The Elephant in the Hall: Motivating the Study of Student Motivation and Self-regulation in Studies of Academic Achievement and Persistence in Higher Education

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Abstract

This essay proposes that much of what constitutes the quality of an institution of higher education is the quality of the students attending the institution. This quality, however, is conceptualized to extend beyond that of academic ability. Specifically, three propositions are considered. First, it is proposed that a core construct of student quality is defined in terms of student motivation and self-regulation generally, information that many institutions do not routinely collect. Second, without information on students' motivational profiles, admissions formulas and statistical models of program evaluations are misspecified at best and run the risk of producing biased parameter estimates. In these situations, the bias is often positive and can lead educational leaders into believing that the commonly collected ability measures are more predictive of college performance and that institutional programs are more effective than they really are. This problem may not be mitigated by including demographic or socioeconomic variables. Third, institutional and program accomplishments are supervenient on student characteristics such that differences between or among institutions or programs within institutions cannot exist without differences in the characteristics of the students attending the institutions or participating in the programs. If these propositions are true, then not only are the admissions formulas and program evaluation models that exclude motivational and self-regulatory influences misspecified, but a deeper issue arises that questions the exogenous nature of institutional and program effects and thus the credibility of institutional and program accomplishments.

Keywords: Motivation, Self-regulation, Procrastination, School belongingness, Supervenience, College students

"The essential achievement of the will, in short, when it is most 'voluntary', is to attend to a difficult object and hold it fast before the mind." -William James

1. Introduction

1.1 Student Motivational Characteristics as Exogenous Variables in Institutional Effects

Understanding academic achievement and persistence in college cannot be understood in terms of the characteristics of the institutions students are admitted to as if they were independent of the characteristics of the students admitted to those institutions (Astin, 2005-2006). As pointed out by Astin (2005-2006), institutions can undeservedly get the "credit" or "blame" for outcome measures of retention and graduation, which may really be based in some significant way on the characteristics of the students admitted. Importantly, these characteristics extend beyond the ability, demographic, and socioeconomic measures that institutions readily collect. As suggested by Heckman and colleagues (e.g., Almlund, Duckworth, Heckman, & Kautz, 2011; Borghans, Duckworth, Heckman, & ter Weel, 2008; Duckworth, Peterson, Matthews, & Kelly, 2007; Heckman & Kautz, 2012), the identification of students who achieve versus those who do not includes considering core personality and motivational characteristics beyond those of intelligence and ability.

While some scholars (e.g. Bowen, Chingos, & McPherson, 2009; Tinto, 1975; 2012) give an acknowledging nod to

personality, motivational, and self-regulatory variables, measures of student characteristics usually involve demographic, socioeconomic, or ability variables while a subset of variables, usually referred to with the irksome "non-cognitive" label, is proposed to measure everything else. However, some of these non-cognitive variables measure *cognitively* influenced processes such as self-regulation, effort, perseverance, and conscientiousness, but are often not measured and usually dismissed as error. The reason for this is that these non-cognitive characteristics are generally unavailable and the only recourse is to lump them in the error term of statistical models. However, not including them may give the impression that ability, demographic, socioeconomic, and institutional effects on academic achievement are greater than they really are.

This essay proposes that the quality of an academic institution of higher learning is, to a large extent, an emergent property of the exogenous qualities of the effort and dispositional motivational and self-regulatory characteristics of the students attending the institution. This seems to be tacitly acknowledged but not actively discussed or pursued. To that extent, this is the elephant in the halls of many institutions of higher education. In addition, however, it is also proposed that a deeper question arises concerning whether institutional and program effects on student achievement and persistence are thus *supervenient* effects; that is, the idea that differences among institutions and programs cannot exist without the collective differences in the characteristics of the students attending those institutions. Thus, the thesis of this essay is that what appears to be institutional or program effects, even after controlling for ability, demographic, or socioeconomic influences may, in large part, be due to the constitutive and collective effects of student motivational and self-regulatory characteristics and not to any exogenous or independent elements inherent in institutions or programs per se.

