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ENSURING A MORE EQUITABLE FUTURE: ASSESSING STUDENT LEARNING AND GROWTH IN HIGHER EDUCATION

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INTRODUCTION

In the past decade, public sentiment has shifted increasingly to question the value of a college education. These concerns have diverse causes, including the rising cost and questions about the return on investment of higher education, the growing precariousness and insecurity of middle-class households regarding paying for higher education, and changes to the supply of and demand for highly educated workers. Questions about the value of higher education have also coincided with declining public support for higher education, and these may be correlated (Fingerhut, 2017; Marken, 2021). In addition, public opinion polls have surfaced concerns about multiple aspects of higher education including cost, curriculum, and management of the institutions (Marken, 2021; Newport & Busted, 2017).

In response to these questions and institutional challenges, various initiatives have been launched to demonstrate to the public that the net cost of investing in higher education—after accounting for scholarships and grants—is relatively low, and the return on individual investment remains high (see e.g., Carnevale, Cheah, & Van Der Werf, 2019; Ma, Pender, & Welch, 2019). As early as 1964, the economist Gary Becker demonstrated that investment in education and human capital had extraordinarily high rates of economic return relative to other financial investments (Becker, 1964). Scholars have shown that these high rates of individual economic returns have persisted to today and that postsecondary education completion continues to facilitate social mobility for students from economically disadvantaged backgrounds (Brand & Xie, 2010; Carnevale et al., 2021; Chetty et al., 2017).

Because public concern over the value of higher education exists quite generally despite evidence that a credential on average provides a positive return on investment, improved information on economic returns to specific majors and institutions may not be fully sufficient to counter the public narrative. Additionally, student motivation to attend college and educational attainment are associated with a much broader set of aspirations than are revealed by simple analyses of wages, which is the outcome most often used to measure return on a higher education investment (Nadelson et al., 2013). For example, college graduates often pursue employment that may have a relatively lower salary but a higher social status (such as the pursuit of a doctoral degree in an academic field) or a significant benefit to community and society (such as becoming an artist, teacher, social worker, or nurse). In addition, there is a range of other long-term outcomes sought by learners, including marital partner, relationship stability, health, well-being, and life satisfaction that are associated with college attendance (Carnevale et al., 2021; Marken, 2021).

For these reasons, it is important to consider near-term and long-term economic and non-economic postsecondary outcomes. Recognizing that non-economic outcomes can be challenging to quantify, the authors have launched the Next Generation Undergraduate Success Measurement Project (see Sidebox 1), which uses diverse forms of data (including surveys, performance assessments, administrative records, learning management system data, and experiential sampling) alongside information on students' longitudinal trajectories to define near- and long-term measures of the multifaceted benefits students derive from college attendance.

The authors believe that the value of postsecondary education is derived from its relationship not only to a narrow set of skills related to occupational training, but also to broad aspects of human

Sidebox 1. Next Generation Undergraduate Success Measurement Project

The Next Generation Undergraduate Success Measurement Project is a pilot demonstration project funded by the Andrew W. Mellon Foundation at the University of California, Irvine. The project developed new measures from surveys, performance assessments, administrative records and learning management system data and began tracking more than 1,200 undergraduates in September 2019. The project aims to: design, deploy and disseminate new measures of undergraduate experiences and outcomes; inspire and inform efforts to improve institutional performance and advance educational equity; and promote deeper understanding of educational processes and clearer demonstration of value in educational investments (particularly liberal arts education, broadly defined).

development that include cognitive, psychological, social, and civic characteristics.ⁱ It is recognized that many of the factors being measured are normative in nature: they reflect what educators and researchers value and aspire to in both education and human development.ⁱⁱ

The measurement of holistic aspects of human development in 21st century higher education systems manifests a deep commitment to equity and inclusion: the approach taken embraces the notion that college should provide equitable economic returns as well as broad benefits to cognitive growth and human development for all students, and especially first generation college-going students and students from underrepresented minority (URM) backgrounds (including Black, Latinx, Indigenous, and Asian American and Pacific Islander (AAPI) students). The authors are also deeply committed to using educational science to better measure the value of undergraduate education, so that the sector can engage in data-driven continuous improvement efforts. To do this, the study measures current student experiences, rather than concentrating analytical attention on long-term outcomes of student cohorts from prior decades. In the study, there is identification of individual growth, development, and pathways through which a college education contributes value to individual life trajectories. Through the measurement efforts used, this project works to demonstrate the immediate value of college in student lives and provide data that can improve institutional performance.

In the remainder of this paper, ways of conceptualizing and measuring the value of college education through longitudinal observation of undergraduate student experiences, attitudes, and behaviors are articulated. The paper begins by briefly reviewing prior work measuring higher education learning outcomes that informs the project's efforts. The sections that follow go on to discuss how to attempt to measure aspects of undergraduate student growth and development, which can provide a framework for identifying the value of attending postsecondary institutions in a manner aligned with the achievement of later life course success (See Figure 1, as well as the appendix, for additional measurement details for each of the six learning outcomes). The paper focuses on:

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- i Human development refers to the process whereby individuals mature and develop the capacity to lead healthy and productive lives not just for themselves, but for society and others.
- ii For example, the project is particularly interested in measurement that could demonstrate the value of educational investments in traditional liberal arts education (i.e., a commitment to student-centered instruction that promotes critical thinking, complex reasoning, effective communication, intellectual flexibility, and adaptability). Commitment to these educational goals has come to inform instructional efforts in professional schools as well as in arts and science units (Brighouse, 2019).

- 1. Measuring Cognitive Ability and Intellectual Dispositions:** General and specialized (i.e., domain-specific) competencies as well as intellectual dispositions related to adaptability in dealing with dynamic changes in information and society.
- 2. Development of Identity and Adaptive Life-course Agency:** Psychological growth associated with identity formation, self-direction, and what individual students themselves are hoping to attain from the experience.
- 3. Self-Regulation Skills:** Attitudes, dispositions, and skills related to self-regulation.
- 4. Social Capital:** Interpersonal competencies and productive social relationships.
- 5. Civic Engagement:** Knowledge, skills, values, and motivation that promote the quality of life in a community through both political and non-political processes.
- 6. Mental Health and Psychological Flourishing:** Student mental health, supporting individual flourishing, and providing opportunities for students to find meaning and purpose in their lives.

The paper concludes with reflections on the challenges and opportunities surrounding efforts to define and measure the value of higher education.

Figure 1: Measuring Postsecondary Value

Next Generation Undergraduate Success Measurement Project Framework



PRIOR WORK MEASURING COLLEGE LEARNING AND HUMAN DEVELOPMENT

The efforts of this study build on prior initiatives measuring student learning and growth in postsecondary education. Attempts to systematically measure student learning in postsecondary education can be found as far back as the Eight Year Study (1932-1941), which followed students through high school and postsecondary education with periodic testing on a range of academic subjects (Learned & Wood, 1938). In recent decades, however, there has been a resurgence of interest in this area and a plethora of national and international initiatives has emerged around it.

