European Journal of Educational and Development Psychology
Vol.8, No.2, pp.10-19, July 2020
Published by ***ECRTD-UK***
Print ISSN: 2055-0170(Print), Online ISSN: 2055-0189(Online)

THE MEDIATION FUNCTION OF HUMAN CAPITAL ON COLLEGE ENROLLMENT: AN EXAMINATION OF GENDER DIFFERENCES

Mingying Zheng

University of Iowa

ABSRACT: *The purposes of this study are: a) To identify the direct effect of high school learning environment on student postsecondary enrollment; b) To identify how the human capital as the mediator indirectly affect the relationship between high school learning environment and student postsecondary enrollment; c) To examine the gender difference regarding the relationship between student level factors on student postsecondary enrollment. This study used the data from a High School Longitudinal Study of 2009 (HSLS: 09), which were analyzed using Mplus 7 software (Muthen & Muthen, 2006).The results indicate that a) There is direct positive effect of high school learning environment on student postsecondary enrollment; b) Student human capital can positively mediate the relationship between school learning environment and student postsecondary enrollment; c) Indirect effect of school learning environment on student postsecondary enrollment via student human capital was not presented for both male and female students. However, there is a gender difference between male and female students for the school learning environment on student postsecondary enrollment*.

KEYWORDS: College enrollment, moderated mediation, human capital, gender difference

INTRODUCTION

In response to the disproportionate rates of postsecondary attendance and the individual and societal benefits derived from participation, Obama administration has called on every American to "commit" to attending at least one year of postsecondary education. At the center of this call is the need to better understand the link between secondary and postsecondary education and the structures and organizational norms that can enable students to make the journey from high school to college more smoothly. Planning for college is affected by many factors that interact in a complex manner (Alexander & Eckland, 1975). According to the previous studies, one of the strongest human capital predictors of college enrollment is academic preparation (Cabrera & LA Nasa, 2001; Perna & Titus, 2005), which has been defined and operationalized according to numerous proxies (e.g., highest level of math coursework completed, standardized test scores, and grade point average). Recent research has emphasized the important role high schools play in shaping students' college choice decisions (McDonough, 1997). Much of the research on postsecondary educational choices has focused on traditional versus nontraditional gender based choices (Dawson-Threat & Huba, 1996; Helwig, 1998). Models have been developed to explain the impact of gender differences on postsecondary enrollment (Eccles, 1994; Trusty, Robinson, Plata, & Ng, 2000).

The purpose of this study is: a) To investigate the direct effect of high school learning environment (*LrnEvnmt*) on student postsecondary enrollment (*ColEnrl*); b) To investigate how the human capital (*HmnCptl*) as the mediator indirectly affect the relationship between high school learning environment (*LrnEvnmt*) and student postsecondary enrollment (*ColEnrl*); c) To investigate the gender difference regarding the relationship between student level factors on student postsecondary enrollment (*ColEnrl*). I hypothesize that high school learning environment will indirectly and positively affect students' college enrollment, mediated by the acquisition of human capital (*HmnCptl*). I also hypothesize that high school learning environment (*LrnEvnmt*) directly predict the students' college enrollment (*ColEnrl*), please see Figure 1. Meanwhile, I hypothesize that there is a gender difference in regard to the relationship between student level factors and student postsecondary enrollment, please see Figure 2.