1.2 Applying the Concept of Supervenience to the Problem of Institutional Effects

Following the insights provided by Kievit, Romeijn, Waldorp, Wicherts, Scholte, and Borsboom (2011), supervenience is construed as a measurement problem where, in the present case, institutional or program level indicators (e.g. average ACT, average GPA, percent retention, percent graduation) reflectively measure the "construct" of the institution or program quality that is, in turn, dependent formatively on student characteristics as in a latent variable MIMIC model (see Kievit, et al., 2011 for more detail and the use of this notion as applied to the philosophy of mind). A simple analogy of the type of supervenience considered here would be that an institution of higher learning supervenes on its students in the same way a chocolate cake supervenes on the ingredients that constitute it. For example, the differences in two cakes imply differences in the ingredients (e.g. the quality of the chocolate, flour, etc.) that constitute them; differences in the ingredients are necessary, but not sufficient, conditions for the differences in the cakes. To that extent, the properties of the cakes co-vary with the properties of the ingredients. Thus, the cakes cannot differ if the ingredients that constitute the cakes do not differ, but it is entirely possible for the ingredients to differ without realizing a difference between the cakes. Thus, knowledge about the cakes (e.g. how they taste) does not necessarily provide any information about the ingredients that comprise them. (For example, a very skilled baker may be able to use inferior ingredients to make a cake that tastes just as good as one with superior ingredients.)

Given this notion of supervenience, student characteristics generally are necessary but not sufficient conditions for institutional achievement, persistence, and general quality outcomes. Thus, as stated by Kievit, et al. (2011), "results at the population level are not necessarily informative about the individuals that make up that population" (p. 76). For example, at the program level within an institution, the condition of necessity would imply that differences between a group participating in a program and a group not participating could be due to student differences that could have existed *prior to* the program's existence. Specifically, the differences seen between program participation and non-participation co-vary, but the necessary condition is the difference in student characteristics and *not* the program characteristics. Notice also that the condition of *insufficiency* at the program level implies that students in the "experimental" and "control" groups can differ prior to the program *without* there being a program effect. This implies that results from higher education program evaluations do not necessarily provide any information about the students in the program.

The same would be true at the institutional level. That is, given that institutional differences in quality supervene on student differences, those differences cannot exist without differences in the quality of the students attending those institutions. However, even if there are differences between the populations of students constituting two institutions, this does not imply that there will be differences at the institutional level. Thus, even though institutions cannot differ without differences in the students that constitute them, knowledge of institutional characteristics (e.g. percent retained or graduated, average ACT or SAT score of an institution, etc.) does not necessarily specify anything about the students they comprise.

1.3 Implications for the Interpretation of the Meaning of Institutional Effects

These propositions, if true, could have a significant impact on how institutional and program evaluations are interpreted. At the program level, program outcome differences should not be interpreted as *exogenous* effects of an institutional program. That is, program effects are not due to variables that do something *to* or *for* students as if the variable differences were independent of the student differences that necessarily constitute the program evaluation. Rather, program effects are *endogenous* and thus dependent on student motivational factors that 1) may have existed prior to program implementation, 2) not the focus of program outcomes, and 3) inherent in the students participating in the program. Program outcomes reflectively measure or indicate program success. As such, the program can be thought of as a construct that is itself determined by motivational factors that may be completely independent of the intent of the program. Most importantly, this implies that the "effect" of the program depends not on the program manipulations but rather on how independent motivational factors influence these manipulations. The program is only a mediator and not an independent cause of student outcomes.

At the institutional level, institutional quality is often measured by mean standardized test scores, mean high school GPA or class rank, first year retention rate, graduate rate, and the number of students successfully employed after graduation (to name just a few). However, these statistics are reflective indicators that are intended to measure institutional quality. Institutional quality is thus a construct that depends not on what measures it, but rather on student characteristics that constitute the institution so measured. Thus, as is true for program evaluation, institutions are mediators of student motivational effects on institutional quality. Simply put, there are no institutional effects without student motivation and self-regulation effects.

It must be understood, however, that student motivation and self-regulation differences are proposed as exogenous *necessary* conditions. They clearly won't account for all of the variability seen between institutions or programs. However, they are conceptualized to be exogenous and thus not something that should be ignored or treated as error. They are exogenous because they determine voluntary behavior – what is or is not attended to and acted upon. Institutional and program effects are thus dependent on the effects of what students attend to and therefore the students' motivational qualities.