Prominent efforts that have sought to develop and deploy assessments of postsecondary learning include the Council for Aid to Education's Collegiate Learning Assessment, the Association of Public and Land-grant Universities and the American Association of State Colleges and Universities' Voluntary System of Accountability, the Organisation of Economic Cooperation and Development's Assessment of Higher Education Learning Outcomes (AHELO) project and the Association of American College and Universities' Value Rubric initiative (Arum, Roksa, & Cook, 2016). These projects focus on general higher order competencies—such as critical thinking, complex reasoning, and writing—rather than domain-specific learning that occurs in particular subjects, with the exception of the AHELO project.ⁱⁱⁱ In addition, most of these projects administered standardized tests to measure student learning.^{iv} There have also been efforts to develop faculty consensus on learning outcomes in more specific subject matter domains, including through Lumina Foundation's Tuning initiative, the Social Science Research Council's Measuring College Learning project, and the European Union's CALOHEE consortium (Arum et al., 2016).

In addition to efforts that have focused on the assessment of postsecondary student learning, other initiatives have focused on surveying students on self-reported attitudes and experiences. The most prominent and significant of these efforts, the National Survey of Student Engagement, has surveyed postsecondary students over the past two decades to generate a set of high impact practices that are associated with student self-reported learning outcomes (Kuh, 2008). The University of California Los Angeles Higher Education Research Institute has operated similar efforts focused on surveying postsecondary students with a greater emphasis on issues of diversity and inclusion (Pryor, Hurtado, Saenz, Santos, & Korn, 2007). Neither of these efforts has typically tracked individual students longitudinally, but rather has compared snapshots of freshmen and seniors at the same institution to infer growth. Efforts to track students longitudinally and integrate both student surveys and assessments of student learning outcomes have been exceedingly rare in postsecondary education.^v

The Next Generation Undergraduate Success Measurement Project builds on this prior work. It not only tracks student growth with longitudinal student surveys and student performance assessments,

iii The AHELO project also included measurement of gains in economics and civil engineering (Braun et al., 2013).

iv The exception is the Value Rubric initiative which applied a holistic rubric to assess "authentic" writing from student course assignments.

v The Wabash Study of Liberal Arts Education (Pascarella, Blaich, Martin, & Hanson, 2011) and the Social Science Research Council's partnership with the Council for Aid to Education (Arum & Roksa, 2011) are two notable exceptions.

but also integrates administrative data and click-stream learning management system data to identify changes in student academic engagement and performance.^{vi}

MEASURING COGNITIVE ABILITY AND INTELLECTUAL DISPOSITIONS

In today's complex global economy, a combination of flexible thinking, habits of mind, and content knowledge is necessary to respond effectively to real-life situations encountered in work and civic life. Given this need for dynamic reasoning and intellectual dispositions, institutional grades and subsequent wages alone do not capture the full potential of student development and cannot be relied upon to make accurate inferences regarding the overall growth occurring in programs of study.

A primary skill educators and employers alike hope graduates possess is perhaps the most well-known and persistent competency in higher education: critical thinking. While continued academic debate remains whether critical thinking is indeed a generally transferable skill (Davies, 2013; Lehman, Lempert, Nisbett, 1988; Lehman & Nisbett, 1990; Liu, Frankel, & Roehr, 2014; Monteiro, Sherbino, Sibbald, & Norman, 2020; Moore, 2011), the increasing importance placed on a capacity to reason under uncertainty, and to solve problems in complex and new circumstances, is unequivocal. To this end, several studies show that a diversity of experiences and challenging and engaging coursework are key aspects in the development of critical thinking and associated dispositions (e.g., Pascarella, Wang, Trolian, & Blaich, 2013). Recent studies on the effect of college going on student cognitive ability shed light on the attention given, and different approaches to, measuring and assessing critical thinking, or some related variant, such as analytic reasoning or general problem-solving ability.

Included in this body of literature is Arum and Roska's (2011) *Academically Adrift*, in which the authors employ the Collegiate Learning Assessment (CLA), an essay-based exam assessing respondents' quality of writing and correct judgement decisions in practical settings. Other studies have used multiple-choice formatted tests, focusing on identifying assumptions and analyzing, evaluating, and appropriately extending arguments, such as subscales found in the ETS (Educational Testing Service) Proficiency Profile (EPP) and the Collegiate Assessment of Academic Proficiency (CAAP). More recently, ETS conducted an extensive review of the critical thinking literature, integrating various conceptualizations into a coherent definition in an attempt to remedy some of the shortcomings of previous measurement instruments with a view towards dynamic 21st century skills. The resulting synthesis provided a framework for developing the HEIghten critical thinking instrument, which contains a mix of structural item response features, such as selecting key statements in passages and marking material in text (Liu, Frankel, & Roehr, 2014). Although studies have validated the HEIghten assessment in the U.S. and abroad, the instrument has not yet been used in large-scale rigorous evaluations where individual students are tracked over time to identify how specific college experiences are related to growth on the critical thinking performance assessment. It is a novel contribution of the current project to deploy and assess this instrument for broader applicability.

vi Administrative data refers to data routinely collected by UCI administration such as students' demographic information, course choices, majors, GPA, interactions with non-health related student support services, etc. Clickstream data refers to detailed data of students' online activity and engagement on the learning management system Canvas (such as logins, discussion board activity, posting of assignments and interacting with course material).

Individual performance on critical thinking tasks is one component of a larger and more holistic approach to measuring the development that occurs in college. There are a plethora of intellectual virtues and character traits that position one to apply themselves critically, such as a habit of inquiry, open-mindedness, courage, self-confidence, trust in reason, and the desire to seek truth (Hitchcock 2018). Not only are these traits traditionally associated with college education, recent evidence suggests that personality and ability are not easily teased apart (Kyllonen & Kell, 2018). Measuring these dispositions is thus all the more appropriate to understanding undergraduate intellectual development.

With the longitudinal nature of the current project, there is unique positioning to test the relationship among and growth in intellectual abilities, dispositions, and student preferences using a variety of assessment formats and designs. Specifically, data are triangulated by the HEIghten assessment with both established (e.g., Need for Cognition measure) and new measures of intellectual skills and dispositions.^{vii} For example, in this study there was a collaboration with ETS to develop performance-based tests of adaptable dispositional qualities usually only assessed through self-reported surveys.^{viii}

While the project extends work in general outcomes assessment, such as critical thinking, students spend most of their academic coursework acquiring knowledge and skills within a particular discipline. Indeed, subject-specific instruments present a suitable and promising approach to large-scale outcomes assessment of student learning gains in college.

Although it is acknowledged that such assessments will be advantageous and recognize important work towards that direction, such as the Measuring College Learning project (Arum, Roksa, & Cook, 2016), existing measures that can be widely implemented in the majority of majors remain limited. While course-level outcomes will be linked with survey and assessment data to determine how grades relate to generic competencies and dispositions, it is the intention of this project as it develops to work toward the development of measures of domain-specific competencies that can be implemented at scale.

Critical thinking, adaptability, and problem-solving aptitude are crucial to success in a fast-paced and ever-evolving digital age. The diverse set of measures used in the Next Generation Undergraduate Success Measurement Project include both established and new performance based and self-reported measures. This combination of measures is needed to provide a holistic portrait of student intellectual development and cognitive ability to serve as proximal measures of the value of higher education.

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vii The Need for Cognition instrument is a common intellectual curiosity measure used in large-scale studies investigating the effect of higher education.

viii The performance-based tests that were developed in partnership with ETS include perspective-taking, confirmation bias, and an innovative new performance task involving groups of students on collaborative problem solving. The diversity and complexity of contemporary work settings position teamwork as a vital skill for nearly all occupations graduates are likely to fill, and the importance of acquiring empirical support for college's influence on collaboration and interpersonal communication cannot be overstated.

