Social Support and Medical Student Retention: An Analysis of Ethnic Differences

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Dedicated to:

My parents, Doreen (Hoff) and Gerald Christensen
# TABLE OF CONTENTS

ACKNOWLEDGMENTS .................................................. iii
LIST OF TABLES ....................................................... v
LIST OF ILLUSTRATIONS ........................................... vi

Chapter
1. INTRODUCTION .................................................. 1
   Minority Student Drop-out and Retention in Higher Education
   Social Support
   Social Support and Minority Student Academic Persistence
2. HYPOTHESES ...................................................... 25
3. METHOD ......................................................... 27
   Subjects
   Measures
4. RESULTS ........................................................... 35
5. DISCUSSION ...................................................... 57
REFERENCES .......................................................... 68
VITA ................................................................. 73
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Within-Medical School Social Support Broken Down by Ethnic Group and Time of Testing</td>
<td>40</td>
</tr>
<tr>
<td>2. Mean Level of Reported Depressive Symptoms Broken Down by Ethnic Group and Time of Testing</td>
<td>41</td>
</tr>
<tr>
<td>3. External Locus of Control Broken Down by Ethnic Group and Time of Testing</td>
<td>41</td>
</tr>
<tr>
<td>4. Depressive Symptoms During the Third Year Broken Down by Ethnic Group and Graduation Status</td>
<td>46</td>
</tr>
<tr>
<td>5. Depressive Symptoms During the Fifth Year Broken Down by Ethnic Group and Graduation Status</td>
<td>47</td>
</tr>
<tr>
<td>6. Anxious Symptoms During the Third Year Broken Down by Ethnic Group and Graduation Status</td>
<td>48</td>
</tr>
<tr>
<td>7. Anxious Symptoms During the Fourth Year Broken Down by Ethnic Group and Graduation Status</td>
<td>48</td>
</tr>
<tr>
<td>8. Medical School Stress During the Third Year Broken Down by Ethnic Group and Graduation Status</td>
<td>49</td>
</tr>
<tr>
<td>9. Medical School Stress During the Fourth Year Broken Down by Ethnic Group and Graduation Status</td>
<td>50</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mediational Model</td>
<td>54</td>
</tr>
<tr>
<td>2. Majority Students' Mediational Model</td>
<td>55</td>
</tr>
<tr>
<td>3. Minority Students' Mediational Model</td>
<td>56</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION

From 1978 to 1993, the percent of under-represented minorities enrolled in medical school steadily increased from 7.9% to 10.3% of the total enrollment (Association of American Medical Colleges, 1993). The Association of American Medical Colleges has classified under-represented minorities as students from African-American, American Indian, Mexican American, and Mainland Puerto Rican cultural backgrounds.

The academic course of these students, however, is not always smooth. Their courses of study are often fraught with more voluntary withdrawal, dismissal, and official leave than the courses of study of those students who are not of under-represented minority status. For example, figures published by the Association of American Medical Colleges (1993) which traced the academic progression of 1988 matriculants showed this to be the case during every year of study through 1992 except for voluntary withdrawal at the beginning of the third year (in which under-represented minorities were slightly less likely to engage in this behavior than other students). Furthermore, after four years of medical school 81.6% of non-under-represented students (i.e., those of White, Asian/Pacific Islander, Commonwealth Puerto Rican, and other...
Hispanic cultural backgrounds) had graduated while only 55.5% of under-represented minorities had graduated. It appears as though 13.2% of non-under-represented students were still in school after four years of attempting to complete their medical training while 34.5% of under-represented minorities remained in school. Taken together, these figures seem to suggest that while just over 5% of the non-under-represented students had left medical school altogether (i.e., were not still in school and did not graduate), 10% of the under-represented minorities had left. Additionally, even for the students who did ultimately graduate, it seems as though students of under-represented minority status were more likely to take a longer period of time in completing their medical school training.

While the increase in the enrollment status of under-represented minority groups in medical school is encouraging, it is somewhat disheartening that this increase is not always reflected in the timely completion, or completion at all, of medical training by a percentage of students from certain ethnic minority groups. Additionally, despite an increase in these groups as an overall percentage of graduates, these groups remain (as their classification suggests) under-represented in the field of medicine relative to the percent of the total United States' population which they compose (Association of American Medical Colleges, 1993). For example, 1990 census figures showed that African American,
Native American, and Latino people made up 11.7%, 0.7%, and 9.0% of the population. On the other hand, in the same year, these groups respectively made up only 5.7%, 0.3%, and 5.3% of medical school graduates and only 3.6%, 0.1%, and 4.9% of practicing physicians in the United States. This is in contrast to Whites who made up 75.6% of the United States' population in 1990 while they constituted 78.4% of medical school graduates and 80.5% of practicing physicians.

Shea and Fullilove (1985) have traced past rises (e.g., between 1964 and 1974) in the representation of ethnic minorities in medical school to affirmative action programs. They stated that these programs were developed in an attempt to remedy centuries of educational and economic discrimination which, among other things, resulted in minority students who wanted to enter medical school being at a disadvantage relative to their "majority" counterparts due to minority applicants' less competitive academic records. Through affirmative action, minority people were thus specifically targeted for entry into medical school.

Shea and Fullilove have also pointed out the fact that there existed financial aid, educational, and other enrichment programs to help minority students succeed once they entered medical school. Since 1974, however, there appears to have been a decline in the number of special programs to help minority students succeed once in medical school. In the past, this decline in enrichment programs appeared to be a
result of many factors, some of which included a questioning of the constitutionality of "special" programs for minorities (Motley, 1979) and challenges regarding the effectiveness of such programs (Sleeth & Mishell, 1977).

Shea and Fullilove cited work by Sleeth and Mishell (1977) which seemed to suggest that little can be done by medical schools to retain minority medical students until these students come to medical school as academically prepared as the students who do succeed (who are also more likely to be of majority status). By placing the blame for the low completion rates among minority medical students upon the institutions outside of the medical school context (such as high schools or colleges), Sleeth and Mishell have exculpated the medical establishment itself and excused it from accepting its share of responsibility for redressing the disparity in opportunity which continues to exist between racially and culturally diverse groups of people. Furthermore, their position seems to spare the medical establishment the burden of examining ways in which its existing policies continue to subtly contribute to discrimination based upon ethnic status. Lastly, these authors failed to consider how the quality (broadly defined), and not just the existence of, such enrichment programs related to minority medical student success in medical school.

In the current study, we are interested in examining medical school retention rates across different ethnic groups
and the factors associated with the ultimate completion of medical training in these groups. The predictive factor we are most interested in is social support. It is our hypothesis that for certain minority students (e.g., African-American and Latino), having a supportive social network within the medical school environment will be an important factor for those who remain and ultimately graduate. Alternatively, for White students, we do not expect to see social support from within the medical school context as being a critical factor related to the ultimate completion of medical school. Underlying these hypotheses is our belief that the social support which White students receive from outside of the medical school context is more likely to be congruent with the demands of the medical school environment. On the other hand, we feel that it may be the case that the social support which certain ethnic minorities receive from outside of the medical context is less likely to be compatible with these demands. By the same token, we feel that the social support which minority medical students receive from within the medical school environment is more likely to be one of the only sources of support which is congruent with the demands of their chosen career path.

In order to assess the relationship between social support and medical school retention rate, we will compare the social networks of minority medical students who dropped out of school to the social networks of minority students who
completed medical school and to the social networks of White students who also dropped out. Furthermore, we will compare minority medical students who successfully completed medical school to White medical students who did the same. In general, we expect to find qualitative differences among these groups of students to the extent that the successful minority medical students will evidence a much stronger within medical school support network than both minority students who dropped out and White students who successfully completed medical school. Relative to the work which has been done to date exploring the issue of minority student drop-out and retention rates, an important difference is that the current study is longitudinally designed so that we can observe how the relationships between these variables change over time.

An increased understanding of the factors associated with drop-out and retention among minority medical students seems to be the first step in helping these students to complete their medical education. This increased understanding will not only suggest certain ways that minority students can help themselves to succeed in medical school, such as seeking relationships with other people who are in some way supportive of their endeavors, but, may more importantly suggest ways that medical schools can become more conducive environments for minority persons to obtain a medical education.