2. Evidence for the Importance of Motivational and Self-regulatory Factors in Student Achievement

2.1 Dispositions and Effort

Consider the following examples. Astin and Lee (2003) showed that 61 percent of the variability of the number of hours students reported studying in college was accounted for by knowing only the number of hours they reported studying in high school, their self-ratings of academic and leadership ability, and the importance of a life goal ("develop a meaningful philosophy of life"). In a meta-analytic study, Credé and Kuncel (2008) showed that study skills, habits, attitudes, and motivation had relatively high criterion validity for academic performance, ranging from ".27 for study habits to .39 for study motivation" (p.441) and accounted for incremental variance beyond that of standardized test scores.

Students' traits, values, and preferences may also play an important role in academic achievement. For example, Delaney, Harmon, and Ryan (2013) in a large scale survey of seven universities in Ireland, reported that personality traits, particularly conscientiousness and future-orientation, were significantly related to study behavior and lecture attendance. Kappe and van der Flier (2012) reported that about one-third of the variability in GPA and time to graduation were accounted for by student traits (intelligence, conscientiousness, and intrinsic motivation). Conscientiousness accounted for over 17% to 22% of the variance in GPA and time to graduation after controlling for intelligence. Other studies have also suggested that student motivation and self-regulation are important factors in student academic success. Richardson, Abraham, and Bond's (2012) meta-analytic study, summarizing 13 years of research, found 50 unique personal constructs as potential antecedents of college GPA. Among these, personality measures such as the tendency to procrastinate, conscientiousness, and need for cognition had small but significant correlations with GPA. Motivational factors such as academic and performance self-efficacy and grade goal were also significantly related to GPA with performance self-efficacy having the strongest correlation ($r = .59$). Self-regulatory factors (effort regulation and test anxiety) were also significantly related to GPA. Robbins, Allen, Casillas, Peterson, and Le (2006) assessed the incremental predictive validity of 10 psychosocial factors on first-year college GPA and retention in hierarchical regression models after controlling for ability measures (i.e. ACT scores, COMPASS scores, and high school GPA) and institutional effects for 14,464 students at 48 institutions. They found small increases in the variance accounted for in both GPA and first-year retention after controlling for ability and institutional effects with Academic Discipline as the most consistent predictor of the outcomes. Importantly, note that as operationalized by the authors, Academic Discipline "reflects the amount of effort students put into schoolwork and the degree to which

[students] see themselves as willing to work hard to complete homework and academic assignments …" (p. 613).

2.2 Procrastination as a Potential Mediator of the Influence of Academic and Social Values

Kennedy and Tuckman (2013) conceptualized students' academic and social values as necessary conditions of self-regulation to the extent that these factors contribute to engagement decisions in the pursuit of goals. These authors found in a structural equation model that academic values (Pintrich, Smith, Garcia, and McKeachie, 1993) assessed at the beginning of students' first term had a statistically significant negative relationship (β = -.49) with trait procrastination (as measured by the *Tuckman Procrastination Scale* from Tuckman, 1991 and the *Self-control Scale* from Tangney, Baumeister, and Boone, 2004). In addition, social values (specifically, concerns about feeling socially excluded from friends and peers), also assessed at the beginning of the term, had a statistically significant positive relationship (β = .11) with trait procrastination. This latter relationship was predicted based on experimental evidence that perceptions of being socially excluded can impair self-regulation (Baumeister, DeWall, Ciarocco, & Twenge, 2005). Trait procrastination was also assessed at the beginning of the term, so a causal relationship between academic/social values with procrastination cannot be ascertained. However, this result suggests that procrastination tendency may reflect the academic and social values students possess as they enter the university. Furthermore, this study showed that the tendency to procrastinate partially mediated the influence of academic and social values on perceived school belongingness, self-regulatory self-efficacy, and perceived stress assessed six weeks later during the latter part of the first term. Finally, academic values and procrastination (but not social values) had statistically significant total effects on first term GPA (β = .11 and β = -.10 for academic values and procrastination respectively) assessed nine weeks later and after controlling for ability measures (ACT or SAT and high school class rank).

