Scholastic Abilities and Academic Decision-Making Patterns as Predictors of Dropout in Higher Education

Tamar Kennet-Cohen, National Institute for Testing and Evaluation, Israel
tami@nite.org.il

Itamar Gati, Depts. of Education and Psychology, Hebrew University, Israel

itamar.gati@huji.ac.il

Abstract

This study posits a new group of factors as potential predictors of dropout in the higher education system. These factors are characteristic of the individual's academic decision-making patterns. Specifically, we hypothesized that an individual's academic decision-making patterns, together with his scholastic abilities, affect the specific decision-making process regarding where and what to study, selected characteristics of his actual studies and, ultimately, his decision to persist or drop out. The research questions were: 1. How predictable is voluntary dropout based on applicant characteristics (scholastic abilities, academic decision-making patterns, and demographic variables)? 2. How predictable is forced dropout based on scholastic abilities? The study was based on three samples of applicants (N=1,001; N=1,227; and N=527) for first-year undergraduate studies. The first research question was addressed using a path-analytic approach. The second research question was addressed using a multiple logistic regression model. Six percent of the variance in persistence vs. voluntary withdrawal was accounted for by our hypothesized model. Ten percent of the variance in persistence vs. forced withdrawal was accounted for by scholastic abilities. Even with this limited explanatory power, the models proposed can contribute to the sensitivity of the admissions system.

Key words: Higher education, dropout, career decision-making

Scholastic Abilities and Academic Decision-Making Patterns as Predictors of Dropout in Higher Education

Objectives

The dropout phenomenon in the higher education system is a source of ongoing concern for students, institutions, and society at large. The problem can take several forms: (a) dropping out of the system (leaving higher education altogether), (b) dropping out of a specific institution (switching institutions), and (c) dropping out of a field of study (switching majors). Each of these forms of dropping out has social, economic, and personal implications.

A large-scale examination of the literature on college outcomes (Robbins et al., 2004) distinguished three types of predictors of student persistence: standardized test scores and high school achievement; demographic characteristics; and psychosocial factors. Combining multiple psychosocial factors with the first two groups of predictors to predict persistence yielded low to modest explanatory power (Robbins, Allen, Casillas, Peterson, and Le, 2006).

The present study seeks to introduce a new group of variables into the study of college dropout – variables that describe *the process that led to the decision* of what to study and where. These variables were combined with more traditional predictors of college dropout with the aim of improving our understanding of this phenomenon. The study focuses on the first year of studies, in keeping with the literature, which indicates that this is the most critical stage of vulnerability for student dropout (Cuseo, 2005).

Theoretical framework

This study introduces a new group of factors as potential predictors of dropout. These factors are related to the way an individual makes the decision about what (and where) to study. Adopting the view that the process of choosing an academic institution and a major is a decision-making process (Gati & Asher, 2001), we hypothesized that an individual's academic decision-making patterns, together with his or her scholastic abilities, affect the specific decision-making process regarding where and what to study, selected characteristics of the studies themselves, and ultimately, the decision to persist or drop out. (The conceptual framework guiding this study is presented in Figure 1 in the Results and Discussion section).

With respect to the outcome variable, this study investigated two forms of dropping out: dropping out of the institution and switching majors (within the academic institution). The study was conducted in Israel, where, unlike in the U.S.A., undergraduate studies are conducted within a specific academic department (major) from the outset. Applicants have to declare a major (or two) at the time of registration and, since switching majors is generally considered an undesirable outcome, the choice of a major is both a challenge and a critical decision.

Dropout can be characterized as planned or as unintended. Planned dropout, for our purposes, was identified according to several criteria (e. g., switching to a major that was given higher preference on the application form but to which the applicant was not initially admitted). This study concentrated mainly on explaining unintended dropout, particularly when it was not the result of academic failure. Thus, a further distinction within unintended dropout was made between failing dropouts ("forced dropouts") and dropouts in good standing ("voluntary dropouts").