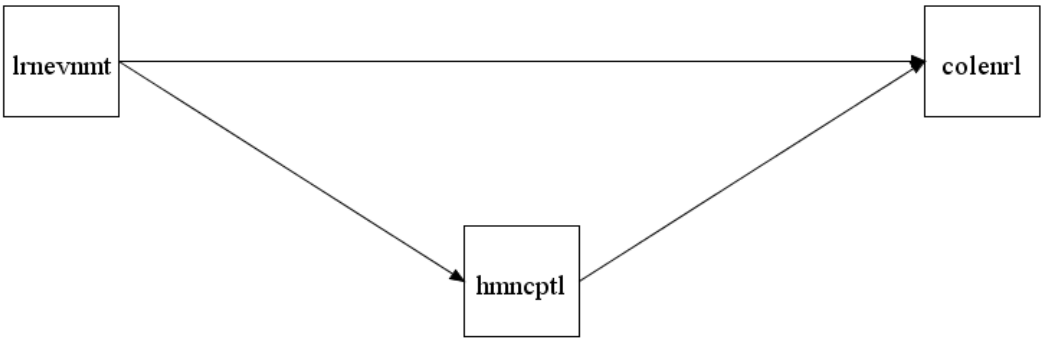

Figure 1. The Preliminary Research Model of Postsecondary Enrollment (Model 1).

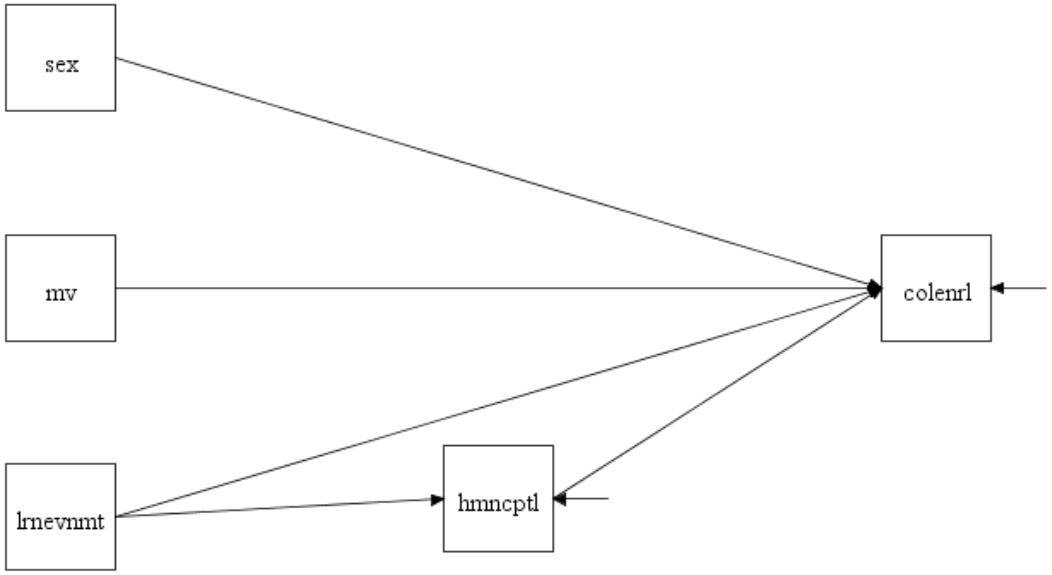

Figure 2: The Full Research Model of Postsecondary Enrollment (Model 2).

METHOD

Data and Instruments

This study used the data from a High School Longitudinal Study of 2009 (HSLS: 09), a survey research project funded by National Center for Educational Statistics (NCES). In this project, the data of nationally representative of 23,000+ 9th graders from 944 schools in 2009 (base year), 2012 (first follow-up), 2013 (2013 update), and 2013-2014 (high school transcripts) were collected with five questionnaires used in the base year (Student Questionnaire, Parent Questionnaire, Teacher Questionnaire, School Counselor Questionnaire, and School Administrator Questionnaire), four questionnaires in the first follow-up year (Student Questionnaire, Parent Questionnaire, School Counselor Questionnaire, and School Administrator Questionnaire), and one 2013 update questionnaire (Student/Parent Questionnaire). In the current study, the data of gender (*SEX*), human capital (*HmnCptl*), and student postsecondary enrollment (*ColEnrl*) were obtained from 2013 Student/Parent questionnaire, the data of high school learning environment (*LrnEvnmt*) were obtained from the first follow-up year School Administrator Questionnaire.

Table 1. Measurement of Variables in the Research Model of Postsecondary Enrollment.

