance at T1 (i.e., at baseline, there was considerable between-person variance in these factors not explained by measurement error), indicating significant heterogeneity in SEB skill level at the study's onset. Second, all SEB skills were also characterized by significant between-persons variance for the T2 and T3 latent change factors. Synthesizing the results suggests that while mean levels of SEB skills did not change much across an academic year, many individual adolescents did indeed report positive or negative change for any given skill domain.

Investigating correlations between the baseline and latent change factors for SEB skills provided two further insights. First, all SEB skills factors at baseline were negatively correlated with SEB skills change factors at T2 and T3 (except for Innovation Skills at T1/T2). These results suggest that participants with lower baseline SEB skills changed more positively (i.e., they started to catch up with their peers) across an academic year. Second, all SEB skills change factors at T2 and T3 were positively correlated, which indicates that individual participants' SEB skills change trajectories were generally consistent across the academic year.

We next assessed whether participant grade and gender were associated with changes in SEB skills. We found no significant associations between participants' grade level and their baseline levels or changes in SEB skills. Similarly, gender and change in SEB skills were largely unrelated,

Table 2. Model fit indices for longitudinal invariance tests for each SEB skills domain construct.

Model	Parameters	χ^2	df	*p*	CFI	ΔCFI	TLI	RMSEA	90% CI LL	90% CI UL
BESSI self-management skills										
Configural	111	543.171	294	.000	.952		.942	.03	.027	.035
Weak	95	578.507	310	.000	.948	.004	.941	.031	.027	.035
Strong	79	600.612	326	.000	.947	.001	.943	.031	.027	.035
BESSI social engagement skills										
Configural	75	318.2	114	.000	.951		.934	.045	.039	.051
Weak	65	320.617	124	.000	.953	.002	.942	.042	.037	.048
Strong	55	337.663	134	.000	.951	.002	.944	.041	.036	.047
BESSI cooperation skills										
Configural	60	210.996	75	.000	.957		.939	.045	.038	.052
Weak	52	232.595	83	.000	.952	.005	.940	.045	.038	.052
Strong	44	244.901	91	.000	.951	.001	.943	.044	.037	.050
BESSI emotional resilience skills										
Configural	60	384.423	75	.000	.911		.875	.068	.061	.075
Weak	52	394.972	83	.000	.910	.001	.886	.065	.059	.072
Strong	44	403.125	91	.000	.910	.000	.896	.062	.056	.068
BESSI innovation skills										
Configural	63	206.209	72	.000	.958		.939	.046	.039	.053
Weak	55	208.620	80	.000	.960	.002	.947	.043	.036	.050
Strong	47	220.348	88	.000	.959	.001	.951	.041	.034	.048

Note. CFI = comparative fit index; TLI = Tucker Lewis index; RMSEA = root mean square error of approximation; LL. = lower limit in RMSEA confidence interval; UL = upper limit in RMSEA confidence interval.

Table 3. Model fit and latent rank-order stabilities for SEB skills domains.

Construct	CFI	TLI	RMSEA	90% CI LL	90% CI UL	Rank order stability (*r*) T1-T2	Rank order stability (*r*) T1-T3
SEB skills domains (BESSI-45)							
Self-management	.942	.938	.029	.026	.033	.880	.830
Social engagement	.942	.934	.040	.035	.045	.900	.875
Cooperation	.942	.932	.041	.036	.047	.870	.760
Emotional resilience	.904	.888	.056	.051	.062	.866	.788
Innovation	.940	.928	.043	.037	.049	.830	.765

Note: All factors control for participant gender and grade. All rank order stability values significant at the $p < .001$ level.

Table 4. Latent mean change, between-person variance in latent mean change, and within-construct correlated change for SEB skills across three measurement occasions.