DEVELOPING ADAPTIVE LIFE-COURSE AGENCY

In pre-modern societies, late adolescence and early adulthood is the time when young people move into their socially prescribed work, family, and community roles with relatively little conscious evaluation and decision making. In contrast, modern societies, particularly individualistic Western societies like the U.S., allow for more inter-individual variability, including the chance of social mobility. Higher educational institutions also provide paths that allow individuals from diverse backgrounds to make personal choices and invest time and effort in education and careers that can lead to upward social mobility.

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In individualistic societies with substantial social inequality, such as the U.S., individual youth from higher socioeconomic status backgrounds are encouraged to play a substantial role as active agents in shaping their own paths into and through adulthood. However, many youth from underrepresented minority or lower socioeconomic status backgrounds may not have the opportunities and resources to have available to them such a full spectrum of individualistic choices. Nevertheless, with intensified and widespread outreach efforts, along with a widespread recognition among students and families of the economic returns to a postsecondary education, a growing number of youth from diverse backgrounds now pursue college credentials. For upwardly mobile youth, higher educational institutions may provide the opportunity to develop and hone the skills needed to become more effective agents in their own lives. For students from racially or economically privileged backgrounds, higher education can increase their awareness of the world around them and help them develop the agency to navigate a diverse world and promote a more equitable and just society (Heckhausen, Wrosch, & Schulz, 2019).

Higher education institutions also provide an ideal context in which students develop self-regulation skills, including goal engagement, disengagement, and goal adjustment. These skills are essential because they help students navigate the uncertainties and discontinuities rampant in modern globalized societies (Heckhausen, Wrosch, & Schulz, 2019). By encountering important challenges (e.g., making a choice of major, calibrating educational aspirations, and preparing for career entry) and interacting with people from diverse cultural, socioeconomic, familial, and career backgrounds, college attendance can provide students with the opportunity to acquire and hone critical self-regulatory competencies and a broadened world view. In turn, students become more effective adaptive agents in shaping their own life trajectories and adjusting to new realities in the social and material world.

The Next Generation Undergraduate Success Measurement Project was designed in part to assess the acquisition of adaptive agency skills and to document individual and group differences in the development of these skills as students enter and go through college. Learning to navigate the challenges of self-direction in academic settings in higher educational institutions can provide a critical foundation for adaptive agency in the transition into careers and adult life after college. In times of globalized economies, climate-change related upheavals, public health challenges, and potential socio-political change, individuals' capacities for adaptive agency are important not just

during the classic age-normative transition into adulthood, but throughout life.

Assessing both these skills and the types of college experiences likely to facilitate the honing of such skills has received very little research attention in the field of higher education. However, there have been substantial improvements in the ability to define and reliably measure the constructs and processes linked to adaptive agency and both career and educational choices (Eccles & Wigfield, 2002; Heckhausen et al., 2019). Motivation, goal engagement, and enactment researchers have developed measures of individual development of self-regulation skills, coping skills, expectancies, beliefs, values, and attitudes. Lifespan developmental psychologists have created measures to assess specific life goals and the values and motivational commitments to these goals. Together these research groups have provided strong constructs and emerging measures that can be used to study and assess aspects of near-term higher educational outcomes (such as academic engagement, cognitive growth, course grades, and credit accumulation).

Drawing on these bodies of work, the Next Generation Undergraduate Success Measurement Project has developed and collected detailed longitudinal assessments of educational and occupational goals; self-perceptions of competence and values; self-reports of engagement with goals and flexibility to adjust goals if necessary; perceptions of academic-related experiences; and perceptions of their impact on subsequent educational, occupational, and civic engagement planning and choices. These measures will be used to model academic and occupational identity and goal development as a function of educational and social experiences over the college years.

The relationship of these proximal measures with longer term outcomes, such as later general life satisfaction, adaptive capacity, vocational success, lifetime productivity, familial success and satisfaction, civic engagement, and general mental and physical health have not been adequately studied. Lifespan developmental theorists assume that a successful passage through the college years and into early adulthood for students from 18-30 years of age sets the stage for a more successful passage through adulthood along many dimensions. Gathering a comprehensive set of measures of the impact of college attendance on the developmental processes associated with the development and honing of adaptive agency will put higher educational policy makers in a much stronger position to understand the full benefits of a college education to both the individual and the larger society in which these individuals live.

This section has discussed adaptive agency for one's broader life goal setting and implementation. Educational psychologists also stress the importance of immediate, task specific self-regulated learning skills for academic success. These are discussed in the next section.

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SELF-REGULATED LEARNING SKILLS

The ability to set goals, plan, organize, and monitor one's own behavior is highly relevant for being an active and efficient agent in one's own life. Such skills are crucial for individual goal achievement in any complex environment with several demanding and competing tasks (e.g., complex and challenging occupational settings). But a subset of these skills, self-regulated learning skills, are particularly important for academic thriving and lifelong learning.

Zimmerman described self-regulated learning as a purposive use of strategies and processes to transform mental abilities into academic skills (Zimmerman, 1990; 2002). Several well-established theoretical models about self-regulated learning coexist and describe self-regulated learning as a cyclical process with different phases and subprocesses (Boekaerts, 2011; Pintrich, 2000; Winne & Hadwin, 1998; Zimmerman, 2002). The three central phases of a successful self-regulated learning process are: a phase of forethought and planning of tasks; a phase of performing a task while monitoring and controlling the progress; and an evaluation phase with reflections on performance and outcomes and potential adaptation of the goals and strategies for future tasks. Regulation is needed in all three phases. Meta-cognitive and cognitive skills are needed to plan and monitor the learning process and to use adequate learning strategies. Besides, students need to regulate their motivation and emotions that can foster or inhibit the learning process (e.g., anxiety or frustration). In addition, students also need to organize their external resources, referring to choosing their study environment, getting access to study material, and seeking help, if it is needed.

During childhood and adolescence, the learning environment in elementary and secondary schools is relatively structured, and teachers and parents help monitor the learning process of students. In postsecondary education, as well as in later occupational settings, the learning and working environment becomes less structured, while simultaneously individuals are afforded more freedom to choose their own academic activities and to set their own academic goals. This shift requires students to learn how to organize and monitor their learning behavior successfully, rather

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than relying on a structure that is externally provided by their environment. Postsecondary education is a highly relevant time to develop and use self-regulated learning skills. Different theoretical perspectives describe the process of developing such skills. The social cognitive perspective implies that observing and learning from others who successfully use self-regulated learning skills is a central element of developing self-regulated learning skills (Zimmerman, 2002).

The perspective of information processing, instead, implies that interaction with the learning material and tasks itself provide the best opportunity to develop self-regulated learning skills (Hoyle & Dent, 2018). This approach emphasizes that practice is the best way to develop expertise in self-regulated learning. By studying at a two- or four-year college, students are uniquely able to develop self-regulated learning skills through both approaches. Students interact with, study with, and are surrounded by peers, mentors, and faculty, who can model these skills. Moreover, when college coursework is highly demanding, it provides students with many simultaneous and academically challenging tasks that help students develop and improve their self-regulated learning skills.

Sidebox 2.