Variable	Measured by	Measure	Notes
Student Postsecondary Enrollment (*ColEnrl*)	Student's planning to attend a postsecondary institution in the fall 2013.	2013 Student Questionnaire	Endogenous Variable (Outcome)
School Learning Environment (*LrnEvnmt*)	A certain number or type of credits are required to be academically promoted to the next grade or not (YES=1, NO=0).	2012 Follow-up Questionnaire	Exogenous Variable (Predictor)
Human Capital (*HmnCptl*)	The composite score of credits earned in college subjects in 4-year high schools.	2013 Student Questionnaire	Exogenous Variable (Mediator)
Gender (*Sex*)	Gender (Male=1, Female=0).	2013 Student Questionnaire	Exogenous Variable (Moderator)

In the current study, Respondents who indicated that they planned to attend a postsecondary institution in the fall 2013 was used as the proxy indicator of outcome postsecondary enrollment (*ColEnrl*), the composite score of credits earned in college subjects in 4-year high schools was used as the proxy indicator of student human capital (*HmnCptl*), whether a certain number or type of credits are required to be academically promoted to the next grade or not by the high school

student attended was used as a proxy indicator of school learning environment (*LrnEvnmt;* YES=1, NO=0). With regard to gender (*SEX*), only two options Male (=1) and Female (=0; recoded) were given to the respondents. Summary of variables of postsecondary enrollment model can be seen in Table 1.

The data used in the current study has a sample of 8762 high school students with 37 missing data patterns.

Data Analysis

Data were analyzed using SEM techniques and Mplus 7 software (Muthen & Muthen, 2006) with maximum likelihood estimation (ML). There are two missing data patterns. In the current study, multiple indices were used to assess global model fit of the preliminary mediation model (Model 1). The Comparative Fit Index (CFI; Bentler, 1990), the Tucker Lewis Index (TLI; Hu & Bentler, 1999; Bentler, 1990), the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), the Standard Rood Mean Residual (SRMR; Hu & Bentler, 1999) for the model are reported. For the CFI and TLI, values of .90 or greater reflect adequate fit of the model, value of 1 reflects perfect fit of the model. For the RMSEA and SRMR, values of .05 or less indicate good fit, values up to .08 indicate reasonable fit, values ranging from .08 - .10 indicate mediocre fit, and values greater than .10 indicate poor fit (MacCallem, Browne, & Sugawara, 1996). Data were also analyzed to examine the component (local) fit. A bootstrap approach (Shrout & Bolger, 2002), which maximizes power while minimizing Type I error rate, was implemented to provides an empirical approximation of sampling distributions of indirect effects to produce confidence intervals (CI) of estimates. In addition to the direct effect of school learning environment (*LrnEvnmt*) on student postsecondary enrollment (*ColEnrl*), the indirect effect of student human capital (*HmnCptl*) as a mediator to student postsecondary enrollment (*ColEnrl*), and gender (*SEX*) as a moderator and its interaction with student human capital (*HmnCptl*) on the student postsecondary enrollment (*ColEnrl*) were investigated.

RESULTS

In the current study, the direct effect of high school learning environment on student postsecondary enrollment was examined. Meanwhile, human capital as the mediator was examined to investigate the indirect relationship between high school environment and postsecondary enrollment. Last but not the least, the gender differences of human capital on postsecondary enrollment was investigated.

In the current study, the proposed mediation model was just identified (df=0) and recursive. In addition, the gender difference of human capital and the interaction between human capital and gender (*HmnCptl*GENDER; mv*) on student postsecondary enrollment (*ColEnrl*) were investigated in the full moderated mediation model (See Figure 2).