	Latent Mean T1	Δ latent Mean T1/T2	Δ latent Mean T1/T3	Variance T1	Variance T2[a]	Variance T3[a]	T1/T2[b] correlation	T1/T3[b] correlation	T2/T3[c] correlation
SEB skills domains (BESSI-45)									
Self-management	2.973	−.046	−.046	.663***	.156***	.210***	−.241**	−.390***	.643***
Social engagement	3.003	−.044	−.063	.713***	.136***	.165***	−.188*	−.333***	.668***
Cooperation	3.697	−.065**	−.062*	.356***	.100***	.174***	−.183*	−.309***	.618***
Emotional resilience	2.823	−.012	−.002	.491***	.114***	.184***	−.263*	−.348***	.688***
Innovation	3.395	−.044	.000	.549***	.215***	.267***	−.144	−.306***	.656***

Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$.
[a]Variance T2 and Variance T3 represent change variances.
[b]T1/T2 correlation and T1/T3 correlation represent baseline-change correlations.
[c]T2/T3 correlation represent change-change correlations.

although there were some exceptions: female participants reported less positive change in Cooperation skills (−.17, $p = .044$) and Social Engagement skills (−.17, $p = .043$) from T1 to T3. Beyond these two exceptions, participants of different genders and grade levels were similarly likely to show change in SEB skills.

Step 4: Assessing change in personality traits, social and emotional competencies, and outcomes

The fourth analytical step was to repeat the analyses described in Steps 1–3 for the other key constructs assessed in this research. These analyses facilitated our final aim of

assessing patterns of correlated change among SEB skills domains, personality traits, social and emotional competencies, and important outcomes (i.e., Step 5). We provide a summary of those results here and report additional details in the Online Supplemental Materials as Tables OSM 1–6.[4]

In terms of model specification and invariance testing, all other constructs fit well and were characterized by strong (i.e., scalar) longitudinal measurement invariance. In terms of mean-level change, most constructs were similar to SEB skills in that there were few systematic gains or losses. Of the 38 latent mean comparisons we conducted, only five significantly differed from baseline: lower Extraversion (T1/T3), lower SECA social awareness (T1/T2), lower behavioral academic engagement (T1/T3), lower artistic interests (T1/T2), and higher depression (T1/T3) over time.

The latent change score models provided several informative results. All SECA social and emotional competencies constructs as well as all outcome constructs were characterized by a pattern of between-persons variance that was similar to the pattern for SEB skills: despite no systematic mean-level change, there was significant between-persons variance at baseline, as well as for the T2 and T3 change factors. This suggests that these constructs are amenable to testing for correlated change (i.e., there is change to correlate).

In contrast, while personality traits also showed no systematic mean level change, they lacked a systematic pattern of between-persons variance in change. Only Negative Emotionality had significant between-persons variance at baseline and for both change factors. These results suggest that surprisingly little change and little variance in change occurred in personality traits in this sample across this academic year. Because this assessment of personality traits did not capture reliable individual differences in change, we refrain from interpreting correlations with change parameters for personality traits.

Step 5: Correlated change among SEB skills domains and other constructs

In our last analytical step, we tested for patterns of correlated change among SEB skills, social and emotional competencies, and important outcomes. The full correlation results for T1/T2 and T1/T3 can be found in the Online Supplemental Materials as Table OSM 8; here, we present an abridged summary based on our preregistered hypotheses.[5] Overall, we found support for 42 of 58 tested hypotheses (about 72%). Per wave, we found support for 20 of 29 (about 69%) hypothesized patterns of correlated change for the T2 change factors, and 22 of 29 (about 76%) hypothesized patterns of correlated change for the T3 change factors.

Breaking down the results into categories, we first found a strong pattern of correlated change among SEB skills domains and SECA social and emotional competencies.[6] Nearly all (11/12) of the hypothesized correlated changes between SEB skills and SECA competencies were significant, suggesting that many changes in skills generalize between these two conceptual frameworks. We next identified mixed support for our hypotheses regarding vocational interests, with half (6/12) of the hypotheses supported. These results suggest that the associations between changes in skills and vocational interests may be strongest for particular skill/interest pairings (e.g., Innovation skills change and Investigative interest change were consistently correlated across waves).

Finally, and perhaps most centrally, we found that positive changes in adolescents' SEB skills were generally correlated with positive changes in their academic, social, and well-being outcomes. We found support for 13 of 16 (82%) hypothesized patterns of correlated change among T2 change factors, and 11 of 16 (69%) hypothesized patterns of correlated change among T3 change factors. For example, we found that when adolescents reported improvements in Self-Management, Social Engagement, and Emotional Resilience skills across an academic year, they also tended to report improvements in their life satisfaction. As a second example, changes in Social Engagement predicted increases in friendship quality and decreases in depression across both waves. All results for the preregistered hypotheses for change across T1/T2 and T1/T3 are presented in Table 5. Taken together, these results indicate that when adolescents improve in their SEB skills across an academic year, they also tend to report improvements in related psychological characteristics, as well as academic, occupational, social, and well-being outcomes.