Impact of COVID-19 on Self-Regulated Learning

The less structured a learning environment is, the more self-regulation is required to master several competing tasks and to achieve individual goals. At the same time, it is more difficult to self-regulate the learning process when less structure is provided by the environment. Hence, it is low structured and unforeseen situations in which high self-regulation skills are particularly important. The most salient example for such a situation is the current COVID-19 pandemic, which has caused many changes to daily life. Most students at UCI – similar to other students across the country – left campus. Many moved back home to their families. Classes in Spring 2020 and the following year were taught on online platforms, instead of face-to-face. On-campus study groups and use of the library were suddenly unavailable. Students also had other important responsibilities besides course work, such as working to support their family, home-schooling siblings, caring for family members, or helping in the neighborhood. Under these circumstances, self-regulation skills of students became even more important for successful learning and course completion than during other academic terms. In addition to tracking changes in student outside responsibilities, course grades and course completion during COVID-19, we also have been identifying changes in academic engagement, student stress, student mental health, and student long-term goals.

Self-regulated learning is an immense research field in higher education and several measurement instruments that focus on different aspects of the complex construct of self-regulated learning are widely used. Most of these measurement instruments use students' self-reports to assess self-regulation skills. Besides interviews and learning diaries, questionnaires are undoubtedly the most widely used measurement instrument in the field (e.g., the Motivated Strategies for Learning Questionnaire—MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991; the Learning and Study Strategies Inventory—LASSI; Weinstein and Palmer, 2002).^{ix} A common critique of these instruments is the gap between reported strategies and skills and the objective use and application of these in real-life learning situations.

The Next Generation Undergraduate Success Measurement Project addresses this critique in two ways. First, in student surveys, items are used that are as specific as possible. Hence, specific behavior is asked about in specific course-related situations, rather than about strategy use and skills in academic situations in general. Second, self-reported information of survey data are combined with data about students' actual learning behavior from the learning management system in the corresponding courses (e.g., when and how regularly students work on assignments, submit homework on time, engage in group discussions, etc.; see Sidebox 2).

SOCIAL CAPITAL

As discussed in the introduction, the benefits of higher education are typically framed in terms of returns on investment in human capital related to increased productivity and wages (Becker, 1964). Coleman (1988) argued that the importance of human capital development in educational institutions is complemented by social capital. Social capital is empirically captured through a network analysis of “friends, colleagues, and more general contacts through whom you receive opportunities to use

^{ix} In questionnaires, students are typically asked to rate their self-regulation skills and use of regulation strategies in academic settings on items that have been validated and well established in educational research.

your financial and human capital” (Burt, 1992). The characteristics of students’ social ties and the structural features of social networks are strongly related to a range of positive outcomes, including degree attainment and career success.

At the institutional level, colleges and universities provide access to professional opportunities, affiliated organizations, and alumni communities that support social relationship formation and expand the social networks of students. These relationships are not tangential to the college experience; rather they are an essential component of success in higher education (Tinto, 1993). Students gain social capital when they form ties with others who are not only willing to employ directly their own resources for the student, but leverage their social connections and the resources of others in their extended network (Stanton-Salazar, 2011). This is particularly the case when students form relationships with higher-status individuals, such as mentors.

Students tend to gravitate towards others who are similar (McPherson, Smith-Lovin, & Cook, 2001), but relationships with individuals from diverse demographic and cultural backgrounds provide a number of benefits. Social network diversity allows access to different kinds of information and previously unfamiliar groups and contexts, which may open new opportunities and encourage innovation. Engaging with others who hold different perspectives fosters communication skills, adaptability, and cultural capital. More broadly, diversity promotes tolerance of differences and appreciation of multiculturalism that supports a cohesive society. College environments counterbalance the tendency towards group homogeneity by cultivating diverse relationships through student interactions in a variety of contexts, including classroom settings.

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Considering the potential influence of social networks, a useful distinction can be drawn between strong ties and weak ties, each carrying their own advantages and disadvantages for students. The stronger the relational tie, the more likely resources will be shared (including knowledge and skills) and the more robustly higher education connections will be mobilized to meet students’ needs (Stanton-Salazar, 2011). Close relationships established in the educational context (e.g., mentorship or deep friendship) likely contribute to providing socioemotional support and social norms that bolster common values and goals, potentially fostering academic and career achievement (Coleman, 1988). In contrast, weak ties are associated with open networks, which do not provide the same degree of security but are less constraining and redundant. Students with a large number of weak ties (e.g., acquaintances or professional contacts) receive more diverse information and cultural knowledge, as well as access to a greater number of opportunities (Granovetter, 1973).

The conceptualization of different network structures as social capital has been a subject of debate in the field; Burt (2000) argues that social capital is associated with weak ties and open networks, but a balance with strong ties and closure is desirable for optimizing capacity to use social capital. Put simply, strong ties can serve functions that help students to take advantage of opportunities provided by weak ties. Both strong and weak ties may positively influence students’ academic and

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professional success in different ways. Students who have low social capital due to their socioeconomic circumstances may especially benefit from the social scaffolding that colleges and universities provide to deepen ties and expand networks with faculty, mentors, peers, and professionals.

The field of social network analysis has produced a powerful suite of tools capable of empirically capturing social capital and the effects of relationships in higher education (Biancani & McFarland, 2013; Kezar, 2014). The measures employed are diverse; multiple types of student networks can be captured, including friendships, roommate relationships, and academic collaborations. Because application of social network analysis to higher education is relatively new, research has not consolidated around particular indicators or inventories. Network analysis has great potential for explaining the outcomes and effects of colleges and universities, but it rarely

has been used to demonstrate the value of higher education. The Next Generation Undergraduate Success Measurement Project employs several survey items that allow researchers to investigate the links between educational achievement and social networks. For instance, students are asked to identify their closest friends at college and provide information about each friend. The extent to which persistence and performance in college is related to the proportion of friends in the same major is thus being assessed. In combination with student record data, the project will be able to model the career outcomes of students who report having friends of higher socioeconomic status. The study will assess the degree to which the university supports the formation of demographically diverse social networks through classroom interactions. Additional measures capture factors that may also be salient to their university social networks, such as the subjective value students attribute to their relationships and their perceived social mobility. More generally, the project aims to advance research that will clarify how social capital is conferred upon students and elucidate the mechanisms underlying network change and stability that are responsible for academic success and social advancement.

The current research is working to identify strategies that expand access to social networks in ways that increase the equity of academic and career outcomes.

Changes in social capital related to participation in formal education may be responsible for reproducing inequality (Bourdieu, 1986), but educational institutions can foster social capital in a way that facilitates social mobility (Coleman, 1988).

This study is working to better understand how different types of higher education experience (e.g., residential, commuter, and online-learning) comparatively influence the development of social capital. Perhaps one or two years of face-to-face classes have relatively similar effects on students' social networks as do four years; if so, then students from disadvantaged backgrounds may be able to pursue more feasible and affordable educational pathways while reaping comparable benefits.

Educational institutions can foster social capital in a way that facilitates social mobility (Coleman, 1988).

CIVIC ENGAGEMENT

Since the founding of the nation's first colleges, democratic values have remained central to the missions of higher education institutions.^x When confronted with conflicting goals or declining youth political participation, colleges and universities have repeatedly reaffirmed their responsibility to cultivate an engaged citizenry (National Task Force on Civic Learning and Democratic Engagement, 2012). Civic engagement is conceptualized as the knowledge, skills, values, and motivation that promote the quality of life in a community through both political and non-political processes (Ehrlich, 2000). Considering that early adulthood is a crucial period for the development of lifelong civic attitudes and practices (Flanagan & Levine, 2010), higher education institutions are perhaps the most important socializers of civic behavior in society. The recent push toward labor market preparation and the prioritization of economic returns on educational investment presents a potential threat to the civic function of higher education (Evans, Marsicano, & Lennartz, 2019). This trend portends changes that could have broad implications for political participation and the quality of democracy in the United States.