Estimation of this measurement model yielded perfect global fit (CFI = 1.000, TLI = 1.000, RMSEA = 0.000, SRMR = 0.000). Data were also analyzed to examine the component (local) fit. The standardized coefficients (and SEs) and unstandardized coefficients (and SEs) are reported in

Print ISSN: 2055-0170(Print), Online ISSN: 2055-0189(Online)

Tables 2 and 3. The results indicate that neither extremely large estimates nor negative variances were detected in the current model. Results reveal that LRNEVNMT was positively associated with COLENRL significantly with standardized coefficient of .164 (p<0.001), and HMNCPTL was also positively associated with COLENRL significantly with standardized coefficient of 0.126 (p<0.001). Meanwhile, HMNCPTL and LRNEVNMT are positively correlated with each other significantly ($\varphi = -0.021, p > 0.05$). COLENRL accounts for 4.6% (p<0.001) of the variance in the current model.

Table 2. Standardized Parameter Estimates for Tested Structural Model.

	Standardized	
Observed Variable	Estimate	S.E.
COLENRL ON		
LRNEVNMT	0.164 ****	0.010
HMNCPTL	0.126 ****	0.010
HMNCPTL ON		
LRNEVNMT	0.070 ****	0.011
R-SQUARE		
COLENRL	0.046****	0.004

* <.05. **<.01. ***<.005. ***<.001.

In order to examine the gender difference and the interaction of gender and student human capital on student postsecondary enrollment, a full moderated mediation model was proposed and examined (See Figure 2).

In this full moderated mediation measurement model of student postsecondary enrollment (Model 2; Figure 2), there were one exogenous variable (*ColEnrl*), four endogenous variables (*LrnEvnmt, HmnCptl, SEX,* and *HmnCptl*SEX*). The total number of model parameters (*q*) was 11, and the total number of observations (*p*) in the data matrix was 15. The direct effect of school learning environment (*LrnEvnmt*), the indirect effect of student human capital (*HmnCptl*), the gender as the mediator and its interaction with student human capital on student postsecondary enrollment (*ColEnrl*) were examined. The proposed mediation model was over identified (df=4) and recursive.

Table 3. Unstandardized Parameter Estimates for Tested Structural Model.

	Unstandardized	
Observed Variable	Estimate	S.E.
COLENRL ON		
LRNEVNMT	0.214 ****	0.014
HMNCPTL	0.240 ****	0.020
HMNCPTL ON		
LRNEVNMT	0.048 ****	0.007

* <.05. **<.01. ***<.005. ***<.001.

Multiple indices were used to assess global model fit of the structural model. Estimation of this measurement model (see Figure 2) yielded poor global fit, CFI = 0.100, TLI = -2.151, RMSEA = 0.517, SRMR = 0.142. The large values of standardized residuals (z-scores) for covariance between sex and student human capital (=6.931) and large values for modification indices (M.I.) for LRNEVNMT with HMNCPTL (=3470.433) and for MV with HMNCPTL (3584.409) indicated that the interaction between LRNEVNMT and HMNCPTL (LRNEVNMT*HMNCPTL), and between MV and HMNCPTL (MV* HMNCPTL) were recommended. Preacher, Rucker, and Hayes (2007) recommend including the interactions for the "second stages" moderated mediation model when the M.I. are large.

In the following stage, a different moderated mediation model (Model 3) was proposed by dropping the model constraint and adding the interaction between LRNEVNMT and HMNCPTL (LRNEVNMT*HMNCPTL), and between MV and HMNCPTL (MV* HMNCPTL to improve the model fit. The bias-corrected bootstrapping was implemented to maximize power while minimizing Type I error rate (Shrout & Bolger, 2002). Bootstrapping can provide an empirical approximation of sampling distributions of indirect effects to produce confidence intervals (CI) of estimation in this modified model.