Minority Student Drop-out and Retention in Higher Education

In one of the initial attempts to develop a theoretical
framework for understanding dropout from higher education, Tinto (1975) proposed a longitudinal model based on the degree to which students were integrated into the academic and social spheres of the university setting. Within this model, Tinto sought to overcome two of the major shortcomings in the previous research which had been conducted on attrition from college. Those shortcomings were: 1) the lack of attention given to different types of leaving behavior (e.g., academic failure versus voluntary withdrawal); and 2) "the lack of attention given to the development of those types of longitudinal models that would lead to an understanding of the processes of interaction, which bring, over time, differing individuals within the institution to varying levels of persistence and/or to varying forms of dropout behavior" (p. 90).

Tinto’s model is based on Durkheim’s theory of suicide. Durkheim’s theory suggests that suicide can be attributed to insufficient integration into and affiliation with society. In a similar fashion, Tinto describes various forms of leaving the university as related to a particular student’s low level of interactions with other people at the college and/or to a low congruence between the values of the individual student and the collective values of the university. Tinto further specifies that this integration can occur in either the academic or social sphere. He posits that different types of leaving behavior are related to the lack of integration in one
or both of these realms. The best predictor of academic success appears to be integration into both the academic and social realms.

Tinto acknowledged the role of pre-college individual characteristics upon this process of integration (or lack thereof) into the university setting at both the academic and social level. In his review of the literature, Tinto pointed out several factors that have been demonstrated to be significantly related to retention and dropout in college. For example, family background, individual characteristics, past educational experiences, and goal commitment all have shown a relationship to retention and dropout at the college level.

In the end, Tinto stressed the fact that little is known about the relationship of race and ethnicity to dropout and retention rates in higher education. He suggested that future work focus on how the processes of academic and social integration may be different across different ethnic or racial groups and how that integration is related to academic success among various groups of students.

Pascarella (1985) tested the degree to which Tinto's constructs related to persistence or withdrawal of undergraduates from college. The constructs measured were: 1) background characteristics of students, such as socio-economic status and other demographic variables; 2) initial commitment of students to completing their degrees; 3) students' academic
and social integration at the particular institution; and 4) overall satisfaction with the university (termed "subsequent commitment"). The students were surveyed upon entering college in the fall regarding their background characteristics, initial goal commitments, and expectations about college. They were again surveyed nine years later about their actual college experiences as they pertained to degree of academic and social integration and subsequent commitment.

Pascarella's results lent tentative support to Tinto's hypothesis that academic and social integration are central to students completion of their education. Overall these results were similar for both African-American and White students. There were, however, several important differences between these two ethnic groups. Results showed that while for White male and female students, academic integration was a stronger predictor of academic persistence and degree completion, the opposite was true for African-American male students. For them, social integration at the university provided a more robust prediction of later academic success than academic integration. For African-American female students, academic and social integration proved to be equal predictors of later academic achievement.

Pascarella concluded that for African-American males in particular, social integration is especially relevant in their academic career. This finding suggested that in order for
institutions of higher education to effectively educate certain groups of students, they must foster an environment which provides students with such nontraditional and non-academic opportunities as social integration.

Although Pascarella's work has provided useful information that serves to direct future research efforts, his findings must not be overstated. The main shortcoming of his study was that the second survey required students to recall their experiences over the preceding nine years. It is unlikely that surveys such as this capture the true nature of the students' actual experiences. Furthermore, this study relied upon purely correlational data, making it difficult to determine whether or not social integration (or lack thereof) preceded or followed academic persistence or withdrawal.

Research which has specifically addressed ethnic minority students' experiences in college has revealed the dilemmas and difficulties which these students face in terms of becoming integrated into the university environment, either academically or socially. Often times this integration results in a difficult choice for ethnic minority students to the extent that choosing to become integrated with the university setting may come at the cost of their own ethnic identity and cultural values. For example, Scott (1986) described the situation which Native American students often face in the university environment. He identified research which seemed to suggest that one of the best predictors of
academic success among Native American students was the degree to which they were committed to "White" ways and their level of social integration into White culture. Scott suggested that often times Native American students who are not willing to sacrifice their cultural identity respond to a university environment which they perceive as not accepting of their ways by leaving the institution altogether. As a remedy to this unfortunate situation, Scott suggested that the university community commit itself to becoming more accepting of Native American ways. This might be demonstrated through the hiring of Native American faculty, establishing Native American cultural centers, and showcasing Native American languages and art.

A debate which is frequently brought up in discussions regarding the attrition and retention rates of ethnic minority students is the degree to which academic versus sociopsychological predictors account for the observed rates. While there has been much evidence that previous academic factors (e.g., high school grade point average, standardized test scores) play a critical role in determining future success, researchers have also found evidence for ethnic differences in the importance of various predictors of future academic performance. For example, Suen (1983) found that at a predominantly White university, while academic predictors were significantly related to the future success of both African-American and White students, feelings of alienation
were also significantly related to future dropout for the African-American students. For White students, however, feelings of alienation were unrelated to their future academic performance.

Nettles (1986) has argued that predicting African-American students' achievement in college based on their previous academic performance alone often results in a projection that these students will do better than they actually do. For African-American students, factors besides previous academic performance appear to significantly impact upon later academic achievement. Nettles suggests that one of these contributing factors is the extent to which there is a "good fit" between student characteristics and the academic environment. An environment which provides ethnic minority students with a "good fit" consists of such factors as nondiscrimination, satisfactory peer group relations, and academic integration. Nettles noted a surprising finding that lower feelings of discrimination not only contributed to higher academic performance for African-American students, but for White students as well.

Tracey and Sedlacek (1985) have tested the relationship of Sedlacek and Brooks' (1976, cited in Tracey & Sedlacek, 1985) seven non-cognitive factors to the academic success of African-American and White college students. Among these seven non-cognitive variables which Sedlacek and Brooks hypothesized to play an important role in academic success,
was the availability of a strong support person. They stated that it is especially helpful if this person is someone who is supportive of the student’s academic goals. Tracey and Sedlacek measured these non-cognitive variables upon entrance to college. They then followed students’ academic progress and persistence via university records over the course of four years.

For both African-American and White students, the non-cognitive variables predicted equally as well their future grades. However, in regards to academic persistence, Tracey and Sedlacek found that the non-cognitive variables and SAT scores provided a better indication of future academic persistence for African-American students than SAT scores alone provided. This was not the case for White students. Specifically, this support was most important at the beginning of the African-American students’ academic careers (i.e., during the first three semesters). However, because the non-cognitive variables were measured only once and very early on, it is not clear whether or not the lack of a relationship between the presence of a supportive person and academic persistence was a valid finding. For example, it could be that the students who ultimately graduated from college maintained their relationship with this supportive other person while the students who did not graduate may have lost contact with this person. It would have been more informative had the longitudinal nature of the students’ relationships
with a supportive other person been examined in relation to their long-term academic achievement.

The work of Tracey and Sedlacek seemed to suggest that academic ability (as measured by the SAT) had little to do with ultimate persistence in completing an undergraduate degree for certain ethnic minority groups. Again, however, this finding must be taken cautiously. The lack of a relationship between SAT scores and persistence may be related to the fact that often times a relatively small range of scores is accepted by the university. In contrast, there was very likely a large range of scores for these students on the non-cognitive variables measured.

In summary, while academic predictors of future attrition or completion of higher education are important, it appears that in order to fully appreciate the processes which lead to ultimate academic outcomes, psychosocial factors also need to be accounted for. In addition, these predictors may play an especially critical role for ethnic minority students. Tinto (1982) has called for "group specific" (e.g., based on gender, race, or socio-economic status) models to explain student persistence and withdrawal. As Tracey and Sedlacek (1985) suggested, "To perform as well as Whites, minority students must demonstrate a greater variety of characteristics, not just academic ability" (p. 409). Furthermore, the degree to which different factors impact upon persistence or withdrawal at different times must be appreciated in the form of
longitudinal models.

With an increased understanding of the nature of student withdrawal, important policy changes can be made to avert this problem in the first place. As Tinto stated (1982, p. 692):

"Work on group-specific models of dropout can have important policy implications. Studies of dropout among specific groups of students, especially among the disadvantaged, may aid in the development of institution and system policies designed and targeted to assist the educational continuance of particular sub-populations within the student body. As currently constituted, our models do not permit the fine-tuning of attention and therefore are not as policy relevant as they might otherwise be."

Social Support

Heller and Swindle (1983) have suggested that the "major reason for the current popularity of social support (as a factor in psychological well-being) is because of its preventive and therapeutic promise through environmental change" (p. 88). Despite the promise which social support holds in theory, Heller and Swindle have also suggested that some impediments to the actualization of this potential exist. At the most basic level, the lack of a generally accepted definition of social support often hinders progress. Heller and Swindle have suggested that in a general sense, social support might be defined as behaviors provided by others which aid in the fulfillment of goals or in coping with environmental demands.