2.3 Characteristics of Underachievers

In an attempt to understand the characteristics of academic underachievers, McCall, Evahn, and Kratzer (1992) conducted a longitudinal study of the characteristics of high school underachievers and their life situations thirteen years later. Conceptually, McCall (1994) defines an academic underachiever as "a student who performs more poorly in school, typically as measured by grade average, than one would predict on the basis of his or her mental or educational ability, often measured by IQ, aptitude, or educational achievement tests" (p.15). Operationally, McCall, et al. (1992) defined underachievement as greater than one standard error below the line resulting from the regression of GPA on a "mental ability index" (composed of various intelligence and aptitude tests). The authors concluded that "*underachievers lack persistence in the face of challenge and adversity*" and that "instead of persevering and attempting to conquer the inevitable difficulties of life, they check out" (p. 143, emphasis in the original). Mandel and Marcus (1988), list underachievement criteria such as "consistent procrastination", "loss of interest in almost any long-term area of commitment", "a tendency to give up easily at the first sign of any difficulty", a "tendency to distraction" a "multitude of excuses for poor performance", "laziness and lack of motivation, typically noted by parents, teachers, friends, and even [the] underachievers themselves" (p. 265). This research suggests a significant disparity between student potential and performance with approximately 15% to 20% of high school and college students performing below what would be expected on the basis of ability alone (Mandel, 2004).

Krouse and Krouse (1981) showed that the evidence points to underachievement being related to fear of failure, impulsiveness, and a high need for approval. Furthermore, underachievers tend to be motivated by extrinsic factors relative to overachievers, less accurate in assessing their abilities, and more likely to give up in the face of difficult situations. These authors suggested that a crucial element in academic underachievement is the underachiever's inability to manage his or her own behavior due to deficits in academic study skills, interfering affective factors, and deficiencies in self-control.

3. Theoretical Motivational Processes in Academic Success

3.1 Grit

These results suggest that necessary conditions for student success in college likely extend beyond the student characteristics typically used in college admissions protocols. What is often not considered when looking at institutional outcome differences is the differentiation of the students as potential academic achievers or underachievers based on effort and perseverance. One useful construct in this context is that of *grit* (Duckworth, et al., 2007) defined as ". . . perseverance and passion for long-term goals. Grit entails working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress" (pp. 1087 – 1088). Duckworth, et al. created a Grit Scale that measured the constructs of "Consistency of Interest" and "Perseverance of Effort" and found that, for individuals older than 24 years of age, grit was positively related to educational level after controlling for age. For example, post-college graduates had higher levels of grit than

individuals with lower levels of educational attainment. In another study examining the relationship between grit and the college GPA of undergraduates at the University of Pennsylvania, Duckworth, et al. (2007) reported a statistically significant correlation (.34) between grit and GPA after controlling for SAT. Another interesting finding in this study was that grit was negatively correlated with SAT (-.20) suggesting, in their words, "that among elite undergraduates, smarter students may be slightly less gritty than their peers" implying a compensation effect for students with lower SAT scores (see also Moutafi, Furnham, and Paltiel, 2005).

3.2 Values

However, the construct of grit would seem unnecessary if the condition of multiple competing and conflicting goals did not prevail. And to the extent that students pursue multiple goals, goal conflict implies value conflict because goals cannot exist independently of their perceived importance (Carver and Schrier, 1998; Schwartz, 1994). Thus, in addition to grit, values would to be another necessary condition influencing student achievement. Values are beliefs about the desirability and importance of goals that transcend specific situations (Schwartz, 1994) and in academic settings guide, rather than direct, behavior through achievement goals (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Harackiewicz, Durik, Barron, Linnenbrink-Garcia, and Tauer, 2008) and self-regulation (Bandura, 1986). Values place positive or negative valences on goals that can affect the strength and direction of behavior toward different goals (Feather, 1988).

Academic goals must find their place within a goal hierarchy (Carver and Schrier, 1998) and interact with values associated with other goals in this hierarchy. While a synergy can be achieved between academic and social goals (Urdan & Maehr, 1995; Wentzel, 2005), conflicts may occur when they have different value levels (Dietz, Hofer & Fries, 2007; Schouwenburg & Groenewoud, 2001; Hofer, Schmid, Fries, Dietz, Clausen, & Reinders, 2007; Senecal, Julien, and Guay, 2003). For example, a student who is debating whether to study or go to a party will have to decide which goal is more important. According to Carver and Schrier's (1998) control theory representation of the hierarchical structure of goal systems, the decision made will be determined by one or both of two possible mechanisms. The first mechanism concerns the strength of the connection (i.e. the means to the end) between lower level goals such as studying versus going to a party, for example, and higher level goals such as "I need to do well on my exam" versus "I need to have fun". These goals are, in turn, means to higher level goals such as "I need to pass this course" versus "I need to meet new people". Thus, the means path that is the strongest (i.e. [study→ do well on the exam → pass the course] versus [go to the party → have fun → meet new people]) will determine whether this student studies or goes to the party. The other mechanism concerns the number of links a lower level goal (e.g. study versus go to a party) has with other higher level goals being considered. For example, if going to a party can accomplish having fun and meeting new people but studying can accomplish only getting a good grade on the exam, to the extent that having fun, meeting new people, and getting a good grade on the exam are all of equal valence, the decision would be to go to the party because that goal satisfies two higher level goals, but studying satisfies only one.