The research questions were:

1. How predictable is voluntary dropout based on applicant characteristics (scholastic abilities, academic decision-making patterns, and demographic variables), under the conceptual framework presented in Figure 1?

2. How predictable is forced dropout based on scholastic abilities?

Methods

Study variables

A. Characteristics of the applicant

  (1) Scholastic abilities

    PET score: The total score on the Psychometric Entrance Test (PET), which is used for admission to Israeli universities

    Bagrut score: The average of the scores reported on the high school matriculation certificate

  (2) Academic decision-making patterns

    CDA: Career Decision-Making Adaptability (Gati & Levin, 2012), which refers to whether the way an individual approaches and makes career decisions leads to better decisions

    CDSE: Career Decision-Making Self-Efficacy (Betz, Klein, & Taylor, 1996), which refers to the degree to which an individual believes that he or she can successfully complete the tasks necessary to making career decisions

    EPCD: Emotional and Personality-Related Career Decision-Making Difficulties (Saka, Gati, & Kelly, 2008), which includes pessimistic views, anxiety and difficulties in forming a positive self-concept

  (3) Demographic variables: Gender and age

B. Characteristics of the decision-making process for registration

  Investment in the process: The intensity and extent of the applicant's activities leading to the registration decision

  Self-selection: Whether the applicant ruled out an option because of low expectations of being accepted

  Fit with registered majors: The proximity between the applicant's career preferences and characteristics of his or her listed majors

  Commitment to the decision: How confident the candidate is regarding his or her choice and how long ago he or she made that choice

C. Characteristics of the actual studies

  Order of preference of studied majors: The order of preference on the application form for the majors actually studied

  Fit with studied majors: The proximity between the applicant's career preferences and characteristics of the majors studied

  FGPA: First-year grade point average

  Persistence vs. voluntary or forced dropout (switched majors or dropped out of the institution)

Data analysis

The first research question was addressed using a path-analytic approach for examining the multivariate relations among the study variables. The second research question was addressed using a multiple logistic regression model.

Data sources

The study was based on applicants for first-year undergraduate studies, who responded to a questionnaire on the Internet, and gave their consent to combine their

responses with information held by the institutions regarding their registration and first-year studies:

1) 1,001 applicants for institution A in the academic year 2009/10, 705 of whom became first-year students.

2) 1,227 applicants for institution A in the academic year 2010/11, 875 of whom became first-year students.

3) 527 applicants for institution B in the academic year 2010/11, 304 of whom became first-year students.

Samples 1 and 2 were used to predict voluntary dropout (the small number of voluntary dropouts in sample 3 did not enable us to test the multivariate hypothesized model there). All three samples were used to predict forced dropout.

Results and Discussion
Predicting persistence vs. voluntary dropout

Significant path coefficients and explained variance (R^2) for the endogenous variables in the model for predicting persistence vs. voluntary dropout are presented in Figure 1. Paths that were hypothesized but not found significant appear as pale arrows. The relations between the demographic variables and the other sudy variables were not hypothesized a priori, and no discernible and consistent pattern emerged from the data. Indirect effects as well as total effects of the independent variables were computed (Wright, 1934).