Because social support is not a unidimensional construct, an attempt has been made to delineate the various dimensions of support which fall under the general term "social support."
Cohen and Wills (1985) have listed four such dimensions of social support. The first is esteem, or emotional, support which involves the communication to an individual that he or she is valued for his or her own worth and is accepted regardless of any shortcomings. There is also a dimension known as informational, or appraisal, support which involves specific help in dealing with particular demanding events. Social companionship on the other hand, involves having others with whom to participate in leisurely pastimes. This dimension could contribute to psychological health by fulfilling needs for affiliation, by serving as a distraction from problems, or simply by promoting a positive mood. Finally, the dimension of instrumental support is one in which others provide financial or other material resources or services (e.g., looking after children). While in theory these separate dimensions of social support exist, it is often difficult to separate them in the real world therefore making them troublesome to study.

Cohen and Wills (1985) have also described the two ways in which social support has been hypothesized to impact upon psychological health and other outcomes. A main effects model suggests that social support provides a "generalized beneficial effect" (p. 311) upon psychological and physical health and other outcomes regardless of the level of stress which an individual has experienced. From their review of the literature, Cohen and Wills suggest that rather than any
increase in level of social support resulting in increases in well-being, there instead appears to be a minimum threshold for which an increase in social support affects well-being. There are several ways in which social support as a main effect could result in positive outcomes. For example, people who are involved in a supportive network might avoid negative events in the first place, are provided with a certain degree of predictability and stability, or are provided with a general sense of self-worth.

Alternatively, the stress-buffering, or interactional, model of social support has also been offered to describe the relationship between social support and positive outcomes. This paradigm proposes that the positive effects of social support will only be evident at times of stress. Cohen and Wills (1985) define stress as situations which the individual judges as "threatening or otherwise demanding and (he/she) does not have an appropriate coping response" (p. 312). During these stressful times, an individual who has a supportive social network might evidence "reappraisal (of the situation), an inhibition of maladjustive responses, or facilitation of adjustive counter responses" (p. 313). Thus, differences in outcome between individuals with a supportive social network and those without such a network will only be witnessed during times of stress. Otherwise few, if any, differences will be observed between these two groups.

Hirsch (1989) has explored the impact of social support
within the context of the major spheres of an individual's life. These spheres include work or school, family, friends, and leisure interests, to name a few. Hirsch's main hypothesis is that "social networks affect the quality of our involvements and the satisfactoriness of our social identities in major spheres of life, which in turn affect our mental health" (p. 119).

Hirsch makes an important point that the relative importance associated with any one sphere of life, such as school or work, will determine the significance of social support in that sphere. In the current study, involvement in medical training certainly takes on a central role in students' lives. Therefore, as Hirsch suggests, it is likely that a "higher correlation between work social support and mental health (will be found) among those for whom work is a central rather than a peripheral life interest" (p. 124).

Social Support and Minority Student Academic Persistence

In discussing the importance of various factors associated with academic persistence (or withdrawal), the role of students' social environments and networks is often stressed. As stated previously, for example, Tinto (1975) addressed the relevance of social integration while others (e.g., Pascarella, 1985) further suggested that this sort of integration might be especially important for certain ethnic groups. In their discussion of the principles which successful recruitment programs should follow, Oliver and
Brown (1988) have argued that universities should facilitate linkages both within and between ethnic minorities' social networks. Oliver and Brown stressed that universities should not excuse themselves from being proactive in facilitating these "social supports" for students by seeing the lack of such support as the fault of students. These authors felt quite strongly that recruitment and retention programs would fail if social factors were not accounted for by a truly comprehensive program.

Unfortunately, despite the theoretical importance of social support upon student academic retention, little empirical work has actually been done to document the impact which social support can have upon students' academic lives. The studies referenced above often did not completely measure social support, but focused upon one small component of the construct. The current author was able to find only three studies (two of which were from the same data set) which included comprehensive measures of social support in their quest to empirically establish the link between social support and academic outcomes for minority students. While the following studies also have their methodological shortcomings, they provide a starting point in the attempt to understand the predictive factors (especially social factors) for minority student academic success.

In an attempt to understand the social support systems of African-American and White undergraduates on a predominantly
White campus, Jay and D'Augelli (1991) compared these two groups on various dimensions of social support, academic and psychological adjustment, and predictors of adjustment. All measures of social support and of social and academic adjustment were collected during the beginning of the students' first year of college. Significant differences were found between these two groups on the following dimensions: African-American students reported less availability of social support than White students ($p < .01$) (however, when family income was controlled, no differences between the two groups were found); and, African-American students had lower pre-college and first semester academic performance than White students ($p < .001$). On the other hand, the two groups did not significantly differ in terms of social network size, frequency of interaction with network members, amount of support lost upon the beginning of school, or adequacy of support. Differences were also not found between the two groups' general well-being.

In terms of differentially predicting the academic adjustment of these two groups, Jay and D'Augelli did not find social support to be strongly associated with first-year college grade point average. Interestingly, pre-college measures of academic performance did not predict academic performance at the university level for African-American students. As the authors suggested, there appear to be important non-academic variables which impacted upon their
performance. Although in this cross-sectional study social support did not prove to be one of those mediating variables, it is quite likely that over a longer time frame, social support would be shown to influence academic outcomes. Finally, social support did not differentially predict psychological adjustment between these groups. For both African-American and White students, perceived availability and adequacy of support was significantly and about equally predictive of psychological well-being ($p < .001$).

While this study gives important clues as to understanding the psychological and academic adjustment of African-American students to university life (such as the finding that previous academic measures do little to predict academic adjustment in college for African-American students), it remains limited by its cross-sectional design. Most obviously, group differences in social support or the degree to which social support predicts academic and psychological outcomes could very well be expected to emerge later on in the year or over the course of years in college. For example, ties with friends/family back home which remain strong during the beginning of college may become less stable over the years. As classes go on and the student must settle in to his/her life away from home, it may become harder to maintain closeness with supportive others.

In a follow-up study to Jay and D’Augelli (1991), Hershberger and D’Augelli (1992) explored the relationship
between social support and academic performance measured during the 1991 study and ultimate academic status measured 6 1/2 years after the initial data collection. Students were thus assessed at two time points, 6 1/2 years apart. As mentioned above, at the first data collection point, upon the start of the first fall semester, students' academic performance, social support, and adjustment were assessed. At the second data collection point, 6 1/2 years after the first time point, the graduation status of all subjects was determined by examining university records. On the basis of their analyses of this data, the authors concluded that "differences in social support and adjustment between African-American and White students cannot be implicated, directly or indirectly, in racial differences in graduation rates" (p. 196). Instead, they suggested that racial differences in graduation are "solely" related to differences in high school and first year of college academic records.

An obvious flaw in their reasoning is that Hershberger and D’Augelli have made these strong conclusions based upon an incomplete design. Because social support was assessed at only one point in time, e.g., 6 1/2 years before graduation status was determined, there is no way of knowing how or whether social support changed over the course of these years. For the same reasons that the initial study found few significant differences between groups, one would expect that at the start of college, social support would be quite
different from even one year after students had either a chance to become more connected at school, or less connected with a previously supportive network of family and friends. If social support had been assessed longitudinally over time, a more valid indicator of the students' levels of social support would have been available. It is possible that social support would then be found to be related to college drop-out rates. In light of these procedural and methodological shortcomings, this particular study does not appear to definitively answer the question of whether social support is predictive of college graduation or drop-out among racially diverse groups of students.

Mallinckrodt (1988) found preliminary evidence for the possibility that different types of social support are related to staying in school for students of differing ethnic status. He examined the extent to which African-American and White students' feelings of encouragement to stay in school by friends at school and by their families was related to their actual persistence in college. It was found that for African-American students, the quality and availability of friends at school was most strongly associated with staying in school up to one semester later. On the other hand, support from family was the most important factor in predicting which of the White students stayed in school. Since the relationship between support at school and retention for the African-American students was not significant below the .05
level \((p < .06)\), a replication is needed to determine the strength of this finding. Additionally, the entire sample was followed over a relatively brief period of time (two semesters). It is possible that a more realistic sense of the relationship between different sources of social support, ethnicity, and actual outcome would not emerge over this brief time period. This study does, however, seem to indicate that a worthy direction for further research might focus upon the importance of different sources of support for different ethnic groups within certain contexts.