General discussion

Summary of results and broader implications

Interest in socioemotional, soft, or non-cognitive skills has blossomed, in part, because of the growing evidence that these skills are malleable, develop rapidly early in the life span, and are related to important life outcomes (e.g., Steponavičius et al., 2023). However, a detailed understanding of these skills' plasticity and their relations to outcomes is complicated because they represent such a broad conceptual umbrella and are often measured differently across studies. The present research sought to address this limitation by exploring the development of adolescents' SEB skills across an academic year and whether change in SEB skills was associated with commensurate changes in adolescents' important life outcomes. Overall, we found that, across a secondary school academic year, some adolescents do change in their SEB skills, and when they do, those improvements tend to be linked with changes in important outcomes. These results should motivate future work to understand normative life-span developmental variation in SEB skills, and to develop interventions to promote these skills in the service of enhancing youth thriving.

We presented a considerable number of findings here. To streamline our summary, Table 6 provides a simplified overview of the research questions, analyses, and results based on our five analytical steps. These findings highlight some key takeaways for researchers and practitioners. A first main takeaway is that this abridged version of the BESSI seems suitable for longitudinal analyses. Prior work (Soto et al., 2022a) demonstrated that the full, 192-item version of the BESSI had strong psychometric properties, and subsequent work has found that the 45-item BESSI

Table 5. Pre-registered Hypothesized latent Change Correlations Between SEB skills and Academic, social, and Well-being Outcomes at T1/T2 and T1/T3.

	Self-management	Social engagement	Cooperation	Emotional resilience	Innovation
Correlated change T1/T2: 20/29 (69%) hypotheses supported; T1/T3: 22/29 (76%) hypotheses supported					
SECA self-management	.23***/.29***				
SECA resp. Decision-making	.06/.13***				
SECA relationship skills		.23***/.08*	.44***/.22***		
SECA self-awareness			.47***/.33***	.30***/.37***	
SECA social awareness					
Realistic interests				.02/.02	
Investigative interests					.08*/.17***
Artistic interests			−.01/.03		.02/.13***
Social interests			−.02/.10**		
Enterprising interests		.20***/.09*			
Conventional interests	.02/.01				
Grades	−.02/.01				
B. Acad. Engagement	.22***/.24***			.07*/.05	
E. Acad. Engagement	.08*/.18***			.10**/.16***	
Life satisfaction	.26***/.13***	.33***/.17***		.23***/.26***	
Peer acceptance		.07*/.00	.00/−.07*		
Friendship quality		.15***/.25***	.10**/.25***		
Anxiety		.05/−.02		−.15***/−.22***	
Depression		−.29***/−.27***		−.21***/−.29***	

Note. * = $p < .05$; ** = $p < .01$; *** = $p < .001$. Correlations for T1/T2 change are left of the forward slash, and correlations for T1/T3 change are right of the slash. All factor scores derive from models controlling for participant gender and grade. Resp. = Responsible, B. = Behavioral, E. = Emotional, Acad. = Academic.

Table 6. Analysis and Results Overview.

Step	Question	Analysis type	Results synopsis
1	Are SEB skills characterized by measurement invariance across a secondary school academic year?	Longitudinal latent measurement invariance	Yes, all factors achieved strong (intercept) invariance.
2	Are secondary school students' SEB skills stable across an academic year?	Latent autoregressive structural equation models	Yes, SEB skills were highly stable, on average
3	Is there significant between-person variability in within-person change in SEB skills?	Latent change score models	Yes, SEB skills were characterized by within-person differences in between-person change
4	Are the other study measures suitable for longitudinal analyses? If so, are the factors stable and/or characterized by significant between-person variability in within-person change?	Longitudinal latent measurement invariance, latent autoregressive structural equation models, and latent change score models	Yes, all factors achieved strong invariance, and were stable, on average. All factors other than personality traits were characterized by systematic within-person differences in between-person change
5	Is change in SEB skills associated with change in other psychological constructs and outcomes?	Correlations using generated factor scores	Yes, when people change in their SEB skills, there are similar systematic changes in outcomes.