Four variables had a **direct positive effect** (and the largest total effect) on persistence. These were (ordered according to the magnitude of their effect): (a) FGPA, (b) commitment to the decision, (c) order of preference of studied majors, and (d) fit with studied majors. This finding supports the conceptualization of performance as the result of two independent factors: ability and motivation. Such a conceptualization applies here to persistence in higher education as a special performance variable (Alarcon & Edwards, 2012). With regard to the four predictors, FGPA is itself a performance variable (also found in this study to be affected by both ability and motivation, as will be described below) and the other three variables can be viewed as measures of motivation: a direct subjective measure (commitment to the decision), a direct objective measure (order of preference of studied majors), and an indirect measure (fit with studied majors).
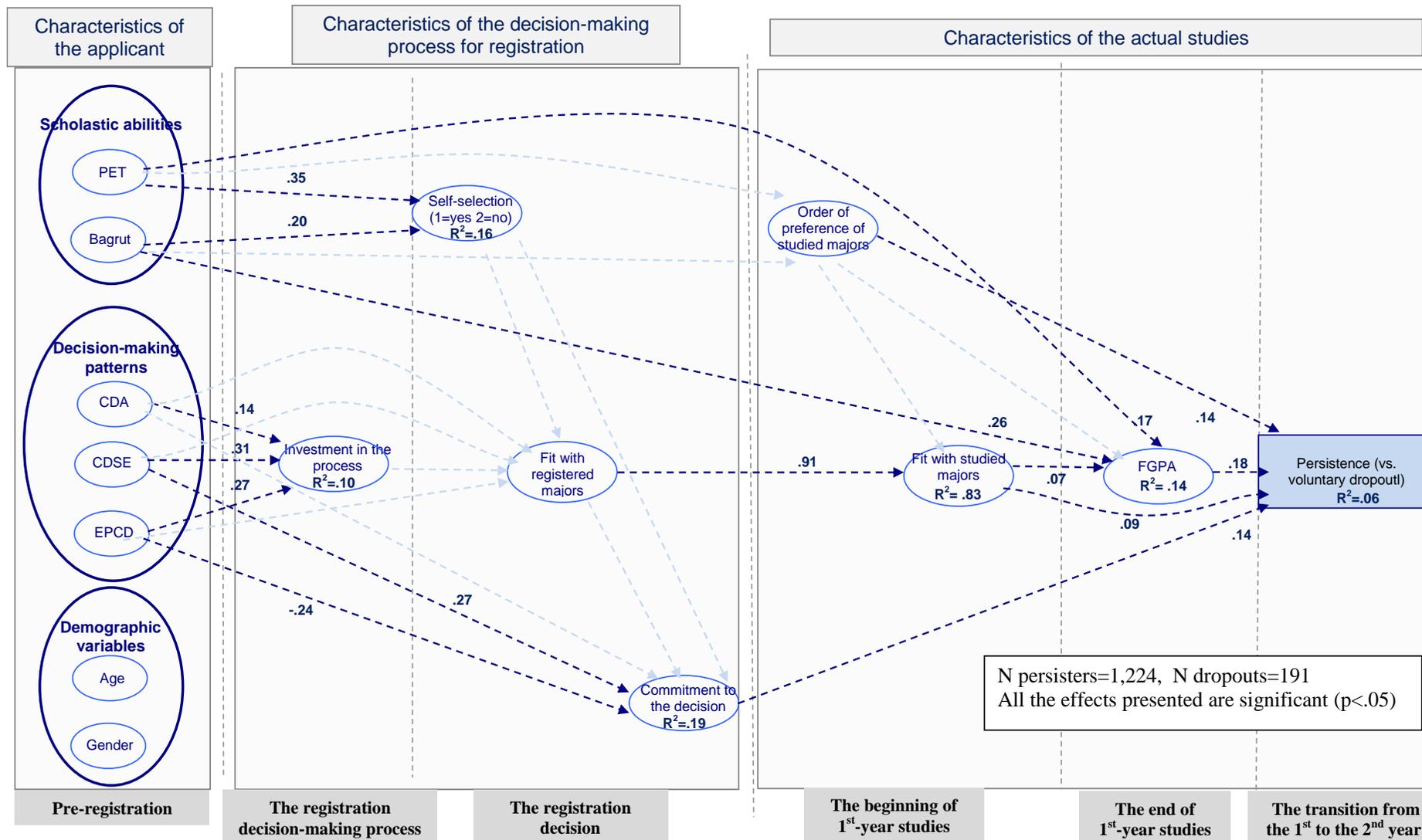
The fact that FGPA has the largest effect on persistence is consistent with the literature (Burton & Ramist, 2001; Pascarella & Terenzini, 2005). However, most of the studies address total dropout, and the current research outcome indicating that FGPA is related to voluntary dropout is an interesting finding. Clearly, some students meet their institution's academic standards but experience a sense of failure because of their low grades and as a result, drop out.