Given the above studies' limitations, the current study hopes to overcome some of them by addressing the longitudinal nature of social support and academic standing. In the current study, students were followed on a yearly basis over the span of five years. Secondly, a comprehensive measure of social support was utilized which assessed the source of support (e.g., parent, significant other, friend, etc.), whether or not this person was within the students' academic environment, and the type and extent of support which this person provided the student (e.g., emotional, instrumental, etc.). Finally, this study appears to be one of the only studies to assess the role of social support across various ethnic groups of students who are involved with post-undergraduate education.
CHAPTER 2
HYPOTHESES

As stated previously, it is our hypothesis that within-medical school sources of social support will be especially critical in determining the ultimate success (as measured by the completion of medical training) of certain ethnic minority students. We believe that this will be the case for students from African-American and Latino cultural backgrounds. We will compare the course of these ethnic minority students' social support networks and academic standing (i.e., whether or not they were still in school and whether or not they ultimately graduated) to the course of White students'. This will be an analysis across five years of medical training (i.e., the first year of medical school through the first year of residency).

More specifically, we will compare the social networks of minority medical students who dropped out of school to the social networks of minority students who completed medical school and to the social networks of White students who also dropped out. Furthermore, we will compare minority medical students who successfully completed medical school to White medical students who did the same. A MANOVA will be performed for each of these four groups. We expect to find qualitative
differences among these groups of students to the extent that the successful minority medical students will evidence a much stronger within medical school support network than both minority students who dropped out and White students who successfully completed medical school. MANOVA will also be used to see how these four groups of students differ on all other variables in the study.

In addition, logistic regression will be used for times 2 through 5 in order to determine the significant relationship which exists at each of those times between graduation status and ethnicity and within-medical school social support.

Finally, various path models will be used to explore the possibility of any mediating or moderating influences of social support on academic outcome. These analyses will allow us to make causal conclusions regarding antecedent (e.g., high within-medical school social support) and consequent events (e.g., medical school retention).
CHAPTER 3

METHOD

Subjects

The subjects in this study were selected from a group of 184 first-year medical students at a large, ethnically diverse Midwestern medical school during the 1987-88 academic year. All members of the class were administered a self-report questionnaire during the beginning of the first fall semester (time 1). Of the 184 questionnaires given out, 167 were returned (91%).

Due to the longitudinal nature of the study, only students who returned questionnaires at time 1 were eligible to participate in the study during the succeeding four years of medical school and residency. Furthermore, responders who, during the five year course of the study, transferred, dropped out of, or were on leave from medical school were also not followed. Self-report questionnaires were thus administered during the beginning of each of the three remaining school years and during the first fall of residency. As a result, the following response rates were observed: 144 questionnaires out of 158 eligible were returned at time 2 (91%); 140 questionnaires out of 153 eligible were returned at time 3 (92%); 137 questionnaires out of 147 eligible were returned at
time 4 (93%); and, 130 out of 146 eligible were returned at time 5 (89%). For the current study, only White, African American, and Latino students' data were used at each time point.

Measures

Measures were used to assess students' demographic characteristics, social support networks, personality characteristics, and mental health as described in the following. Unless otherwise noted, measures were administered at all five time points.

Demographic information. At the first data collection point, demographic information provided by the students included gender, age, ethnicity, marital status, parental education, parental occupation, and number of children. Beyond time one, only students' marital status and number of children were ascertained.

The Social Support Network Inventory (SSNI). The SSNI (Flaherty, Gaviria, & Pathak, 1983) includes 11 items pertaining to the five (or fewer) most important people in an individual's social support network. The degree to which the members of the social support network provided overall support and five sub-areas of support (instrumental, emotional, event-related support, availability, and reciprocity) was assessed. Flaherty et al. (1983) found alpha coefficients for each of these six dimensions to be as follows: overall support showed
an alpha of over .90; instrumental support showed an alpha of over .79; emotional support evidenced an alpha of over .63; event-related support showed an alpha of over .75; availability of support exhibited an alpha of over .75; and reciprocity of support showed an alpha of over .58. Students rated their responses to these questions on a five-point Likert-type scale indicating the amount of support received, from little or no support (1) to maximal support (5). This measure also allowed for an estimate of the total size of an individual's support network, the frequency of contact with network members, and the relationship of each network member to the student. Test-retest reliability over a two-week time span yielded a Pearson product-moment correlation of .82. Convergent validity has been established with a clinical population. SSNI scores were highly correlated with clinician ratings of social support ($r = .68, p < .01$)

**Rotter Internal-External Scale.** Locus of control was measured by a sub-set of items from the Rotter Internal-External Scale. The scale was reduced for the purpose of brevity. Ten of the original 29 scale items were utilized to assess the degree to which students believed that their behavior affected the reinforcement which they did (or did not) receive from the world. Conversely, it was a measure of the extent to which student felt that their lives were controlled by external events. Measuring the internal consistency of this sub-set of ten items, Cronbach's alpha
ranged from .51 to .70 over the five data collection points. Test-retest reliability for the original scaled ranged from .60 to .82 (Rotter, 1966). Rotter (1966) has provided evidence supporting the construct validity of this measure. Both convergent and divergent validity has been shown.

The Center for Epidemiologic Studies Depression (CES-D) Scale. The CES-D (Radloff, 1977) was used to assess depressive symptomatology among the students. The CES-D is a 20 item self-report rating of depressive symptoms and mood. It was especially designed to be used among a community population. The CES-D has been shown to have high internal consistency with a Cronbach's alpha of .85 in the general population and .90 in a clinical sample. Test-retest correlations ranging between .51 and .67, over a time span of 2-8 weeks were found. The construct validity of the CES-D was established by finding positive correlations with other measures of depressive symptomatology ($r = .60$). Additionally, the measure has been shown to discriminate well between a clinic and community sample.

Profile of Mood States - Anxiety. Anxiety was measured by the nine-item tension-anxiety factor of the Profile of Mood States (McNair, Lorr, & Doppleman, 1981). It has been shown to manifest a high test-retest reliability, internal consistency, and a high correlation with other anxiety measures (McNair et al., 1981). Its use in the current study has yielded alphas of over .90.
Medical school stressors. Perceptions of medical school stressors were measured during the second year of medical school and onward. This measure was developed by Vitaliano, Russo, Carr, and Heerwagen (1984). It is a 13-item index on which students rated the degree to which they agreed or disagreed with statements regarding various stressors associated with medical training. In general these items addressed the degree to which students felt that medical school required long hours, restricted their personal time, fostered competition among peers, involved poor communication between students and faculty or administration, required extensive skill and knowledge mastery, and provided a cold and/or bureaucratic environment. Internal consistency reliability for the measure has demonstrated an alpha of .81. In relation to measures of psychological distress, sub-sets of items have been shown to significantly predict both anxious and depressive symptomatology.

Self-esteem. The degree to which students took a positive view towards themselves was measured by a scale developed by Pearlin and Schooler (1978) in their study of coping behavior. Pearlin and Schooler based the scale on items for the Rosenberg scale (1965, cited in Pearlin & Schooler, 1978). Pearlin and Schooler used 6 of Rosenberg’s original 10 items, presumably for reasons of brevity. Rosenberg (1965) found the reproducibility of this scale to be 93%. Furthermore, validity studies showed a relationship
between Rosenberg’s self-esteem scale and depressed mood. Internal consistency for the current 6 items showed a Cronbach’s alpha of .72 to .84.

Parental education. Father’s and mother’s educational attainment were both measured on the following scale: 1 - graduate or professional training; 2 - college graduate; 3 - some college; 4 high school graduate; 5 - some high school; 6 - completed elementary school; and 7 - less than six year education. Thus, lower numbers were indicative of higher educational attainment. For the purposes of the current study, fathers’ and mothers’ educational attainment was averaged.

Proposed Analyses

We wished to look at the data in two ways: first in terms of changes over time and, secondly, in terms of assessing the predictors of student drop-out or retention.

Analysis of variance (ANOVA) was used to assess how the support networks of White and minority (i.e., African-American and Latino) medical students changed over time. As stated in our hypotheses, we expected to see different patterns of social support emerging in these two groups over time. Initially, we did not expect to see any differences in amount, type, or quality of social support between White and minority students. Over time, however, we expected to see significant increases in the amount and importance of within medical school social support for the White students but not for the
minority students.

Additionally, MANOVA was used to determine the presence of any significant changes over time between the White and minority students in terms of medical school related stress, psychological distress, locus of control, and self-esteem. In general, we expected to see significantly greater negative changes across the five years of training for the minority students than for the White students. Specifically, relative to the White students, we anticipated increases in medical school stress and psychological distress and decreases in locus of control and self-esteem for the minority students.