For generations, education has been one of the most powerful and reliable predictors of civic participation. Each additional year of higher education is related to a substantially greater likelihood of voting throughout an individual's life. Colleges and universities foster civic engagement through a multitude of overlapping pathways, four of which are described here: 1) institutional characteristics, 2) coursework, 3) community partnerships, and 4) student-led organizations.

Considering that early adulthood is a crucial period for the development of lifelong civic attitudes and practices (Flanagan & Levine, 2010), higher education institutions are perhaps the most important socializers of civic behavior in society.

1. **Institutional characteristics:** An institution's civic ideology (often manifested in its mission) may be transmitted to students and internalized. The degree to which a college or university prioritizes diversity and cultivates a climate of open dialogue can shape students' beliefs and values regarding their role in the broader society.
2. **Coursework:** College courses can increase students' knowledge of social issues, as well as familiarity with the political system. Processes inherent in many learning environments can foster skills that are necessary for democratic participation (e.g., collaborative problem solving and critical thinking).

x For additional discussion on the relationship between educational attainment and civic engagement, see: Carnevale, A.P., Campbell, K.P., Cheah, B., Fasules, M.L., Gulish, A., Quinn, M.C., Sablan, J.R., Smith, N., Strohl, J., & Barrese, S. (2021). The Monetary Value of Economic and Racial Justice in Postsecondary Education: Quantifying the Potential for Public Good. Postsecondary Value Commission. Retrieved from: <https://www.postsecondaryvalue.org/wp-content/uploads/2021/05/PVC-GUCEW-FINAL.pdf>

3. **Community partnerships:** Institutions of higher education facilitate civic engagement through direct involvement in community organizations. Students may participate in service-learning courses, community-based research, or volunteer opportunities via college partnerships. In 2015, college students contributed hundreds of millions of hours in volunteer service worth approximately \$6.7 billion (Corporation for National and Community Service, 2020).^{xi}
4. **Student-led organizations:** Student-led organizations and extracurricular activities can provide a rich context that promotes democratic qualities such as leadership, agency, and cooperative organizing skills. Youth-centered civic experiences at colleges and universities facilitate young adults' expression of political power and increase participation in elections and political processes.

In addition to being an end in itself, civic engagement is also related to a variety of other positive outcomes for students. For example, participation in community service and service learning is associated with academic achievement and pursuing higher degrees. Civic engagement is also linked to a range of non-academic outcomes, such as psychosocial well-being and career attainment. Justice-oriented civic activities can empower first generation college-going students and students from underrepresented minority (URM) backgrounds (including Black, Latinx, Indigenous, and AAPI students) in ways that could facilitate equity in educational environments; such activities have been related to a number of benefits, including increased academic motivation and school connectedness (Watts & Flanagan, 2007).

Given the complex relationship between higher education and civic engagement, substantial work remains in developing research strategies capable of capturing the civic value of colleges and universities. The Next Generation Undergraduate Success Measurement Project will advance understanding of civic attitudes, which play mediating roles between college experiences and civic behavior. The project's weekly surveys cover a wide range of student experiences that allow the researchers to identify mechanisms underlying civic engagement. Generally, measures of civic

Sidebox 3. Civic Values and COVID-19 Public Health Precautionary Behavior

The significance of civic values was demonstrated in the longitudinal tracking of students last year. For example, it was found (using OLS regressions controlling for gender, race/ethnicity, first generation college status, and previous academic performance) that students' civic values in Fall 2019 predicted mask-wearing in Spring 2020 during the COVID-19 pandemic - and a composite of other precautionary behaviors (e.g., avoiding crowded places, using hand sanitizer, purchasing personal protective equipment, etc.). To capture civic values, the study used an established inventory consisting of five items that assessed the subjective importance of multiple features of civic engagement, such as volunteering, influencing political decisions, and contributing to solving problems in society. The measure of civic values was also related to student participation in service-learning courses as well as volunteering behavior prior to the pandemic. This pattern points to the value of cultivating civic orientations in postsecondary education.

xi For additional discussion on the role institutions play as engaged community members, including advancing justice, see: Institute for Higher Education Policy. (2021c). Ensuring a More Equitable Future: How Colleges Can Engage their Communities to Ensure Economic and Cultural Vitality. Postsecondary Value Commission. Retrieved from: <https://www.postsecondaryvalue.org/wp-content/uploads/2021/05/PVC-IHEP-Community-Members-FINAL.pdf>

engagement assess the types and frequencies of civic behavior, as well as political attitudes. The Next Generation Undergraduate Success Measurement Project also includes more specialized instruments. For instance, in collaboration with Dr. Sam Wineburg of Stanford University, the study employs new measures regarding civic attitudes and reasoning.^{xii} Also, the Next Generation Undergraduate Success Measurement Project conducted multiple surveys during the outbreak of COVID-19 (see Sidebox 3). Students were asked about their perceptions of social responsibility related to social distancing, which may be related to reported trustworthiness of sources of information and subjective value of civic involvement.

More research is needed to understand how students from diverse demographic backgrounds differentially participate in, and benefit from, civic engagement initiatives in higher education. Evidence suggests that marginalized students are more inclined to be involved with critical forms of participation that address their experiences with structural inequities, and greater support for justice-oriented civic activities may be an effective strategy to increase persistence and inclusivity in colleges and universities. Several mechanisms of social networks in higher education presented in the previous section may prove relevant to civic engagement, especially for students from diverse backgrounds.

MENTAL HEALTH AND PSYCHOLOGICAL FLOURISHING

One of the many benefits of higher education is that students may improve their psychological well-being (Colby, Ehrlich, Beaumont, & Stephens, 2003; Sullivan & Rosin, 2008). The importance of student well-being has always been recognized if not always emphasized (e.g., in mission statements, in institutional traditions, and in the reminiscences of alumni). Traditionally, psychological well-being has been associated primarily with mental health. Going beyond this traditional perspective, and spurred at least in part by the positive psychology movement, is a concerted effort to identify and quantify aspects of student well-being with the goal of demonstrating that improved well-being is associated with positive outcomes after college (Huta & Waterman, 2014; Marken, 2021; Ryan & Deci, 2001).

One of the many benefits of higher education is that students may improve their psychological well-being.

Well-being in this literature is associated with the Aristotelian concept of eudaimonia. To illustrate this concept, consider the four eudaimonic activities assessed in the influential study by Huta and Ryan (2010): (a) seeking to pursue excellence or a personal ideal; (b) seeking to do what you believe in; (c) seeking to use the best in yourself; and (d) seeking to develop a skill, learn, or gain insight into something. Critically, well-being is distinguished from hedonia, which refers to pleasure, enjoyment, comfort, and absence of distress. Understood this way, eudaimonia seems well aligned with what are often stated as the larger goals of a college. In the discussion below, the term psychological flourishing is used as a label for this recent concept and mental health to identify the traditional concept.