used here retains most of the full-length measure's reliability and validity for assessing SEB skills domains (Sewell et al., 2024). The present research is the first to demonstrate the utility of the short "BESSI-45" for longitudinal research. The BESSI is free for researchers and practitioners to use, is flexible for a variety of applications (e.g., from detailed analyses of specific SEB skills facets to brief administrations that assess broad SEB skills domains) and has already been adapted into several languages and cultural contexts (Feraco et al., 2024; Lechner et al., 2022; Postigo et al., 2024). The BESSI can therefore serve as a useful tool for understanding the development of SEB skills across the life span and across the globe.

A second and third key takeaway is that at the group level, adolescents' SEB skills seem quite stable across an academic year, but at the individual level, many adolescents do show significant change in their SEB skills. In other words, adolescents' developmental trajectories for SEB skills were systematically heterogeneous and diverse in reference to the stable average change of the sample. This finding is consistent with conceptualizations of SEB skills as generally stable, but potentially malleable (e.g., Duckworth & Yeager, 2015; Soto et al., 2021). Moreover, the present findings likely represent a lower-bound estimate for the malleability of SEB skills, given that we have observed naturally occurring change without the added

effects of intentional interventions designed to facilitate skill development.

Interestingly, the pattern of heterogeneity in change observed for SEB skills was not also found among personality traits. Instead, most traits did not show either mean-level change or individual differences in change across an academic year. This discrepant finding further emphasizes the conceptual and empirical distinction between traits and skills (e.g., Ringwald et al., 2025; Soto et al., 2021). It also suggests that SEB skills might be more malleable than traits in response to life experiences, and potentially to interventions—although more research is needed to directly compare the malleability of skills versus traits across different time scales and contexts. For us, the fact that SEB skills do seem to show reliable change across an academic year for some adolescents invites the question of whether there are types or "ingredients" of interventions that may further enhance positive change. For example, an intervention based in the volitional change approach (e.g., Hudson & Fraley, 2019), where people intentionally aim to improve a particular SEB skill or domain through a series of behavioral "challenges," may prove an effective and cost-efficient method. More systematically, perhaps participating in outside-of-school time programs based in the skills-oriented Positive Youth Development perspective (Lerner et al., 2021) could further enhance adolescents' SEB skills development.

Most interventions on SEB skills or related constructs are motivated by the possibility that when a person refines and then adeptly deploys their skills, they are more likely to achieve their goals or enhance their levels of thriving. Said differently, SEB skills are tools that a person hones and then uses to agentically promote their positive development. A final main takeaway supports this idea: We found that when adolescents report changes in their SEB skills, they also tend to report changes in their academic engagement, occupational interests, friendship quality, anxiety, depression, and life satisfaction. Indeed, the present results supported more than 70% of our hypothesized correlations between changes in SEB skills and outcomes. Although our analyses are correlational rather than causal, these results are consistent with the idea that promoting SEB skills may enhance youth thriving.

Strengths, limitations, and future directions

The present research on SEB skills had some important strengths, including its longitudinal design, reasonably diverse sample of youth, focus on both mean and individual-level change, and collection of a broad set of important outcomes. However, it also had some limitations that suggest key directions for future research. First, most variables were assessed through either self-reports or school records. We note that there was no incentive for participants to inflate ratings of their SEB skills or personality traits, and there was no obvious evidence of such inflation: mean item responses, across all time points, tended to be near the scale midpoint. Even so, future research can draw on additional data sources, such as peer, parent, and teacher reports, as well as task-based performance measures, to draw a more holistic picture of youths' SEB skills. As for school-reported outcomes, the privacy and confidentiality procedures employed by the Character Lab Research Network ensure that researchers do not know the identities of participating schools. Thus, grading policies may differ somewhat across schools, and the present findings should be interpreted with that caution in mind.