In addition, regression analyses were used to test the predictive value of several variables on academic retention and the timely completion of medical school. A mediation model was tested. This model was tested separately for two sub-groups of students: the White students and the ethnic minority students (i.e., African-American and Latino). These models were then compared to one another. The possibility of a mediating relationship was tested to determine the degree to which psychological distress mediated the relationship between medical school stress and academic outcome. The presence of a significant mediating relationship between medical school stress and academic outcome would suggest that this variable could only impact upon academic outcome via the psychological distress which was created. In other words, in the presence of a mediating relationship with psychological distress,
medical school stress would not have any significant direct effect on academic outcome.
CHAPTER 4

RESULTS

The sample was divided into four groups based on ethnicity and graduation status. Ethnicity was broken down into two groups: a majority group (White students) and a minority group (Latino and African-American students). Graduation status was classified as either "on-time" or "not-on-time." The "not-on-time" group consisted of students who had either dropped out of their medical training altogether, either voluntarily or at the request of the medical school, or who had graduated late for a variety of reasons (e.g., due to a leave of absence or to the repetition of a year of medical training). Although it has been suggested in the literature (e.g., Tinto, 1982) that it is important to understand each of these types of late or leaving behavior as qualitatively different occurrences, in this sample it was not possible to statistically analyze these instances separately due to the very small numbers of students who fell into each of these groups.

The four groups which resulted from the breakdown of the sample (n = 148) were as follows: White/on-time (n = 78); White/not-on-time (n = 24); Minority/on-time (n = 30); Minority/not-on-time (n = 16). Although 35% of the minority
group and only 24% of the minority group did not graduate on-time, a chi-square procedure did not reveal a statistically significant difference overall between the graduation status of these two groups.

Demographics

In the majority/on-time group during the first year of medical school there were 54 males and 24 females (a total of 78 students overall). The average age of this group was 23.25 years while the average parental education level was 3.26 (with low numbers signifying higher educational attainment). In terms of marital status for this group, 9 students were married, 68 were single, and 1 was divorced. Over the subsequent 4 years of medical school, the number of these students who originally participated in this study and who continued to participate were as follows: year 2 - 72; year 3 - 71; year 4 - 71; and, year 5 - 72. The marital status for this group over the succeeding four years was as follows: number of married students (years 2 through 5) - 10, 12, 24, and 27; single - 62, 59, 47, and 44; and 1 student reported being divorced in the 5th year.

For the minority/on-time group during the first year of medical school, there were 19 males and 11 females (a total of 30 students in this group overall). The average age of this group was 24.07 years while the average parental education was 4.68. In regards to marital status, 2 students were married and 27 were single. Over the subsequent 4 years of medical
school, the number of these students who originally participated in this study who continued to participate were as follows: year 2 - 23; year 3 - 22; year 4 - 21; and, year 5 - 18. The marital status for this group across the subsequent four years was as follows: number of married students (years 2 through 5) - 2, 1, 1, and none; single - 20, 21, 19, and 17; and divorced or separated - 1, none, 1, and 1.

For the majority/not-on-time group during the first year of medical school, there were 16 males and 8 females (totalling 24 students). The average age of this group was 24.75 years while the average parental education was 3.73. In terms of marital status, 2 students were married and 22 were single. The number of students in this group who actually dropped out of medical school altogether was 9 (or 37% of the majority/not-on-time students) versus 15 (or 63%) who graduated late. Over the subsequent 4 years of medical school, the number of these students who originally participated in this study who continued to participate were as follows: year 2 - 17; year 3 - 16; year 4 - 18; and, year 5 - 16. The marital status for this group across the subsequent four years was as follows: number of married students (years 2 through 5) - 1, 4, 6, and 9; and single - 16, 12, 12, and 7. No divorces or separations were reported during any year by this group of students.

For the minority/not-on-time group during the first year of medical training, there were 12 males and 4 females
(totalling 16 students). The average age of this group was 26.31 years while the average parental education was 5.38. In regards to marital status, 3 students were married, 11 were single, and 2 were divorced. The number of students in this group who actually dropped out of medical school altogether was 10 (or 63% of the minority/not-on-time students) versus 6 (or 37%) who graduated late. Over the subsequent 4 years of medical school, the number of these students who originally participated in this study who continued to participate were as follows: year 2 - 12; year 3 - 12; year 4 - 9; and, year 5 - 8. The marital status for this group across the subsequent four years was as follows: number of married students (years 2 through 5) - 3, 3, 3, and 5; single - 7, 9, 4, 3; and 2 students reported being divorced in the second year and 1 student reported being divorced during the fourth year.

**Changes Over Time Between Ethnic Groups**

To determine the changes which occurred over time for the two ethnic groups, an ethnicity by time of testing analysis of variance procedure was performed for each of the measures (i.e., self-esteem, overall social support, within-medical school social support, outside-medical school social support, anxious and depressive symptomatology, locus of control, and medical school stress). However, due to the nature of the SPSS procedure for MANOVA, all cases with incomplete data (i.e., those missing at least one time point of data for a given measure) were dropped from the analysis. The result of
these deletions was that these MANOVAs then applied mainly to the "on-time" group, since once a student dropped out or took a leave of absence, certain data were not available for him or her. Significant findings were as follows.

A main effect for ethnicity ($F(1, 97) = 12.26, p < .001$) revealed that minority students reported greater levels of overall social support than majority students (4.23 versus 3.90). Furthermore, a main effect for time of testing ($F(4, 388) = 2.59, p < .05$) revealed that overall social support changed for both ethnic groups over time with time 1 and time 4 showing the highest overall social support reported. The means for the first through fifth years were as follows: 4.00, 3.95, 3.90, 4.04, and 3.97.

For time points 2 through 5, the overall support measure was broken down into within-medical school social support versus outside-medical school social support. This distinction was not made for the social support measure during the first year. Significant differences were found only in the within-medical school social support dimension of overall social support. For within-medical school social support, a main effect for ethnicity was found such that minority students reported significantly higher levels of within-medical school social support ($F(1, 95) = 7.82, p < .001$). The means for the minority and majority groups were 2.82 and 1.46, respectively. In addition, a main effect for time of testing was found ($F(3, 285) = 8.29, p < .001$). The means for
the second through fifth years were as follows: 1.12, 1.57, 2.09, and 2.35. It appears that across both ethnic groups, within-medical school social support increased significantly over time. Finally, these results were elucidated by a significant ethnicity by time of testing interaction ($F(3, 285) = 4.84, p < .05$).

TABLE 1

WITHIN-MEDICAL SCHOOL SOCIAL SUPPORT BROKEN DOWN BY ETHNIC GROUP AND TIME OF TESTING

<table>
<thead>
<tr>
<th>Time of testing</th>
<th>Majority</th>
<th>Minority</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd year</td>
<td>1.11</td>
<td>1.17</td>
</tr>
<tr>
<td>3rd year</td>
<td>1.11</td>
<td>3.03</td>
</tr>
<tr>
<td>4th year</td>
<td>1.47</td>
<td>4.05</td>
</tr>
<tr>
<td>5th year</td>
<td>2.14</td>
<td>3.02</td>
</tr>
</tbody>
</table>

It seems that there is no difference between the two groups during the second year. However, the minority group shows a large increase during the third year, peaking in the fourth year, and displaying a downward turn during the 5th year. Despite this downward trend in the fifth year, however, minority students still report a greater amount of within medical school social support than majority students.

In terms of depressive symptomatology, a main effect ($F(4, 392) = 5.23, p < .001$) for time of testing revealed that depressive symptoms were reported to be the highest at times 2 and 3. Collapsing across ethnic groups, the mean levels of
depressive symptomatology for time points 1 through 5 were as follows: 12.37, 15.25, 14.98, 12.13, and 12.38. A marginally significant interaction ($F(4, 392) = 2.14, \ p = .075$) elucidated these findings, however, by showing a different pattern of scores for the two ethnic groups.

**TABLE 2**

MEAN LEVEL OF REPORTED DEPRESSIVE SYMPTOMS BROKEN DOWN BY ETHNIC GROUP AND TIME OF TESTING

<table>
<thead>
<tr>
<th>Time of testing</th>
<th>Ethnic group</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
<th>5th year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Majority</td>
<td>13.08</td>
<td>14.99</td>
<td>14.78</td>
<td>11.68</td>
<td>13.16</td>
</tr>
<tr>
<td></td>
<td>Minority</td>
<td>10.00</td>
<td>16.13</td>
<td>15.65</td>
<td>13.65</td>
<td>9.78</td>
</tr>
</tbody>
</table>

From the interaction of ethnicity and time of testing, it appears that, whereas during the first and last years of medical school minority students reported lower levels of depressive symptomatology than majority students, they reported higher levels during years 2, 3, and 4.