3.3 Delay of Gratification

Thus, students' high level values may be indicative of grit and self-regulatory tendencies. The will-power required in academic endeavors, or as William James (1890/1950) puts it, the ability to "attend to a difficult object and hold it fast before the mind", is manifested as a conflict, one that often involves forsaking a smaller, more immediate reward (e.g., a night out with friends), for a larger, more delayed reward (e.g., getting a good grade on an important exam). The self-regulatory ability to delay immediate gratification in order to achieve a long-term goal is thus proposed as a third necessary condition for student achievement.

One experimental procedure used to investigate delay of gratification (e.g., Mischel & Baker, 1975; Mischel & Ebbesen, 1970) has children face a dilemma of either waiting for an extended time (e.g., 15 or 20 minutes) for a large reward, for example two cookies, or take an immediately available smaller reward. The interesting result is that the amount of time a 4- or 5-year old child waits for a reward is predictive of social, emotional, and cognitive competencies later in life. For example, Shoda, Mischel, & Peake (1990) showed that the delay time of 4- and 5-year old children exposed to the delay of gratification manipulation and offered no strategies to think about during the delay period as an aid at effortful control, was significantly correlated with parents' ratings of self-control in frustrating situation, coping skills, concentration ability, intelligence, perseverance, and resistance to temptation 10 years later. Perhaps even more remarkable was the significant correlation between delay time as young children and performance on the SAT exam over a decade later. In a related study, Mischel, Shoda, and Peake (1988) showed that the delay time was significantly related to an ego-resiliency index (conceptually related to grit) suggesting that competency in delaying gratification is based on the "child's ability to deploy attention effectively and engage in delay-enhancing thoughts and distractions to reduce the aversiveness and arousal during delay while persisting in the task" (pp 694 – 695).

3.4 Self-efficacy

A fourth proposed motivational necessary condition of academic achievement in college is perceived self-efficacy or "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). It is now well established that self-efficacy is positively related to academic achievement (Bandura, 1997; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Gore, 2006; Kahn & Nauta, 2001; Pajares, 1996; Pintrich & DeGroot, 1990; Schunk, 1991; Schunk & Pajares, 2005). However, self-efficacy beliefs can change over time (Sexton & Tuckman, 1991; Sexton, Tuckman, & Crehan, 1992) and initial estimates of self-efficacy can be poor estimators of performance (Tuckman & Sexton, 1990). In line with this finding Gore (2006) has shown that while assessment of self-efficacy at the beginning of college students first semester weakly predicted semester grade point average through the third semester, assessment of self-efficacy late in the first semester was consistently and strongly related to semester grade point average through the third semester. Kahn and Nauta (2001) reported results similar to this: measures of self-efficacy assessed late in a term were superior predictors of academic performance relative to assessments early in a term. A similar pattern was found in predicting first and second year retention. Gore suggested that this finding is consistent with Bandura's (1986; 1997) contention that self-efficacy develops over time as a function of prior performance and vicarious learning.

However, even though self-efficacy is a malleable student characteristic that can be developed through institutional programming efforts and thus contribute to the institutional effects of student achievement (e.g. Tuckman & Kennedy, 2011), it is still to some extent related to student characteristics that are both unmeasured and usually outside of an institution's control. Kennedy and Tuckman (2013), for example, found that self-regulatory self-efficacy (Zimmerman and Kitsantas, 2007), measured near the end of first-year students' first term, was directly and significantly influenced by the tendency to procrastinate (β = -.33) assessed six weeks prior to the self-efficacy assessment. In addition, academic value, also measured six weeks prior to the self-efficacy assessment, had a statistically significant and relatively large positive total effect on self-efficacy (β=.52). These measures of procrastination tendency and academic values were motivational characteristics that developed prior to entering the university, were not directly included in the university's selection criteria, and yet influenced another important motivational characteristic that, itself, had well-established influences on perceived stress (Cohen, Kamarck, and Mermelstein, 1983) and academic achievement. Specifically, self-regulatory self-efficacy was significantly related to both perceived stress (β = -.21) and first term GPA (β = .19), after controlling for ACT/SAT and high school class rank.