A second limitation is that the data were collected during the COVID-19 pandemic, at a time when some students had recently returned from remote or hybrid schooling, and some schools elected to stop or pause research participation, leading to considerable attrition in the sample. It is noteworthy that even in these highly unusual social and academic circumstances, changes in SEB skills were still linked with consequential outcomes. However, future research should test whether such skill-outcome links generalize to other contexts. For example, the uncertainty and challenges of the pandemic may have heightened the importance of SEB skills for students to stay motivated at school and connected with others. Conversely, the pandemic's constraints on social behavior, as well as the subjective sense that it put ordinary life "on hold," may have muted SEB skills and other personal qualities, thereby inhibiting their development and weakening skill-outcome links (Duckworth et al., 2021). Thus, future research conducted during more ordinary circumstances can test the generalizability of the present findings.

Another limitation in study design was that the timing of data collections was based on the Character Lab Research Network's standard schedule of three assessment waves. This schedule allowed us to examine changes in SEB skills, personality traits, and outcomes over time intervals ranging from three to nine months. These intervals proved sufficient for detecting individual-level changes in skills and outcomes, but not traits. Thus, future research can investigate change over longer and shorter timespans; for example, multiple-year intervals may be needed to reliably detect individual differences in trait change. Future work could also investigate the timing of experiences that may be particularly conducive to change. For example, it could purposely sample youth before, during, and after an extracurricular activity aimed at promoting their SEB skills (e.g., Duckworth & Meindl, 2018; Sewell et al., 2023) to identify patterns of development more precisely, or the "ingredients" of SEB skills-promotive interventions. While we were not able to control the timing of assessments, the resulting findings are valuable for future research as they show that individual differences in SEB skill change can and do happen over several months' time. Future studies can use this finding to help better plan investigations of SEB skill development.

Finally, the adaptiveness of SEB skills is not likely restricted to adolescence. A future direction involves expanding this research across the life span, to assess the development and utility of SEB skills among children and adults. Intriguing possibilities involve assessing whether children report an SEB skills domain akin to the "Activity" aspects of child personality (e.g., Soto, 2016), and whether there are particular SEB skills that are most adaptive for older adults, who normatively face decline in their developmental resources (Freund et al., 2018).

Conclusion

A consistent and growing body of evidence points to the importance of SEB skills for the thriving and success of adolescents, but most previous evidence has been based in cross-sectional data, limiting our ability to understand whether and how SEB skills change for adolescents over time, and whether such change is related to commensurate changes in important youth outcomes. The present research advances our understanding of the development of SEB skills during adolescence. It indicates that some adolescents' SEB skills do change across an academic year—even in the absence of any targeted interventions. Moreover, gains in SEB skills are correlated with changes in important outcomes like higher life satisfaction, higher friendship quality, higher academic engagement, and lower anxiety and depression. Taken together, these findings highlight the promise of future work to develop and test SEB skills interventions for adolescents. In addition, the present results provide further support for the BESSI as a reliable, valid, efficient, and free-to-use measure for researchers and practitioners interested in understanding the developmental interplay between adolescents' SEB skills and their thriving.

Declaration of conflicting interests

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Open science statement

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Supplemental Material

Supplemental material for this article is available online.

Notes

1. In supplemental analyses, we investigated whether the cross-sectional findings showing the predictive and incremental validity of SEB skills at T1 were also present at T2 and T3. They largely were: 181 of 232 (or 78%) of the pre-registered analyses were consistent with our expectations. These analyses represented H1–H3 in the pre-registration.
2. These analyses represented H4 in the pre-registration and were inconsistent with our expectations that SEB skills would generally increase as a function of student grade.
3. One item in the FQS was removed from further analysis after factor analyses demonstrated its poor loading.
4. SECA decision making, SECA relationship skills, peer acceptance, and grades were assessed with either one or two indicators at each time of measurement. These factors were not suitable for invariance testing or latent change score modeling. We modeled change for these constructs (and participant grades) using linear growth models, and generated factor scores from these models for use in Step 5.
5. Corresponding results for analyses that regress change in each outcome variable on changes in all five skill domains simultaneously are also presented in Table OSM 9.
6. For the sake of completeness and consistency with our pre-registration, we also report correlated changes with personality traits in the Online Supplemental Materials (Table OSM 7). However, we strongly caution against interpreting these correlations due to the lack of significant individual differences in personality change (see Step 4).

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