Regarding external locus of control, a significant ethnicity by time of testing interaction was found ($F(4, 428) = 2.92, \ p < .05$). See Table 3 for means of this interaction.

**TABLE 3**

EXTERNAL LOCUS OF CONTROL BROKEN DOWN BY ETHNIC GROUP AND TIME OF TESTING
Although minority students began school reporting a lower external locus of control during their first year than majority students, they reported greater external locus of control during all subsequent years.

In terms of medical school stress as measured from the second year onward, there was a marginally significant main effect for ethnicity ($F(1, 98) = 3.77, p = .055$) such that the minority students reported experiencing more medical school stress. The means for the minority and majority groups were 44.36 and 41.67, respectively. In addition, there was a significant main effect for time of testing ($F(3, 294) = 29.51, p < .001$) such that during the third year, the highest reported level of medical school stress was reported, after which point the reported levels of medical school stress decreased. The means for years 2 through 5 were as follows: 41.71, 44.78, 43.93, and 38.74.

### Ethnicity by Graduation Status Differences in Outcome Measures at Each Time Point

Ethnicity by graduation status ($2 \times 2$) analyses of variance were conducted for each measure at each time point.
that a particular measure was available. This was done because of the fact that many of the subjects in previous analyses in whom we were most interested (i.e., those who had left medical school in some capacity) were dropped from the analyses by the SPSS program. In other words, the data was examined one year at a time in order to avoid the loss of subjects which was inherent in the MANOVA design. In addition, this procedure will allow the post-hoc comparison of differences which were reported earlier. In all analyses, parental education was entered as a covariate. Furthermore, all significant interactions were followed by a Duncan’s multiple-range test by way of a one-way analysis of variance procedure. The significance level for the Duncan’s multiple-range test was set at $p < .05$.

Social support. During the third year, a main effect for ethnicity was found for within-medical school social support ($F(1, 115) = 7.67, p < .01$). This revealed that minority medical students overall reported significantly more within-medical school social support than the majority students. The means for the minority and majority groups were 2.23 and .75, respectively. A main effect for ethnicity was also found for within-school social support during the fourth year ($F(1, 114) = 16.77, p < .001$) with minority students again reporting a higher level of support. The means for the minority and majority groups were 3.44 and 1.23, respectively. During the fourth year, a marginally significant main effect for
ethnicity was also found for outside-school social support \((E(1, 113) = 3.28, p < .10)\). The mean for the minority group was 17.55 versus a mean of 18.54 for the majority group. In this case, majority students reported more outside-medical school social support.

In terms of overall social support, a main effect for ethnicity was found at each time point except the third. In each case, minority students reported more overall social support (i.e., regardless of source, type, etc.). The \(E\) and \(p\) values for each of the years were as follows: year 1, \(E(1, 143), p < .001\); year 2, \(E(1, 116) = 10.20, p < .01\); year 4, \(E(1, 114) = 6.91, p = .01\); and, year 5, \(E(1, 108) = 5.92, p < .05\). For years 1 through 5, the minority and majority means were as follows: 4.43 and 3.94; 4.16 and 3.94; 4.21 and 3.82; 4.21 and 4.02; 4.19 and 3.88.

**Locus of control.** During the first year, a higher external locus of control was reported by the majority students. This was revealed by a significant main effect for ethnicity, \(E(1, 143) = 4.24, p < .05\). The means for the minority and majority groups were 4.09 and 4.92, respectively. During the fourth year, a significant interaction between ethnicity and graduation status was found, \(E(1, 114) = 5.85, p < .05\). Follow-up analyses, however, revealed no significant differences between any of the four groups at the \(p < .05\) level.

**Self-esteem.** A main effect for ethnicity was found (\(E(1,
143) = 7.60, \( p < .01 \) during the first year such that minority students reported higher levels of self-esteem than did majority students (the means were 22.82 and 21.86, respectively). This main effect for ethnicity held up throughout every year of medical school with minority students consistently reporting higher levels of self-esteem. The \( F \) and \( p \) values for each year were as follows: year 2, \( F(1, 121) = 9.01, p < .01 \); year 3, \( F(1, 116) = 10.72, p < .001 \); year 4, \( F(1, 114) = 7.01, p < .01 \); and year 5, \( F(1, 109) = 4.38, p < .05 \). The means for years 2 through 5 were as follows for the minority and majority students: 22.67 and 21.70; 22.75 and 21.39; 22.70 and 21.25; and 22.17 and 21.20.

Depressive symptoms. During the first year, a main effect for ethnicity was found (\( F(1, 143), p < .05 \)) such that majority students reported higher levels of depressive symptomatology than the minority students. The mean level of reported depressive symptoms during the first year was 10.14 for the minority students and 13.66 for the majority students.

A main effect for ethnicity was also found during the third year (\( F(1, 116) = 4.54, p < .05 \)), again with majority students reporting more depressive symptoms. The means during the third year were 12.01 for the minority students and 15.77 for the majority students. However, during the third year, this main effect was elucidated by a significant interaction between ethnicity and graduation status (\( F(1, 116) = 7.72, p < .01 \)).
TABLE 4

DEPRESSIVE SYMPTOMS DURING THE THIRD YEAR
BROKEN DOWN BY ETHNIC GROUP AND GRADUATION STATUS

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Graduation Status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On-time</td>
<td>Not-on-time</td>
</tr>
<tr>
<td>Majority</td>
<td>14.28</td>
<td>17.25</td>
</tr>
<tr>
<td>Minority</td>
<td>16.77</td>
<td>7.25</td>
</tr>
</tbody>
</table>

Follow-up analyses indicated that the minority/not-on-time group appeared to report significantly fewer depressive symptoms than all three of the other groups. None of the other groups were significantly different from one another. The significant interaction seems to have resulted from one low cell, namely, ethnic minority students who were classified as "not-on-time."

During the fourth year, follow-up analyses to a significant interaction ($\text{F}(1, 114) = 3.99, p < .05$) did not reveal any significant differences at the $p < .05$ level between any two cells. In the fifth year, however, similar findings to the third year emerged. Again a main effect for ethnicity ($\text{F}(1, 109) = 10.64, p < .001$), with majority students reporting more symptoms than minority students (Majority = 15.96 and Minority = 9.43), was elucidated by a significant interaction ($\text{F}(1, 109) = 4.52, p < .05$).
Follow-up analyses indicated that the majority not-on-time group appeared to be experiencing significantly more depressive symptoms than any of the other groups. None of the other three groups differed significantly from one another.

Anxiety. During the first year, a main effect for ethnicity was found ($F(1, 141), p < .05$) such that majority students reported more symptoms of anxiety than the minority students. The means were 11.05 and 8.7, respectively. During the third year, main effects for both ethnicity and on-time status were found (respectively, $F(1, 111) = 13.20, p < .001$ and $F(1, 111) = 5.13, p < .05$). At this time, ethnic minorities as well as not-on-time students were reporting less anxious symptoms. The means for the minority students versus the majority students were 6.68 and 10.66. The means for the on-time versus not-on-time groups were 9.95 and 7.39, respectively. These main effects were elucidated by a significant interaction ($F(1, 111) = 6.43, p < .05$) during the third year.
TABLE 6
ANXIOUS SYMPTOMS DURING THE THIRD YEAR
BROKEN DOWN BY ETHNIC GROUP AND GRADUATION STATUS

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Graduation Status</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On-time</td>
<td>Not-on-time</td>
<td></td>
</tr>
<tr>
<td>Majority</td>
<td>10.37</td>
<td>10.94</td>
<td></td>
</tr>
<tr>
<td>Minority</td>
<td>9.52</td>
<td>3.83</td>
<td></td>
</tr>
</tbody>
</table>

Follow-up analyses indicated that the minority/not-on-time group appeared to be significantly less anxious than all three of the other groups. None of the other groups were significantly different from one another.

During the fourth year, marginally significant main effects for ethnicity ($F(1, 112) = 3.65, p < .10$) and graduation status ($F(1, 112) = 3.32, p < .10$) were found. Majority students, as well as on-time students, reported being more anxious. The means for the minority versus majority groups were 7.73 and 10.63, respectively. The means for the on-time versus not-on-time groups were 10.62 and 7.74. These main effects were elucidated by a marginally significant interaction ($F(1, 112), 2.83, p < .10$).
Follow-up tests revealed that the ethnic minority/not-on-time group reported significantly fewer anxious symptoms than both the majority and minority on-time groups. The lack of a significant difference between the minority and majority not-on-time groups appears to be due to insufficient cell sizes for these two groups. During the fifth year, only a main effect for ethnicity was found ($F(1, 109) = 6.27, p < .05$) with majority students again reporting more anxious symptoms. The means for the minority and majority groups were 7.22 and 11.00.