Thus, institutions miss an opportunity to get a better understanding of their retention, graduation, and general student achievement statistics by neglecting student self-efficacy and the factors that can influence its development (see the discussion below on Bayer and Gollwitzer's (2007) work on the importance of self-efficacy implementation intentions).

3.5 Perceived School Belongingness

Of course social factors can also have a very important role in student success and can be directly influenced by the institutional environment. Tinto (1993) has shown how difficulties in integrating into the academic and social milieu of an institution can be a very important factor in students' decision to leave that institution voluntarily and perhaps never earn a degree. His analysis suggests that an important factor in decisions to leave college early is perceived incongruence between the student and institution. Incongruence or the "mismatch between the individual and the institution" (p. 51) is both academic and social in nature. Academic incongruence involves a mismatch between one's abilities and interests and the demands of the academic system of the institution. Social incongruence occurs when students' values do not match those of the formal values of the social system of the institution and/or the values of other individual students, faculty, or staff informally assessed through day-to-day, interactions (Tinto, 1993). Academic and social engagement can be influenced by a student's sense of belongingness *in* school (i.e. in the academy generally) as well as *at* a particular institution. There is evidence that a sense of school belonging may be positively related to a students' academic motivation and achievement as well as their overall subjective well-being (Anderman & Freeman, 2004; Freeman, Anderman, & Jensen, 2007).

However, even here, where the institutional environment can have a direct influence on perceived social and academic integration, student characteristics may play an important role. Kennedy and Tuckman (2013) found that the assessment of students' sense of school belonging (Goodenow, 1993) at the university three weeks prior to the end of the first term was positively and significantly related to students' social and academic values assessed six weeks earlier (standardized parameter estimates for total effects were β = .28 and β = .14 for academic and social values respectively). In addition, perceived school belongingness was also negatively and significantly related to the tendency to procrastinate (β = -.23). Thus, procrastination tendency may have partially mediated the relationship of students'

social and academic values with perceived school belongingness. These results suggest that to the extent that an institution's social and academic milieu influence students perceived belongingness, this influence may be a mediator of the motivational characteristics students possess as they enter the university.

4. Potential Consequences of Ignoring Motivational Influences on Achievement

4.1 Model Misspecification and Parameter Bias

The importance of these motivational or so-called "non-cognitive" factors in academic achievement have been known and studied for a long time in both higher education and educational psychology (e.g. Alarcon & Edwards, 2012; Almlund, et al., 2011; Bean & Eaton, 2001-2002; Cassidy, 2012; Sternberg, Bonney, Gabora, & Merrifield, 2012; Tangney, Baumeister, & Boone, 2004; Thomas, Kuncel, and Credé, 2007; Tinto, 1975; Tracey & Sedlacek, 1987). The point is not that these factors are not known, but rather that they often end up as noise in prediction equations and admissions formulas or acknowledged and then buried and subsequently ignored under the weight of institutional programs. Exceptions to what seems like a general rule do exist. For example, Bean and Eaton (2001-2002) are quite clear in their endorsement of taking advantage of what we know about psychological factors (particularly motivational factors) to help students develop in these areas. However, the assumption that Bean and Eaton seem to make is that institutional program participation occurs through random assignment or that all students at an institution would participate. If this is actually the case, then we would indeed be off to a good start. Generally, however, students self-select into these programs. If this is true, then even when the program intent is based on modifying motivational characteristics, the initial motivational characteristics that would undergird participation are not fully appreciated.

There are at least two reasons why not accounting for student's motivational and self-regulatory characteristics can be problematic in formulaic admissions policies and program evaluation. First, by ignoring non-cognitive factors, specifically motivational and self-regulatory factors, we can miss the target of understanding more fully the underlying sources of academic success. That is, the statistical models used for this purpose are misspecified. The second and perhaps more insidious reason is that if the unknown (hence omitted) non-cognitive factors are related to the criterion *and* the known ability or program participation factors, then the estimates of the effects of variables that are known and measured, such as ability or institutional program participation, will be biased upward and inconsistent. Specifically, if the unknown non-cognitive factors are positively correlated with known ability or program participation variables, then the estimated regression weights of SAT or ACT scores, high school class rank or high school GPA, or program participation will most likely appear larger than they really are.