Although there are courses that aim to improve students' mental health or help them flourish psychologically, the contributions of higher education in these areas are more diffuse. For example,

^{xii} These measures present students with sample news and media clips and ask them to evaluate the reliability of the information.

challenging courses and new living situations both create psychological stress and, when done well, provide students with the opportunity to learn to manage and overcome that stress and protect their mental health. More generally, higher education can provide important experiences and a broad range of perspectives during a period when young adults are formulating their identities and roles. However, availability of student support and mental health services vary greatly across postsecondary education institutions in the United States. Furthermore, empirical evidence has shown disparities in the utilization of mental health services by race/ethnicity (Eisenberg et al., 2011; Hunt et al., 2015): Among students with mental health problems, students of underrepresented minorities are found less often in mental health treatment. These findings raise important questions about equity in postsecondary education.

Challenging courses and new living situations both create psychological stress and, when done well, provide students with the opportunity to learn to manage and overcome that stress and protect their mental health.

Among its goals, the Next Generation Undergraduate Success Measurement Project includes measures to assess how a college education leads to quantifiable increases in both mental health and flourishing during and after college and to improved functioning in society after college. The project includes measures designed to track students' activities in each of the areas of eudaimonia discussed above. This work builds on Damon's groundbreaking research on the development of purpose (Damon, 2008) because psychological flourishing, like purpose, "endows a person with joy in good times and resilience in hard times, and this holds true all throughout life." In addition, the project also includes frequent assessments of perceived stress, positive and negative attitudes, mental health, and general life satisfaction. The various instruments involved in this study also provide information about other, possibly mediating factors: for example, the degree of engagement with activities that are personally meaningful, challenging, and fulfilling; environmental mastery; social connectedness; and substance abuse.

Although several large studies have documented the positive effects of education on health in general, there has been less emphasis on the relationship between education and mental health. One important study in this area (Chevalier & Feinstein, 2006), based on the British National Child Development Survey, looked at mental health outcomes over two decades. In the absence of experimental manipulations, the study used instrumental variables to estimate education as a causal effect. Their results showed that "education reduces the risk of poor mental health. The impact is observed for all ages and at all points of the distribution. Education also reduces the risk of becoming depressed" (Chevalier & Feinstein, 2006). The authors went on to show that these benefits of education remain even after accounting for factors such as income or family relationships. What this study did not explore is which aspects of a university education are associated with improved mental health in college and afterward. There has been some notable progress toward the goal of showing that experiences as a student can lead to important changes in the area of flourishing, both during and after college. For example, Bowman, Brandenberger, Lapsley, Hill, and Quaranto (2010) found strong links between psychological flourishing 13 years after graduation and two college activities: time spent volunteering in college and taking at least one service-learning course. However, most studies have been limited to demonstrating effects within time enrolled at college. For example, Denson and Bowman (2011) demonstrated, for students at an Australian university, that both participation in high-quality curricular diversity activities and interactions with diverse peers were

associated with improved intergroup attitudes and civic engagement outcomes, attributes that are arguably critical to and predictive of functioning effectively in a global society. This project aspires to continue to track students after graduation to more clearly identify how particular college experiences are associated with positive adult life-course outcomes.

CONCLUSION

The areas highlighted above and measures developed for the current project provide a path forward to identifying the value of postsecondary education for individuals and a mechanism for colleges and universities to respond to student needs and support student success. It is hoped that such efforts will provide a starting point and catalyst for a broader institutional movement to expand, iterate, and deepen undergraduate measurement focused on improving conditions for student outcomes.

In addition to these efforts being neither exhaustive nor definitive, it is worth highlighting an additional limitation to the approach taken. This work has adopted an individual measurement logic that identifies the potential value of educational experiences solely for the students who are undertaking the activity. This approach assumes that education is largely a private good that should be evaluated based on what it is able to provide to the individual student. Education, however, can also be thought of as a public good (i.e., an investment which generates returns that are shared by society as a whole). For example, a college educated student can enhance their ability to contribute to society in terms of generating art, health, public service, or activities that create broad public benefits. This study has not attempted to measure or quantify the extent to which college educated citizens produce benefits for their families, communities, or society.

It is also recognized that the social and behavioral sciences are not well positioned to identify what society ought to value and produce in higher education. Once those goals and outcomes are agreed upon, however, educators will have the ability to deploy measurement tools to identify mechanisms that increase the likelihood of desired outcomes. This project is premised on an assumption that the value of postsecondary education should include the development of general and specialized cognitive competencies, intellectual dispositions, identity formation, self-direction, self-regulation, productive social relationships, civic engagement, wellbeing, flourishing, and the attainment of self-defined goals. It is believed that all students regardless of social background have the right to aspire to postsecondary value along these dimensions and that these aspects of human development are linked to the increased likelihood of living healthy and productive lives. Improved measurement of undergraduate education can help demonstrate the extent to which students attain this value from college and can simultaneously serve to inform institutional efforts to improve postsecondary success and equity. Educators all have an obligation to do this work for their students.

Improved measurement of undergraduate education can help demonstrate the extent to which students attain this value from college and can simultaneously serve to inform institutional efforts to improve postsecondary success and equity.

REFERENCES

- Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning on college campuses*. Chicago: University of Chicago Press.
- Arum, R., Roksa, J., & Cook, A. (Eds.). (2016). *Improving quality in American higher education: Learning outcomes and assessments for the 21st century*. John Wiley & Sons.
- Biancani, S., & McFarland, D. A. (2013). Social networks behavior in higher education. In M. B. Paulsen & J. C. Smart (Eds.), *Higher education: Handbook of theory and research*, 28, 151–215. New York, NY: Springer.
- Boekaerts, M. (2011). Emotions, emotion regulation, and self-regulation of learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Educational psychology handbook series. Handbook of self-regulation of learning and performance*. 408–425. Routledge/Taylor & Francis Group.
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis with special reference to education*. The University of Chicago Press.
- Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). New York, NY: Greenwood Press.
- Bowman, N., Brandenberger, J., Lapsley, D., Hill, P., & Quaranto, J. (2010). Serving in college, flourishing in adulthood: does community engagement during the college years predict adult well-being? *Applied Psychology: Health and Well-Being*, 2, 14–34. <https://doi.org/10.1111/j.1758-0854.2009.01020.x>
- Brand, J. E., & Xie, Y. (2010). Who benefits most from college?: Evidence for negative selection in heterogeneous economic returns to higher education. *American Sociological Review*, 75(2), 273–302, <https://doi.org/10.1177/0003122410363567>
- Braun, H. (2013) *Assessment of higher education learning outcomes: Feasibility study report*. Paris: OECD Publishing; Chapter 10. Retrieved from OECD website: <https://www.oecd.org/education/skills-beyond-school/AHELOFSReportVolume3.pdf>
- Brighthouse, H. (2019) How Can We Understand Liberal Arts Education? Retrieved from Mellon Foundation website: <https://mellon.org/news-blog/articles/how-can-we-understand-liberal-arts-education/>
- Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, MA: Harvard University Press.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior*, 22, 345–423.
- Campbell, D. E. (2006). What is education's impact on civic and social engagement? In R. Desjardins & T. Schuller (Eds.), *Measuring the effects of education on health and civic/social engagement*, (pp. 25–126). Paris: Centre for Educational Research and Innovation, Organization for Economic Cooperation and Development.
- Carnevale, A. P., Cheah, B., & Van Der Werf, M. (2019). *A first try at ROI: Ranking 4,500 colleges*. Georgetown University Center on Education and the Workforce. Retrieved from Virginia Tech University website: <https://vtechworks.lib.vt.edu/handle/10919/97743>
- Chetty, R., Friedman, J., Saez, E., Turner, N., & Yagan, D. (2017). *Mobility report cards: The role of colleges in intergenerational mobility*. National Bureau of Economic Research, <https://doi.org/10.3386/w23618>
- Chevalier, A. & Feinstein, L. (2006). Sheepskin or Prozac: The causal effect of education on mental health. IZA Discussion Paper No. 2231. <https://ssrn.com/abstract=923530>
- Colby, A., Ehrlich, T., Beaumont, E., & Stephens, J. (2003). *Educating citizens: Preparing America's undergraduates for lives of moral and civic responsibility*. San Francisco, CA: Jossey-Bass.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95–120.
- Corporation for National and Community Service. (2020) *College students: Trends and highlights overview*. Retrieved from AmeriCorps website: <https://www.nationalservice.gov/vcla/demographic/college-students>