Medical school stress. During the third year, a significant interaction between ethnicity and graduation status was found ($F(1, 116) = 15.69, p < .001$).

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Graduation Status</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>On-time</td>
</tr>
<tr>
<td>Majority</td>
<td>10.66</td>
</tr>
<tr>
<td>Minority</td>
<td>10.57</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Graduation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On-time</td>
</tr>
<tr>
<td>Majority</td>
<td>42.68</td>
</tr>
</tbody>
</table>
The majority/on-time reported significantly less medical school stress than did the majority/not-on-time and minority/on-time groups. In addition, the majority/not-on-time group appeared to be experiencing significantly more medical school related stress than the minority/not-on-time group.

A significant interaction was also found during the fourth year ($F_{(1, 114)} = 7.55, p < .01$). See Table 9 for the means.

<table>
<thead>
<tr>
<th>Ethnic group</th>
<th>Graduation Status</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On-time</td>
<td>Not-on-time</td>
<td></td>
</tr>
<tr>
<td>Majority</td>
<td>42.14</td>
<td>47.56</td>
<td></td>
</tr>
<tr>
<td>Minority</td>
<td>45.95</td>
<td>41.78</td>
<td></td>
</tr>
</tbody>
</table>

Follow-up analyses revealed that the majority/on-time group reported experiencing significantly less stress than both the majority/not-on-time group and the minority/on-time group. The mean level of medical school stress for the minority/not-on-time group was actually less than the mean
amount of medical school stress for the majority/on-time group, however, due to the small number of students in this cell and the apparent lack of statistical power, no significant differences were detected between the minority not-on-time group and any of the other groups.

During the fifth year, a main effect for graduation status was found ($F(1, 109) = 7.69, p < .01$) such that the not-on-time group, regardless of ethnicity, reported higher levels of medical school stress. The mean level of reported medical school stress for the on-time group versus the not-on-time group was 37.62 and 42.57, respectively.

The Relationship of Within-Medical School Social Support to Graduation Status for Minority and Majority Students

In order to determine the degree to which within medical school social support was related to graduation status (i.e., not-on-time versus on-time) for the ethnic minority and majority groups, a logistic regression procedure was conducted for each year of training for which the requisite measures were available (i.e., from the second to the fifth year). This procedure was conducted separately for each year of training because the SPSS program for logistic regression only accepts for analysis cases which have a value for every measure which is specified in the logistic regression equation. Because the number of people with complete sets of data decreased from year to year, due to such things as leaving medical school temporarily or permanently, we felt
that to gain an understanding of the greatest number of students, especially the ones who eventually left medical school in some capacity, separate analyses were most appropriate.

For each logistic regression, the dependent variable was graduation status. The independent variables for each equation were ethnicity, within-medical school social support, and the interaction of ethnicity and within-medical school social support. Control variables included medical school stress, anxiety, locus of control, and self-esteem. The significant findings for the second through fifth years of training were as follows.

During the second year, 126 subjects were included in the analysis. Ethnicity showed a marginally significant positive relationship with graduation status $R^2$ change $= .005$, $p = .10$, $\beta = .76$. This suggested that overall, minority students were more likely to drop out at this time point. Neither within-medical school social support nor the interaction of this support with ethnicity were significantly related to ultimate graduation status.

During the third year of training, 115 subjects were included in the analysis. Medical school stress overall emerged as being significantly and positively related to graduation status $R^2$ change $= .03$, $p < .05$, $\beta = .10$. Therefore, as medical school stress was reported to increase, so too did the chances of being not-on-time. In addition to
medical school stress, anxiety emerged, showing a marginally significant negative relationship with graduation status $R^2$ change = -.02, $p < .10$, beta = -.14. It appeared from these results that as anxiety went up, so did the chances of being on-time in terms of medical school progress. Neither ethnicity, within-medical school social support nor the interaction of the two were significantly related to ultimate graduation status during the third year.

During the fourth year of training, with 116 subjects included in the analysis, anxiety again emerged showing a marginally significant negative relationship with graduation status as explained above ($R^2$ change = -.01, $p < .10$, beta = -.11).

Finally, during the fifth year of medical school, 112 subjects were included in the regression equation. At this point, medical school stress was the only variable which emerged as being significantly related to graduation status ($R^2$ change = .04, $p < .05$, beta = .11). According to these findings, it appeared that more stress was associated with a greater likelihood of being not-on-time. Neither ethnicity, within-medical school social support nor the interaction of the two were significantly related to ultimate graduation status during the fifth year.

The Mediating Effects of Psychological Distress Between Stress and Graduations Status

A mediational model was tested separately for minority
and majority students to determine the relationship between medical school stress, psychological distress, and on-time status. Figure 1 depicts the prediction that psychological distress was expected to mediate stress on graduation status.

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V Direct Effect V
STRESS -----> PSYCHOLOGICAL DISTRESS -----> GRADUATION STATUS
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Fig. 1. Mediational model.

The stress variable was computed by summing the medical school stress scores for all five years. The psychological distress variable was computed by averaging the anxiety and depression z-scores for each subject. Graduation status was constituted by either on-time (a numerical value of 1) or not-on-time (a numerical value of 2).

In order to statistically test this model, three separate regressions were conducted for each ethnic group. In the first equation, stress was regressed on psychological distress. In the second equation, stress was regressed on graduation status. In the third equation, stress and psychological distress were regressed on graduation status and were entered as follows: stress in step one, and psychological distress in step two. In all cases, parental education was entered as a covariate.
We found a different relationship between the three variables tested for the two ethnic groups. For the majority students, we found no evidence of a mediating relationship. Specifically, we found a significant relationship between medical school stress and psychological distress ($R^2$ change = .14, $p < .01$, beta = .02) and between medical school stress and graduation status ($R^2$ change = .07, $p < .05$, beta = .04). There was no significant relationship, however, between psychological distress and on-time status for majority students. Refer to Figure 2.

\[ \text{STRESS} \rightarrow \text{PSYCHOLOGICAL DISTRESS} \rightarrow \text{GRADUATION STATUS} \]

\[ \text{beta} = .02 \quad \text{n.s.} \]

**Fig. 2. Majority students' mediational model.**

For the minority group, a marginally significant mediating relationship was revealed such that psychological distress mediated most of the variance of medical school stress on on-time status. In particular, a significant relationship was found between medical school stress and psychological distress ($R^2$ change = .36, $p < .01$, beta = .02) and a marginally significant relationship was found between
psychological distress and graduation status ($R^2$ change = .05, $p < .10$, beta = -1.43). There was no significant direct relationship between medical stress and graduation status, however. Refer to Figure 3.

![Diagram]

**Fig. 3.** Minority students' mediational model.
CHAPTER 5
DISCUSSION

This study explored medical school retention and drop-out rates, and the factors associated with those rates, among majority and minority medical students across five years of training. Of special interest, was the role which different sources of social support played. We posited that for minority students, greater levels of perceived within medical school social support were going to play a more critical role than for majority students in determining which students successfully completed medical school and the first year of residency.

The first step in this study was to understand the interpersonal and psychological experiences of the students over the course of their five years of medical training. In terms of social support, it was found that after collapsing across time, minority students reported higher levels of overall social support than did majority students. Collapsing across the two ethnic groups, on the other hand, revealed that for all students, overall social support was reported to be highest during the first and fourth years.

Social support was examined more closely by breaking it down according to source of support (i.e., either from within
the medical school environment or outside of it). These results showed that again, collapsing across time, minority students reported the highest levels of within medical school social support. In addition, within medical school social support appeared to increase over time for both majority and minority students. The findings for within medical school social support were elucidated, however, by an interaction of ethnicity and time of testing. This significant interaction suggested that whereas majority students reported small but steady increases in within school support over time, minority students reported greater increases from year to year, but a decline during the fifth year, although still reporting higher levels than the majority students.

Stress levels for students were also examined over time and by ethnicity. While no ethnic differences in medical school related stress emerged, it was found that regardless of ethnicity, the third year of medical school was most stressful.

In terms of students' psychological well-being, depression was reported to be the highest during the second and third years regardless of ethnicity. In addition, locus of control was examined. Minority students reported having a lower external locus of control during the first year but then reported a higher external locus of control than majority students for every year subsequent to the first year. Majority students' reports regarding locus of control appeared
to remain relatively stable across the five years.