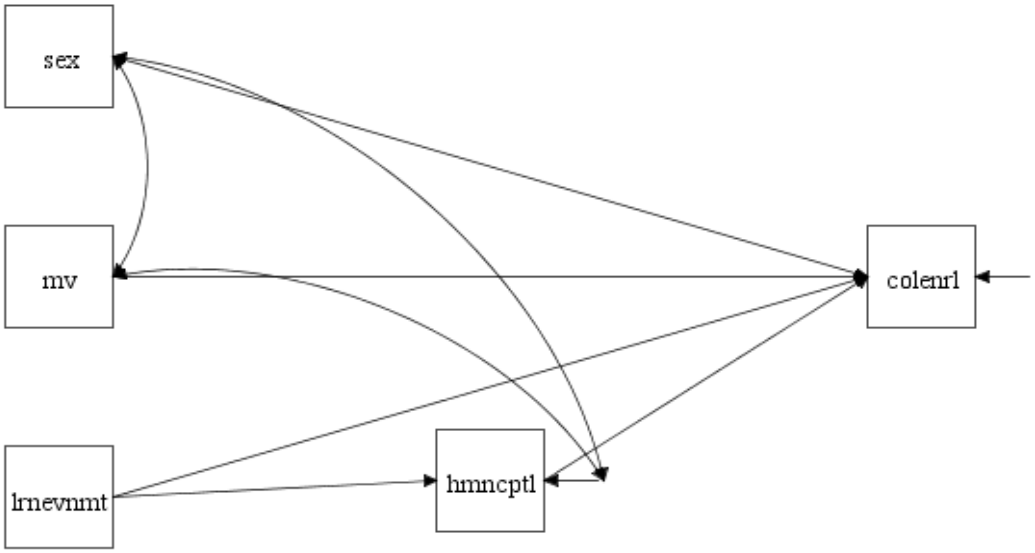

Figure 3: Model 3: The Modified Full Structural Model of Postsecondary Enrollment.

Estimation of this modified full measurement model of postsecondary enrollment (Figure 4) yielded good global fit (CFI = 0.997, TLI = 0.990, RMSEA = 0.029, SRMR = 0.011). Data were also analyzed to examine the component (local) fit of Model 3.

Table 4. Unstandardized Parameter Estimates for Model 3.

Observed Variable	Unstandardized Estimate	S.E.
COLENRL ON		
LRNEVNMT	0.210****	0.051
HMNCPTL	0.229****	0.031
SEX	-0.786****	0.101
MV	0.013	0.043
HMNCPTL ON		
LRNVNMT	0.027****	0.006
HMNCPTL WITH		
SEX	-0.021	0.015
MV	2.436****	0.143
MV WITH		
SEX	-0.181*	0.078

* <.05. **<.01. ***<.005. ****<.001.

A nonparametric resampling method (bias-corrected bootstrap) with 1000 resamples drawn to derive the 95% CIs for the indirect effect of school learning environment on student postsecondary enrollment through relationship student human capital was implemented. Results were reported in Table 5. The 95% CI [0.004, 0.010] for the indirect effect of LRNEVNMT on COLENRL via relationship HMNCPTL did not contain zero. Thus, LRNEVNMT leads to higher chances of COLENRL by gaining greater student human capital during high school years. Specifically, the 95% CI [0.004, 0.010] for the indirect effect of LRNEVNMT on COLENRL via relationship HMNCPTL did not contain zero. Thus, LRNEVNMT leads to higher levels of COLENRL by gaining greater HMNCPTL during high school years. The 95% CI [0.179, 0.238] for the direct effect of LRNEVNMT on COLENRL did not contain zero, which indicates that LRNEVNMT does directly lead to higher chances of COLENRL. The full measurement Model 4 with parameter estimates can be seen in Figure 4.

Table 5. Bias-Corrected Bootstrap Confidence Intervals for Model 3.