With respect to the influence of institutional programs, Tinto (2012) is likely correct that student success is dependent upon expectation, support, assessment and feedback, and involvement. However, without random assignment into programs or statistical control for omitted variables, if program participation and the criterion of interest (i.e. some measure of success) is positively correlated with the unknown motivational and self-regulatory variables, the more motivated and conscientious students who self-select into these programs will likely experience more success than the less motivated students in the control group. It is thus not surprising that many institutional programs are considered to be successful. Given this confound, however, it isn't clear if institutional endeavors of this nature are effective.

4.2 Evidence for the Potential of Parameter Bias in Learning Community Effects (Pike, Hansen, and Lin, 2011)

One example of this is seen in a study by Pike, Hansen, and Lin (2011) that explicitly examined the influence of self-selection effects on the influence of themed learning community participation of first-year students on first term GPA. While, they found that participation in the learning community was positively related to GPA even after controlling for some student characteristics (ability, gender, application date, socioeconomic factors), the learning community advantage disappeared when self-selection effects were controlled through instrumental variable methodology. In the case of program effects, an instrumental variable (IV) removes the influence of the omitted variables on the program through a two-stage process and thereby corrects the beta weight associated with the effect of the program (see Pike, et al., 2011 for details). When instrumental variables are appropriately applied, the omitted variables may still influence the program directly, and if so, the model would still be misspecified. However, the corrected estimated effect of the program (which will usually be lower than the uncorrected effect), is the effect of the program without the influence of the omitted variables. The caveat in using the IV approach is that proper IVs are difficult to find because the variance in the dependent variable accounted for by the IV must completely overlap the variance accounted for by an explicit covariate – the program effect must completely mediate the influence of the IV. In addition, the IV is assumed to be uncorrelated with the omitted variables which may be a dubious assumption. Finally, there needs to be one IV for every explicit covariate in the model. These conditions can make it difficult to analyze programs appropriately when there are omitted variables thought to be lurking about. Nevertheless, these results are important in light of current conceptualizations of learning community programs as effective in many student

outcomes (Tinto, 2012). However, as suggested by Pike et al. (2011) "*evidence of a significant positive relationship between learning community participation and educational outcomes is not equivalent to showing that learning community participation is responsible for those positive outcomes . . .* " (p. 211, emphasis added). In the present case, the Pike et al., (2011) results suggest that students in the learning community program would have done just as well without the program.

5. Encouraging Student Motivation and Self-regulation

5.1 In the Classroom

Actually, it need not be that complicated. More to the point, Tinto (2012) is correct when he writes that the classroom should be the center of student life in college and that institutions should "stop tinkering at the margins of institutional life" (p.116). My reading of this is that it would perhaps be better for student achievement and retention if institutions scaled back some of the initiatives of add-on programs and courses and focused on the classroom. Indeed, students can help themselves achieve with the help of smart pedagogical practices. For example, Tuckman (1992) provided students in an educational psychology course with an opportunity for bonus points. The exercise was voluntary homework designed to have students write test questions for the material that was covered in a given week. The exercise was designed so that students could earn an increasing number of points reflecting the difficulty of the type of question (e.g. 1 point for fill-in-the-blank type questions, 2 points for multiple choice questions, and 3 points for multiple-choice comprehension questions). Tuckman then randomly assigned students to two groups. One group was given a planning form that asked students to indicate how many items they planned to write on a given day, the reason for writing the item, obstacles that may be encountered and how they would be overcome, their self-assessment of their progress, and their goal of how many bonus points they were planning for. Students who earned enough points could increase their course grade by one full letter grade. He then asked students in both groups to rate their confidence in writing test items. The finding was that 57% of the students who rated themselves as having low or medium competence in writing test items and given the planning form wrote the most difficult test item types and thus were more likely to earn a higher course grade compared with only 24% of students at this confidence level *not* given the planning form – a statistically significant difference. The interesting finding was that there was no statistically significant difference between the groups of students who rated themselves as having high competence. Thus, the exercise worked for the students who needed it most. As simple as its implementation is, this is an important result; giving students something as simple as a planning form can improve learning and achievement. In addition, this is a manipulation that can be done for just about any course, can be modified to suite the need of the instructor, and can be accomplished at virtually no cost.