In all, the first set of analyses suggested that minority students did not appear to be seriously worse off than majority students, at least in terms of interpersonal and psychological measures, with the possible exception of external locus of control. In fact, we were surprised that in some instances, minority student were faring significantly better than majority students, for example in terms of both overall social support and within medical school social support.

The fact that minority students reported greater levels of within school social support lent partial support to our hypothesis that for these students, within school social support would be more important. As will be discussed in greater detail below, however, no significant relationship emerged between within school social support and graduation status for either majority or minority students. In addition, further analyses revealed no significant differences in terms of within medical school social support between minority students whose graduation status was classified as on-time versus not-on-time as was predicted.

Because of the nature of the statistical program used to analyze the data, the findings reported thus far pertained only to students for whom all points of data were available. We realized that these analyses were thus not informing us about the experience of students who left medical school in
any capacity during the course of our study. Our next set of analyses, then, were conducted separately for each year of medical training with the data broken down according to ethnicity and graduation status.

For social support, we found that during the third and fourth years, minority students, regardless of graduation status, reported more within medical school social support than majority students. In addition, during each year, minority students, regardless of graduation status, reported more overall social support than majority students. Overall, then, minority students report at least as much, and in some cases more, social support than majority students.

In terms of psychological outcomes, minority students, with few exceptions, again appeared to fare better than majority students. On measures of self-esteem, minority students reported higher levels during every year of the study, regardless of graduation status. Regarding depressive and anxious symptomatology, majority students, regardless of graduation status, reported higher levels than did the minority students during the first year and, for anxiety only during the fifth year, reported higher levels than did the minority students. During the third and fifth years, the minority/not-on-time students reported the least depressive symptoms of all groups. Similarly for anxiety during the third and fourth years, minority/not-on-time students reported the least symptoms of all groups. The one measure on which
minority students appeared higher than majority students was external locus of control during the first year only.

Significant findings also emerged for medical school stress. During the third and fourth years, the majority/on-time group reported less stress than the majority/not-on-time group and the minority/on-time groups. In addition, for the not-on-time group during the third year only, the majority students reported more stress than the minority students. During the fifth year, however, the not-on-time group, regardless of ethnicity, reported more medical school stress than the on-time group.

Our third set of analyses addressed the relationship between within medical school social support and graduation status for the majority and minority students. These analyses were specifically to test our main hypothesis that, for minority students, within medical school social support would be especially salient as a factor related to medical school success. Findings, however, did not lend support to this hypothesis. Instead, other factors such as medical school stress and anxiety emerged as being significantly related to graduation status.

During the third year and fifth years, it was revealed that as medical school stress went up, so to did the chances of not being on-time in terms of graduation. An interesting relationship between anxiety and graduation status also emerged during the third and fourth years. It seems as though
that when anxiety was reported to be higher, so too did the chance of being on-time increased. All of these results held true regardless of ethnicity.

In our final set of analyses, the possibility that psychological distress played a mediational role between medical school stress and graduation status was explored separately for the two ethnic groups. No evidence of a mediating relationship was found for the majority group. Instead, medical stress showed direct effects to both graduation status and psychological distress. For minority students, however, psychological distress appeared to mediate a marginally significant amount of variance between medical school stress and graduation status.

The results of the present study can be understood in light of the previous research in this area. Similar to the findings of Jay and D'Augelli (1991) and Hershberger and D'Augelli (1992), the current study did not find evidence for social support as a key factor in academic success for minority or majority students. Mallinckrodt (1988), however, did find ethnic differences in the relationship of social support to academic success. Specifically, he found that for African-American students, the quality and availability of friendships at school was more important in terms of success, whereas for White students he found that support from family was most important.

The null findings of past research and the current study,
at first seem to contradict Tinto's (1975) theory that academic and social integration are key concepts in understanding the process of drop-out from higher education. Perhaps, however, social support from peers and relatives is not equivalent to being socially integrated. For the purposes of measuring social integration, a broader measure of social support might specifically address the degree to which students felt supported by the academic institution as a whole (e.g., from faculty and administration to classmates).

Future research should include a social support dimension which allows students to comment on the extent to which others are supportive of their academic pursuits in particular. This is especially important considering the fact that past research (e.g., Rospenda, Halpert, & Richman, 1994) has shown that for some students, social support was associated with lower academic performance. The assumption that a student's support network is encouraging of his or her academic life apparently cannot be made without empirical justification. An added dimension such as this could be especially relevant when studying students of various ethnic and cultural backgrounds.

Other authors, such as Nettles (1986), have stressed the importance of measuring whether or not there is a "good fit" between the institution and the individual. Future research should measure the extent to which the personal and cultural values of the individual and institution are concordant or discordant. Scott's (1986) work, for example, demonstrated
that for Native American students', the degree to which they were committed to majority values was predictive of their academic success.

Related to this, students’ feelings about leaving medical school should be assessed in future research. It could be that leaving medical school is a decision with which certain students are content. In past research and the current study, there is an assumption, which is perhaps unwarranted, that retention is something to strive for in all cases.

Another fact that could have accounted for the lack of a significant relationship between social support, ethnicity, and academic progress in both the current study and past research, is that gender differences were not explored. Pascarella (1985) found that social integration into the university setting was especially important for the academic success of African-American male students. Utilizing the same data set as the current study, Rospenda, Halpert, and Richman (1994) found evidence for gender differences in the relationship between social support and academic outcomes. In the present study, it was not possible to break the sample down by gender, in addition to the partitioning which was made according to ethnicity and graduation status, because of the small cell sizes which would have resulted. Clearly, future research in the area of social support, ethnicity, and academic success should take into account the role of gender as well.
Other ways in which future research could be improved over past research and the current study include, as Tinto (1975) suggested, the understanding of qualitatively different types of leaving behavior (e.g., dismissal versus voluntary withdrawal versus temporary leave). In the current study, this was not possible because of the small number of student who fell into each of those groups. In addition, it could be important to break the sample down according to different ethnic groups. In the current study, we did not necessarily assume that the experience of African-American and Latino students was the same, but rather had to group minority students together in order to increase cell size.

Thus, because of the small sample size, there was considerable variability within the four groups used for statistical analyses, not only in type of leaving behavior and ethnicity, but also in terms of socio-economic status. The use of a larger sample in future research would circumvent the problem of heterogeneity within groups and would allow for more fine grained analyses to be conducted.

Future research should also take into account cultural differences. For example, in the current study, psychological distress was assessed through students' reports of depressive and anxious symptomatology. It could be that students from different cultural backgrounds have different ways of expressing psychological distress, such as through the use of alcohol or by manifesting other psychological symptoms (e.g.,
Finally, future research should include a measure of previous academic performance. That the inclusion of this variable is critical in order to truly understand the factors which lead to academic outcomes has been strongly suggested in the literature (Nettles, 1986; Tinto, 1975; Tracey & Sedlacek, 1985). Although an attempt was made to do this for the current study, such academic records were not available.

In the end, the present study found that overall, minority students, regardless, of their graduation status, were doing the same if not better than majority students in terms of psychological and interpersonal outcomes. More surprising were the findings that, in some cases, the minority students whose graduation status was classified as "not-on-time", were doing better than all other students. How can these findings be interpreted? Perhaps one way of looking at these outcomes is in an absolute and not a relative sense. In other words, just because minority students did better than majority students does not mean they were doing well. Perhaps all students, majority and minority alike, suffer in some way from the experience of medical school. Only relative to each other do they look as though they are doing better or worse. But, on an absolute scale of, for example depression, perhaps none were doing well.

In addition, although the minority students did not appear to be doing any worse than majority students
interpersonally or psychologically, they were in fact, more likely to be classified as "not-on-time" (35% versus 24%). Although the difference was not statistically significant, it did seem clinically significant. It is still of concern why this high rate occurred for both groups of students. Perhaps had some of the measures of social integration and value congruence been included in the current study, insight would have been gained. Future research which incorporates some of the suggestions listed so far can hopefully come to a greater understanding of what leads students to voluntary withdrawal, dismissal, and delayed graduation from medical school. Then, perhaps, the "preventive and therapeutic promise through environmental change" (Heller & Swindle, 1983, p. 88) can be realized as medical schools utilize information regarding social support and social integration to create institutions more conducive to psychological and academic well-being for students of all backgrounds.
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VITA

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The thesis is, therefore, accepted in partial fulfillment of the requirements for the degree of Master of Arts.

3/28/95
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