	Lower .5%	Lower 2.5%	Lower 5%	Estimate	Upper 5%	Upper 2.5%	Upper .5%
Effects from LRNEVNMT to COLENRL							
Total	0.180	0.187	0.191	0.216	0.240	0.244	0.254
Total indirect	0.003	0.004	0.004	0.006	0.009	0.010	0.010
Specific indirect							
COLENRL							
HMNCPTL							
LRNEVNMT	0.003	0.004	0.004	0.006	0.009	0.010	0.010
Direct							
COLENRL							
LRNEVNMT	0.173	0.179	0.185	0.210	0.234	0.238	0.248

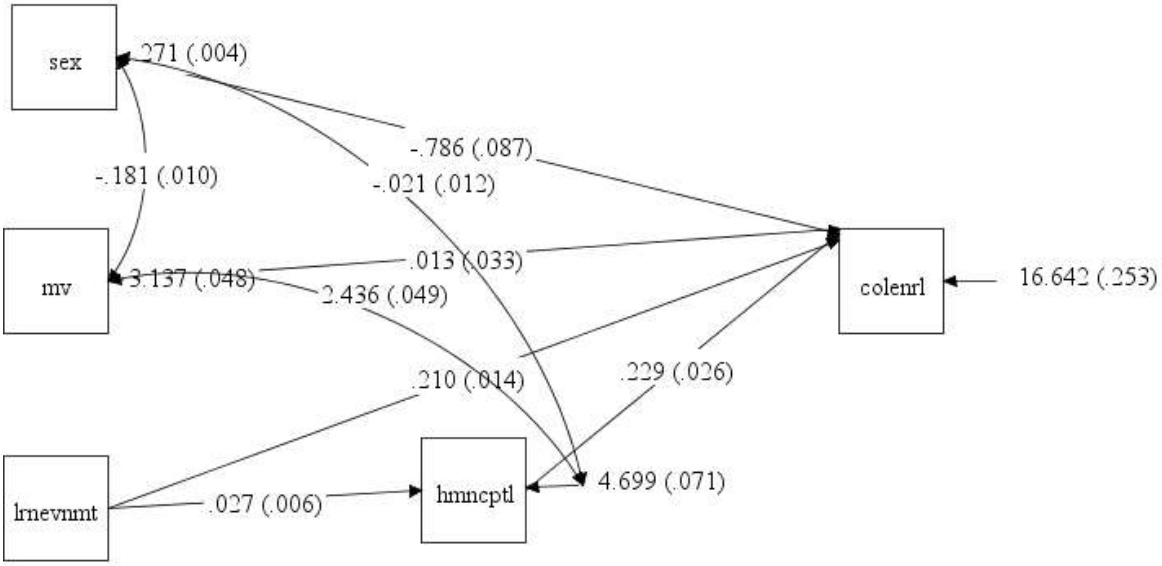

Figure 4: Model 3: The Modified Full Measurement Model of Postsecondary Enrollment.

Table 6. Unstandardized Parameter Estimates with Total Effect of Gender for Model 3.

Observed Variable	Unstandardized Estimate	S.E.
COLENRL ON		
LRNEVNMT	0.210****	0.014
HMNCPTL	0.229****	0.026
SEX	-0.786****	0.087
MV	0.013	0.033
HMNCPTL ON		
LRNEVNMT	0.027****	0.006
HMNCPTL WITH		
SEX	-0.021	0.012
MV	2.436****	0.049
MV WITH		
SEX	-0.181****	0.010
New/Additional Parameters		
WMODVAL1	1.000	0.000
WMODVAL0	0.000	0.000
MALE	0.007****	0.002
FEMALE	0.006****	0.001
T_MALE	0.217****	0.014
T_FEMALE	0.216****	0.014

* <.05. **<.01. ***<.005. ****<.001.

Finally, the conditional total effect of gender (SEX) on student postsecondary enrollment was examined. The results indicated that gender did not moderate the effect of student human capital on student postsecondary enrollment. The interaction effect of human capital and gender (HMNCPTL*SEX; mv) on student postsecondary enrollment was not significant (B=0.013, p>0.05). However, gender did moderate the relationship between school learning environment and student postsecondary enrollment (B=-0.786, SE=0.101, p<0.0001). We can conclude that the effect of human capital was not conditional and it did not depend on gender. However, the effect of school learning environment is conditional and it did depend on gender. Please see Table 6 for more details.