- Damon, W. (2009). *The path to purpose: How young people find their calling in life*. New York, NY: Simon and Schuster.
- Davies, M. (2013). Critical thinking and disciplines reconsidered. *Higher Education Research and Development*, 32(4), 529–544.
- Dee, T. S. (2004). Are there civic returns to education? *Journal of Public Economics*, 88(9-10), 1697-1720.
- Denson, N., & Bowman, N. (2013). University diversity and preparation for a global society: The role of diversity in shaping intergroup attitudes and civic outcomes. *Studies in Higher Education*, 38(4), 555-570, <https://doi.org/10.1080/03075079.2011.584971>
- Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53, 109-132, <https://doi.org/10.1146/annurev.psych.53.100901.135153>
- Ehrlich, T. (Ed.). (2000). *Civic responsibility and higher education*. Washington, DC: American Council on Education/Oryx Press.
- Eisenberg, D., Hunt, J., Speer, N., & Zivin, K. (2011). Mental health service utilization among college students in the United States. *The Journal of nervous and mental disease* 199 (5), 301–308, <https://doi.org/10.1097/NMD.0b013e3182175123>
- Erikson, E. (1968). *Identity: Youth and crisis*. New York, NY: Norton.
- Evans, B. J., Marsicano, C. R., & Lennartz, C. J. (2019). Cracks in the bedrock of American democracy: Differences in civic engagement across institutions of higher education. *Educational Researcher*, 48(1), 31-44. <https://doi.org/10.3102/0013189X18809053>
- Fingerhut, H. (July 2017). *Republicans skeptical of colleges' impact on U.S., but most see benefits for workforce preparation*. Retrieved from Pew Research Center website: <https://www.pewresearch.org/fact-tank/2017/07/20/republicans-skeptical-of-colleges-impact-on-u-s-but-most-see-benefits-for-workforce-preparation/>
- Flanagan, C., & Levine, P. (2010). Civic engagement and the transition to adulthood. *The Future of Children*, 20, 159-179, <https://doi.org/10.1353/foc.0.0043>
- Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360-1380.
- Heckhausen, J., Wrosch, C., & Schulz, R. (2019). Agency and motivation in adulthood and old age. *Annual Review of Psychology*, 70, 191-217, <https://doi.org/10.1146/annurev-psych-010418-103043>
- Hillygus, D. S. (2005). The missing link: Exploring the relationship between higher education and political engagement. *Political Behavior*, 27(1), 25-47, <https://doi.org/10.1007/s11109-005-3075-8>
- Hitchcock, D. (2018). Critical thinking. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Fall 2018 Edition). Retrieved from Stanford University website: <https://plato.stanford.edu/archives/fall2018/entries/critical-thinking/>
- Hoyle, R. H., & Dent, A. L. (2018). Developmental trajectories of skills and abilities relevant for self-regulation of learning and performance. In D. H. Schunk & J. A. Greene (Eds.), *Educational psychology handbook series. Handbook of self-regulation of learning and performance* (pp. 49–63). Routledge/Taylor & Francis Group.
- Hunt, J. B., Eisenberg, D., Lu, L., & Gathright, M. (2015). Racial/ethnic disparities in mental health care utilization among U.S. college students: Applying the Institution of Medicine definition of health care disparities. In *Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry* 39 (5), 520–526, <https://doi.org/10.1007/s40596-014-0148-1>
- Huta, V., & Ryan, R. M. (2010). Pursuing pleasure or virtue: The differential and overlapping well-being benefits of hedonic and eudaimonic motives. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, 11(6), 735–762, <https://doi.org/10.1007/s10902-009-9171-4>
- Huta, V., & Waterman, A. S. (2014). Eudaimonia and its distinction from hedonia: Developing a classification and terminology for understanding conceptual and operational definitions. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, 15(6), 1425–1456, <https://doi.org/10.1007/s10902-013-9485-0>
- Kezar, A. (2014). Higher education change and social networks: A review of research. *The Journal of Higher Education*, 85(1), 91-125.

- Kuh, G. D. (2008). High-impact educational practices: *What they are, who has access to them, and why they matter*. Association of American Colleges & Universities.
- Kyllonen, P. C., & Kell, H. (2018). Ability tests measure personality, personality tests measure ability: Disentangling construct and method in evaluating the relationship between personality and ability. *Journal of Intelligence*, 6(3), 32, <https://doi.org/10.3390/jintelligence6030032>
- Learned, W. S., & Wood, B. D. (1938). The student and his knowledge. *Carnegie Foundation for the Advancement of Teaching Bulletin*, 29, xx + 406.
- Lehman, D. R., Lempert, R. O., & Nisbett, R. E. (1988). The effects of graduate training on reasoning: Formal discipline and thinking about everyday-life events. *American Psychologist*, 43(6), 431.
- Lehman, D. R., & Nisbett, R. E. (1990). A longitudinal study of the effects of undergraduate training on reasoning. *Developmental Psychology*, 26(6), 952.
- Liu, O. L., Frankel, L., & Roohr, K. C. (2014). Assessing critical thinking in higher education: Current state and directions for next-generation assessment. *ETS Research Report Series*, 1-23, <https://doi.org/10.1002/ets2.12009>
- Ma, J., Pender, M., & Welch, M. (2019). *Trends in higher education series, Education pays 2019: The benefits of higher education for individuals and society*. Retrieved from College Board website: <https://research.collegeboard.org/pdf/education-pays-2019-full-report.pdf>
- Marcia, J. E. (1966). Development and validation of ego identity status. *Journal of Personality and Social Psychology*, 3, 551-558, <https://doi.org/10.1037/h0023281>
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27(1), 415-444.
- Monteiro, S., Sherbino, J., Sibbald, M., & Norman, G. (2020). Critical thinking, biases and dual processing: The enduring myth of generalisable skills. *Medical Education*, 54(1), 66-73.
- Moore, T. J. (2011). Critical thinking and disciplinary thinking: A continuing debate. *Higher Education Research & Development*, 30(3), 261-274.
- Nadelson, L. S., Semmelroth, C., Martinez, G., Featherstone, M., Fuhrman, C. A., & Sell, A. (2013). Why Did They Come Here?--The Influences and Expectations of First-Year Students' College Experience. *Higher Education Studies*, 3(1), 50-62.
- National Task Force on Civic Learning and Democratic Engagement. (2012). *A crucible moment: College learning and democracy's future*. Washington, DC: Association of American Colleges and Universities.
- Newport, F., & Busteed, B. (August 2017). *Why Are Republicans Down on Higher Ed?* Retrieved from Gallup website: <https://news.gallup.com/poll/216278/why-republicans-down-higher.aspx>
- OECD (2019). *Education at a Glance 2019: OECD Indicators*. Paris: OECD Publishing. <https://doi.org/10.1787/f8d7880d-en>
- Pascarella, E. T., Blaich, C., Martin, G. L., & Hanson, J. M. (2011). How robust are the findings of *Academically Adrift?* *Change: The Magazine of Higher Learning*, 43(3), 20–24, <https://doi.org/10.1080/00091383.2011.568898>
- Pascarella, E. T., Wang, J.-S., Trolian, T. L., & Blaich, C. (2013). How the instructional and learning environments of liberal arts colleges enhance cognitive development. *Higher Education*, 66 (5), 569–583.
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of Self-Regulation* (452–502). Academic Press.
- Pintrich, P. R., Smith, D., Garcia, T., & McKeachie, W. (1991). *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. Ann Arbor, MI: University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning.
- Pryor, J. H., Hurtado, S., Sáenz, V. B., Santos, J. L., & Korn, W. S. (2007). *The American freshman: Forty year trends*. Los Angeles: Higher Education Research Institute, UCLA.