5.2 Implementation Intentions

Gollwitzer (1999; see Gollwitzer and Oettingen, 2012 for a recent review) has proposed that when people specify an definitive intent to implement an action to achieve an intended goal, that action related to goal achievement has a higher likelihood of being performed relative to just intending to achieve the goal. That is, intending only to achieve a goal may not be sufficient without the intent to implement the actions necessary to achieve it; once the goal is considered, volitional behavior must be implemented in order for the goal to be achieved and specific intentions to implement the necessary behaviors must also be considered. According to Gollwitzer (1999), by virtue of their linkages to future critical situations, implementation intentions help crucial mental representations of goals to become readily accessible and the required goal-directed behaviors automated so that required behavior is enacted more readily and with greater facility. For example, Bayer and Gollwitzer (2007) (Study 1) asked 12th grade female students to solve mathematics problems and instructed one group to specify a goal intention alone (i.e. "I will correctly solve as many problems as possible.") and another group to specify the goal intention plus an self-efficacy-strengthening implementation intention (i.e. "If I start a new problem, then I will tell myself: I can solve it!") (p. 6). They found that the group specifying both the goal and implementation intentions solved significantly more problems than the group specifying only the goal intention. In a second study they showed that self-efficacy-strengthening implementation intentions in male university students significantly increased the number of problems solved correctly on the Raven Progressive Matrices intelligence test relative to forming a goal intention alone or self-efficacy-strengthened goal intention. This result suggests that merely strengthening the self-efficacy of a goal intention alone is not sufficient for improving performance. Only when the implementation of self-efficacy was encouraged did improvement result (Bayer and Gollwitzer, 2077). These results are relevant in the present context, because the technique can be easily taught by any instructor. Thus, as Bayer and Gollwitzer (2007) state "this strategy is easy to explain and apply, and these features qualify self-efficacy interventions based on forming 'if-then' plans (i.e. implementation intentions) as very cost efficient" (p. 15).

6. Conclusion

It has been proposed that institutional and program characteristics supervene on students characteristics. This implies that institutions and programs do not have independent exogenous effects – institutions and programs do not independently influence student success. Specifically, there is evidence that suggests that the will, effort, perseverance, grit, and values of students are necessary conditions for student success and that their exclusion in statistical models of institutional admissions formulas or institutional and program evaluations can lead to misspecification and biased parameter estimates that may be misleading, not only for the estimation of institutional influences, but also for commonly assessed student measures such as ability, demographic, and socioeconomic characteristics.

It is recognized that motivational variables are not the only omitted variables. Clearly there are others that need to be discovered and studied. Furthermore, procuring this type of information would not be an undemanding endeavor. Although much useful non-cognitive information is currently available for admitted students through programs such as the Cooperative Institutional Research Program (CIRP) survey offered by the Higher Education Research Institute (HERI) at University of California at Los Angeles, (Pryor, Eagan, Blake, Hurtado, Berdan, & Case, 2012), standardized measurements of constructs of academic and social values, self-control, emotional, and impulse regulation, achievement goals, perceived self-efficacy, perceived stress, and feelings of belongingness, to name just a few, are lacking at the post-admissions stage. There is also the problem of creating a systematic way of acquiring and using this type of data in admissions processing, although Sternberg, et al. (2012) discuss a promising approach that, at least, collects data beyond the standard IQ-related measures of ability (i.e. SAT and ACT) currently relied upon.

Finally, if the supervenience thesis is correct, institutional quality ostensibly reflected in the ability measures used to admit students, is dependent collectively on motivational and self-regulatory characteristics. Ability measures, with their relatively low predictive validity, may thus be only an expedient construct with high face validity. Likewise, multifarious programs and activities can be shown to contribute to institutional quality only if student motivational characteristics are taken into account. Without these controls, institutional program "effects" may be specious and thus have only a minor and perhaps redundant role in student success. It is the faculty that has the essential role as facilitators of student growth and change and should be the primary mechanism engaging students' motivational potential for success. It is in the classroom where pedagogical techniques can encourage and promote student will and effort toward increased ability, achievement, and success.

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