Of the four direct predictors of persistence, the fit with studied majors had the smallest effect (although it also had an indirect effect on persistence, vis-à-vis its effect on FGPA). This finding, that the concept of person-environment fit (or interest-major fit, in the present context) has a positive, yet weak, relation with important outcome variables is discussed extensively in the literature (Arnold, 2004; Nauta, 2010).

An **indirect effect** on persistence was obtained for variables that were related to the four direct predictors of persistence:

FGPA was affected, as expected, mainly by scholastic abilities, but also by the fit with studied majors, thus conforming to the previously mentioned conceptualization of performance as the result of ability and motivation.

Figure 1. *Estimated model of persistence vs. voluntary dropout*

Commitment to the decision was affected by two components of decision-making patterns: Career decision-making self-efficacy (a positive effect) and emotional and personality-related career decision-making difficulties (a negative effect). The third component of decision-making patterns, career-decision adaptability, had no direct effect on commitment to the decision once the two other components were controlled for.

Thus, applicant characteristics were found to affect persistence through two different routes. Scholastic abilities affected persistence through their positive relation with FGPA (the higher the individual's abilities, the higher the prospect of persisting). Decision-making patterns affected persistence through their relation with commitment to the decision (the higher the individual's career decision-making self-efficacy, the **higher** the prospect of persisting, and the higher the individual's emotional and career decision-making difficulties, the **lower** the prospect of persisting).

Six percent of the variance in persistence was accounted for by the model described above. A model without FGPA, which for practical purposes is generally the one relevant for early intervention, explained 3% of the variance. Thus, the predictive power of the proposed model was modest, a finding that is compatible with the general picture obtained from studies of persistence. Persistence (vs. voluntary dropout) is a complex behavior that is affected by many competing factors. Thus the effect of specific predictors or groups of predictors, such as scholastic abilities and decision-making patterns, may be substantive and still explain a relatively small part of the variance of this outcome (Robbins et al., 2006).

Predicting persistence vs. forced dropout

The results of muliple logistic regression analyses for predicting persistence vs. different kinds of dropout are presented in Table 1. The (standardized) coefficient β describes the change in the log of the odds ratio 'to persist' vs. 'to drop', with a change of 1 standard deviation in the predictor. $Exp(β)$ describes the parallel change in the odds ratio itself. The percent of variance explained (R^2) is Nagelkerke's R^2.

Table 1: *Logistic regression analysis for predicting persistence vs. different kinds of dropout*

Persistence vs. -	Predictor	Sample 1				Sample 2				Sample 3			
		β	Exp(β)	R^2	N	β	Exp(β)	R^2	N	β	Exp(β)	R^2	N
Forced dropout	PET	.22	1.25	.09	13	.13	1.14	.11	34	.37[b]	1.45	.08	13
	Bagrut	.32[a]	1.38			.38[d]	1.46			.02	1.02		
Voluntary dropout	PET	-.06	0.94	.01	120	-.01	0.99	.01	122	.34[a]	1.40	.11	17
	Bagrut	.10	1.11			.10	1.11			.24	1.27		
Total dropout	PET	-.06	0.97	.01	133	.02	1.02	.03	156	.38[c]	1.46	.12	30
	Bagrut	.12[a]	1.13			.17[c]	1.19			.17	1.19		

Note. The N's for the persisters are 567, 714 and 260 for samples 1, 2 and 3 respectively.
[a]p<.05 [b]p<.01 [c]p<.001 [d]p<.0001

Scholastic abilities were found to be positively related to persistence vs. forced dropout. Approximately 10% of the variance in this dependent variable was explained in institution A (samples 1 and 2). In institution B (sample 3), both kinds of dropout – voluntary and forced – were related to scholastic abilities, and 12% of the total dropout was explained in this institution.