- Ryan, R., & Deci, E. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, 52, 141-166, <http://dx.doi.org/10.1146/annurev.psych.52.1.141>
- Stanton-Salazar, R. D. (2011). A social capital framework for the study of institutional agents and their role in the empowerment of low-status students and youth. *Youth & Society*, 43(3), 1066-1109, <https://doi.org/10.1177/0044118X10382877>
- Sullivan, W. M., & Rosin, M. S. (2008). *A new agenda for higher education: Shaping a life of the mind for practice*. San Francisco, CA: Jossey-Bass.
- Tinto, V. (1993). *Leaving college: Rethinking the cause and cures of student attrition* (2nd ed.). Chicago: University of Chicago.
- Watts, R. J., & Flanagan, C. (2007). Pushing the envelope on youth civic engagement: A developmental and liberation psychology perspective. *Journal of Community Psychology*, 35(6), 779-792.
- Weinstein, C. E., & Palmer, D. R. (2002). *Learning and study strategies inventory (LASSI): User's manual* (2nd ed.). Clearwater, F: H & H Publishing.
- Winne, P., & Hadwin, A. F. (1998). Studying as self-regulated engagement in learning. In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), *Metacognition in educational theory and practice* (277–304). Erlbaum.
- Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, 25(1), 3–17, https://doi.org/10.1207/s15326985ep2501_2
- Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, 41(2), 64–70, https://doi.org/10.1207/s15430421tip4102_2

APPENDIX: NEXT GENERATION UNDERGRADUATE SUCCESS MEASUREMENT PROJECT METRICS

Measuring Cognitive Ability and Intellectual Dispositions

In the Next Generation Undergraduate Success Measurement Project, cognitive ability and intellectual dispositions are assessed by administering a mix of assessment formats to students at the start of the fall term. For traditionally conceived cognitive ability measures, critical thinking and civic online reasoning are assessed. For desirable intellectual dispositions, surveys are deployed at the start and end of the academic year, to assess intellectual curiosity and other interest and motivational constructs related to habits of mind. Furthermore, and taking place at the beginning of the academic year, novel performance assessments are used to assess attributes at the intersection of effective reasoning and character virtue, such as: collaborative problem-solving, confirmation bias, and perspective-taking. As each of these measures will be assessed again within two years of initial assessment, these data allow for examining the growth in these qualities over time and undergraduate experiences.

Development of Identity and Adaptive Life-course Agency

The literature discussed in the Adaptive Life Course Agency section was used to develop the measures in the ongoing Next Generation Undergraduate Success Measurement Project. For example, there was development and collection of detailed longitudinal assessments of educational and occupational goals; self-perceptions of competence and values; self-reports of engagement with goals and flexibility to adjust goals if necessary; perceptions of academic-related experiences; and perceptions of their impact on subsequent educational, occupational, and civic engagement choices, planning, engagement, and success. These measures are used to model the development of academic and occupational goals and identity over the college years both, as responses to students' educational and social experiences, and as predictors of students' subsequent academic engagement and success. It is also planned to examine individual and group differences in these measures as predictors of longer term outcomes in adulthood, such as later general life satisfaction, adaptive capacity, vocational success, lifetime productivity, familial success and satisfaction, civic engagement, and general mental and physical health.

Self-Regulation Skills

In the Next Generation Undergraduate Success Measurement Project, there is assessment of students' self-regulated learning skills at several time points with survey data and data from the learning management system Canvas (LMS data). Repeated measures over time allow for examining individual differences as well as change over time in self-regulated learning skills. At the beginning of the academic year there is assessment of students' self-reported self-regulated learning skills as part of a longer student survey. Throughout the quarters in fall, winter, and spring repeated surveys are used to assess students' use of self-regulated learning behavior in specific situations. More precisely, students' study behavior in a particular course during their preparation for midterm exams is requested to gather data about students' use of self-regulation skills rather than their overall evaluation of these skills in

general. In addition to self-reported survey data on self-regulated learning skills, data are used from the learning management system Canvas to obtain behavior-based information about students' study behavior across all terms of the academic year. This data provides real-time information about central elements of students' self-regulated learning behavior (e.g., spacing vs. cramming) in each course.

Social Capital

The items related to social networks, which are included in the Next Generation Undergraduate Success Measurement Project surveys, center on students' friendships. Students are asked to identify their five closest friends at college and their five closest friends in general. Further, they are asked to provide information about each friend, such as college attendance, major, and occupation. Surveys include questions that capture information regarding the context and timing of friendship formation, social activity participation, and sense of social belongingness. Relatedly, a general values inventory is used to assess the subjective value that students attribute to their friendships and the reported importance of maintaining friendships. Lastly, to account for potential effects related to social capital, measures are included regarding perceived social status and social mobility.

Civic Engagement

The authors longitudinally track a wide range of civic engagement constructs in the Next Generation Undergraduate Success Measurement Project. Community involvement, service learning, and extracurricular activity participation are captured through weekly surveys. At the beginning of the academic year, the importance of a variety of civic behaviors is assessed using an inventory of civic attitudes. Political orientation and the subjective importance of political awareness are examined in the fall and spring. There is a capture of the frequency, quantity, and political disposition of students' news consumption, as well as perceived trustworthiness of sources, through weekly and quarterly surveys. Measurement of constructs occurs related to civic engagement, such as perceptions of discrimination, perspective taking, perceptions of social mobility, prosocial career aspirations, and general life values. In each iteration of the survey, the civic engagement questions have been adjusted to be relevant to current events. There was assessment of perceptions of social responsibility related to COVID-19 in the spring of 2020. Surveys in the summer of 2020 included measures of critical perspectives on structural racism and participation in the Black Lives Matter movement. In fall of 2020, questions were asked regarding voting behavior and perspectives on the presidential election.

Mental Health and Psychological Flourishing

The Next Generation Undergraduate Success Measurement Project is collecting data at several points during the school year to assess both mental health, perceived stress, and measures of psychological flourishing: for example, positive and negative affect and general life satisfaction. In addition, survey instruments used in this study, along with institutional and clickstream data can be used to assess other, possibly mediating, factors, for example, the degree of engagement with activities that are personally meaningful, challenging, and fulfilling; environmental mastery; social connectedness; and substance abuse.