DISCUSSION

In the current study, the relationship between high school learning environment and student postsecondary enrollment were examined. Specifically, the direct effect of high school learning environment on student postsecondary enrollment was investigated. The indirect effect of student human capital as the mediator was examined. Meanwhile, the gender as the moderator of student human capital and student postsecondary enrollment was studied.

Based on the results, several conclusions can be made. First of all, there is direct positive effect of high school learning environment on student postsecondary enrollment. When a high school requires students to earn a certain number/type of credits to be academically promoted to the next grade, students in this school are more likely to plan to continue their studies in a postsecondary institution. Second, there is indirect effect of student human capital on school learning environment. Or student human capital can positively mediate the relationship between school learning environment and student postsecondary enrollment. When a high school requires student to earn a certain number or type of credits to be academically promoted to the next grade, students are more likely to earn more credits in college subjects, this will affect them to be more likely to plan to continue their studies as college students. Third, indirect effect of school learning environment on student postsecondary enrollment via student human capital was not presented for both male and female students. However, there is a gender difference between male and female students for the school learning environment on student postsecondary enrollment. Specifically, for male students, when they are required to earn a certain number or type of credits to academically promoted to the next grade, they are less likely to plan to continue their studies as college students. By contrast, for female students, when they are required to earn a certain number or type of credits to academically promoted to the next grade, they are more likely to plan to continue their studies as college students.

LIMITATIONS AND FUTURE STUDIES

In the current study, because many variables that are interested to the researcher are restricted to be used, only five variables across different schools were investigated. The results from the study cannot be generalized beyond the current point. Meanwhile, using a large-scale data set was risky when time is limited. It is suggested that more time should be spent to understand the quality of the data and the accurate choosing variables to conduct a sound study.

For future studies, more variables such as student academic self-efficacy, motivation, and parental involvement, availability of school counseling, and school support of ACT/SAT registration and college applications should be investigated to better understand the issue of student postsecondary enrollment. Multilevel models can be used to understand individual-level and school-level fixed and random effects of different predictors on student postsecondary enrollment.

REFERENCES

Alexander, K. L., and Eckland, B. K. (1975). Basic attainment processes: a replication and extension. *Sociology of Education* 48: 457–495.

Bills, D. B. (2003). Credentials, signals, and screens: Explaining the relationship between schooling and job assignment. *Review of Educational Research, 73,* 441–469.

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education (3rd ed.).* Chicago: University of Chicago Press.

Cabrera, A. F., & La Nasa, S. M. (2001). On the path to college: Three critical tasks facing America's disadvantaged. *Research in Higher Education, 42*, 119–149.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology, 94,* S95–S120.

Engberg, M. E., & Wolniak, G. C. (2009). Navigating disparate pathways to college. *Teachers College Record, 111*, 2255–2279.

Engberg, M. E., & Wolniak, G. C. (2010). Examining the effects of high school contexts on postsecondary enrollment. *Research on Higher Education, 51,* 132-153. DOI 10.1007/s11162-009-9150-y

Hossler, D., Braxton, J., & Coopersmith, G. (1989). Understanding student college choice. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research (Vol. V, pp. 231–288).* New York: Agathon Press.

Lin, N. (1999). Social networks and status attainment. *Annual Review of Sociology, 25,* 467–487.

McDonough, P. M. (1997). *Choosing colleges: How social class and schools structure opportunity.* Albany: State University of New York Press.

Paulsen, M. B. (1990). *College choice: Understanding student enrollment behavior (ASHE-ERIC Higher Education Report 90-6).* Washington, DC: The George Washington University.

Paulsen, M. B. (2001). The economics of human capital and investment in higher education. In M. B. Paulsen & J. C. Smart (Eds.), *The finance of higher education: Theory, research, policy, and practice (pp. 55–94).* New York: Agathon Press.

Perna, L. W. (2006). Studying college access and choice: A proposed conceptual model. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research (Vol. XXI, pp. 99–157).* The Netherlands: Springer.

Perna, L. W., & Titus, M. A. (2005). The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *Journal of Higher Education, 76,* 486–518.