A comparison of the relative predictive power of the two kinds of scholastic abilities – PET score and Bagrut score – revealed that in institution A, the predictive power of the Bagrut score was higher, a finding consistent with the general picture

obtained in the U.S. (Robbins et al., 2004). In institution B, the results were reversed, with the PET score being a stronger predictor of persistence than the Bagrut score. Such a result might be the outcome of the specific areas of study (natural and exact sciences) characterizing this institution (Haimovich & Ben-Shakhar, 2004).

Scientific significance of the study

One important contribution of the study can be identified with regard to the conceptualization of the dependent variable – the dropout variable. In addition to the well-known recommendation (e.g., Tinto, 1975) to distinguish between voluntary and forced dropout, we proposed the distinction between planned and unintended voluntary dropout. This allowed us to differentiate between two totally different behaviors, and thus may reduce some of the noise in this complex phenomenon, and increase its predictability.

With regard to the predictability of the dependent variable, our results confirmed the relative predictability of forced dropout. Voluntary dropout again revealed itself as a complex and less predictable behavior. It should be noted, however, that even given the modest explanatory power of the model that we hypothesized, a significant gain in the sensitivity of the process of distinguishing between prospective persisters and non-persisters can be demonstrated.

Implications for future research include replicating this study in samples that include all applicants and students within an institution in order to avoid possible effects of sample selection bias. In addition, it would be advisable to collect data from multiple institutions in order to distinguish between two behaviors, i.e., switching institutions and dropping out of the system. It would also be desirable to obtain data as to whether students who switched majors and/or institutions started their new course of studies as sophomores or as juniors, since these two alternatives have entirely different implications. Finally, a longer-term follow-up, even until graduation, would probably enhance our understanding of the causes of dropout.

References

Alarcon, G. M., & Edwards, J. M. (2012). Ability and motivation: Assessing individual factors that contribute to university retention. *Journal of Educational Psychology*. Advance online publication. doi: 10.1037/a0028496

Arnold, J. (2004). The congruence problem in John Holland's theory of vocational decisions. *Journal of Occupational and Organizational Psychology, 77*, 95–113.

Betz, N. E., Klein, K. L., & Taylor, K. M. (1996). Evaluation of a short form of the Career Decision-Making Self-Efficacy Scale. *Journal of Career Assessment, 4*, 47–57.

Burton, N., & Ramist, L. (2001). *Predicting success in college: SAT studies of classes graduating since 1980*. College Board Research Report No. 2001-2. New York: College Entrance Examination Board.

Cuseo, J. (2005). "Decided", "Undecided", and "In Transition": Implications for academic advisement, career counseling, and student retention. In R. S. Feldman (Ed.), *Improving the first year of college: Research and practice* (pp. 27-48). Mahwah, NJ: Lawrence Erlbaum.

Gati, I., & Asher, I. (2001). The PIC model for career decision-making: Prescreening, in-depth exploration, and choice. In F. T. L. Leong, & A. Barak (Eds.), *Contemporary models in vocational psychology* (pp. 7-54). Mahwah, NJ:

Lawrence Erlbaum.

Gati, I., & Levin, N. (2012). The stability and structure of Career Decision-Making Profiles: A one-year follow-up. *Journal of Career Assessment, 20,* 390-403.

Haimovich, T., & Ben-Shakhar, G. (2004). Matriculation certificate (*Bagrut*) grades and Psychometric Entrance Test (PET) scores as predictors of graduation and attrition. *Megamot*, *43 (3)*, 446-470, in Hebrew.

Nauta, M. M. (2010). The development, evolution, and status of Holland's theory of vocational personalities: Reflections and future directions for counseling psychology. *Journal of Counseling Psychology, 57*, 11-22.

Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students: A third decade of research, Volume 2*. San Francisco: Jossey-Bass.

Robbins, S. B., Allen, J., Casillas, A., Peterson, C., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology, 98*, 598-616.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin, 130*, 261-288.

Saka, N., Gati, I., & Kelly, K. R. (2008). Emotional and personality-related aspects of career decision-making difficulties. *Journal of Career Assessment, 16*, 403-424.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*, 89-125.

Wright, S. (1934). The method of path coefficients. *Annals of Mathematical Statistics, 5*, 161-215.