

WHY SO WHITE? A PILOT STUDY OF THE SOCIOCULTURAL FACTORS
AFFECTING THE UNDERREPRESENTATION OF AFRICAN AMERICANS IN
VETERINARY MEDICINE

A Dissertation

by

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ABSTRACT

By surveying students and veterinarians at three selected colleges of veterinary medicine (CVM) in the United States, this project investigated the sociocultural conditions that affect the persistent underrepresentation of Blacks in the fields of veterinary medicine. A pilot study was conducted to examine survey participants' attitudes and individual characteristics, including family background, educational experiences, and mentor relationships that might have contributed to their academic and career decisions. Additionally, as a cultural text, the survey instrument was designed as a lens to view participants' social and personal beliefs informing their gender and racial identities.

Because this study was exploratory, quantitative techniques were included that allowed for abductive, counter-factual inferences based on statistical findings. Eighty-nine participants (faculty and practicing veterinarians and veterinary graduate students) were selected from three independent CVMs: one in Texas, one in Alabama (a historically African-American university), and one in Indiana. The survey instruments comprised 128 questions. Group comparisons, Chi-square contingency tables analyses, multiple and logistic regression, and exploratory factor analyses were computed to identify sociocultural spaces and fields of experience that led to careers in veterinary medicine. The findings demonstrated that Blacks and ethnoracial groups' limited access and development of human capital resources disadvantaged their recruitment and retention in the fields of veterinary medicine in the United States.

DEDICATION

I am forever grateful to my late grandparents, Esther Alexander and Willie Vecino, for their love and support that has comforted me throughout my life's journeys. Anything I have accomplished was because of their unquestioning belief in my abilities to succeed. I learned compassion and empathy for others by their example; I learned how to love from their unselfish caring for all who fell under their gaze. I miss them every day and pray this effort demonstrates a small part of my lasting commitment to their memories.

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All work for the dissertation was completed by Billy Ray Brocato, under the advisement of Dr. William A. McIntosh of the Department of Sociology.

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CHAPTER I
PREFACE AND INTRODUCTION

Preface

The purpose of this dissertation project is to address a significant gap in the scholarly literature regarding the underrepresentation of ethnic minorities and Blacks in the fields of veterinary medicine. Because race, social class, gender identities, and sexuality intersect at the individual and institutional levels, a critical cultural method was used to examine the autonomous and heteronomous structures informing survey participants' everyday social practices. The chapters of this dissertation were organized to set out and describe the intersection of culture, structure, and agency and its consequent effects that contributed to and sustained racial inequality in the United States in general, and in the fields of veterinary medicine specifically. Additionally, counterfactual analyses were incorporated to augment empirical findings to make transparent the effects of everyday social practices on groups' interactions.

Chapter One provides readers a general summary of the research project (preface) and an introduction to an extensive review of scholarly research outlining the human, social, cultural, and racial capital formations contributing to study participants' beliefs and attitudes regarding the veterinary fields and the underrepresentation of blacks in veterinary medicine. General descriptions of the historical underrepresentation of minorities in the field of veterinary medicine in the United States is also provided,

followed by a summary of the project's general research question, including a brief outline of the study sampling methodology.

Chapter Two provides a closer examination of the project's research purpose, including summaries of social research that has analyzed future workforce shortages in the veterinary profession's companion and large animal practices. Additionally, the chapter discusses the paucity of explanatory research and a significant lack of descriptive research that investigates the underrepresentation of Blacks, Latinos, and other ethnic groups in the veterinary medical profession. The chapter concludes with a brief discussion of sociocultural stratification theories that have previously investigated institutional racism in the United States and how this framework was incorporated in this project.

Chapter Three is a comprehensive literature review of investigations into educational and occupational marginalization of minorities in the fields of veterinary practice and research; including cautionary remarks that without increased minority recruitment, the country's food security is endangered. Specifically, the literature reviewed acknowledges the need to increase ethnic minorities' workforce participation based on two key critical issues: first, in the near term, the veterinary medical and research fields are facing a shifting population demographic that challenges the country's companion and animal food production systems as baby boomers retire. Secondly, as the world's population continues to expand, food security – the safe

production, packaging, and consumption of food products – is of paramount national importance to the country’s economy and global security.

For example, a lack of public investment, recruitment, and training in those fields of veterinary medicine and research would critically undermine a country’s ability to discover and track pathogens in the animal food chain. This includes providing human capital and public-private funding for the necessary care of animal livestock raised for consumption and the care of companion animals that share close living spaces with humans. As a global phenomenon, food security would be severely affected by the steady increase in the world population, effectively increasing demand on countries’ food production systems.

Chapter Four examines the structural and cultural conditions most often cited in the research literature that leads public school students to pursue science, technology, engineering, and mathematics (STEM) coursework in preparation for college. Additionally, the chapter discusses the long-term, national research that has identified the marginalization of minority students’ opportunities to become prepared for STEM-related course offerings. Specifically, areas of marginalization are examined for possible embedded social inequalities that negatively affect African American students’ participation in science-related courses from middle school through their undergraduate education in general and exposure to agricultural science courses, specifically.

Chapter Five is an integrative literature review of the theoretical and empirical studies that describe agents’ socio-cognitive heuristics affecting their decision-making

and social attainment within society. This is an important theory-methods integrative step because contemporary research has documented correlations between racial and ethnic discrimination and marginalized occupational participation by minority groups, i.e., forms of stratification, but has left gaps in the literature regarding the underrepresentation of minorities in the fields of veterinary medicine. The section posits a framework to investigate the relative weighting of structural and cultural factors that marginalize ethnic minorities' human, social, cultural, and racial capital and subsequent effects on minority participation in the veterinary medical fields.

Chapter Six extends the conceptual findings of Chapter 5 by integrating theories of stratification, human, social, cultural, and racial capital formations, self-identity formation, and self-attainment models to investigate the intersectional consequences of micro- and macro- conditions that structure individuals within fields of social interaction. The chapter also presents three key theoretical propositions that guide the project's investigation into the relational social networks, affect-control, and self-referent behaviors, including those factors that objectify the disproportionality of minorities' entrance into STEM preparation and consequently, pathways to veterinary medical fields of study.

Chapter Seven presents stages in the survey data analyses and findings, including survey instrument design and sampling techniques. Specifically, the chapter identifies significant socio-ecological variables that veterinarians and CVM students report contributed to their decision to enter veterinary medicine (termed capital matrix by the

author). Survey participants' attitudes regarding institutional racism and sexism in the veterinary profession were also examined by race and gender. To accomplish the data analyses, contingency tables were constructed and a chi-square and Fisher's Exact tests of independence was performed to identify differences between selected groups.

Additionally, logistic regression was used to examine nominal variable (gender or race) slopes on the category responses from the survey sample. A log transformation computation followed to obtain odds ratio for the gender and race variation for specified survey question responses. In the study, my goal was to find the predictive probability of the nominal variable's association with the measurement variable; i.e., whether yes and no responses to survey questions (measurement variable) differed by gender identity and/or race. A simple logistic regression model allowed identifying an equation that best predicted the value of the dependent variable for each value of the independent variable. What makes logistic regression different from linear regression is that you do not measure the dependent variable directly. The result instead provided a probability indication of obtaining a particular value of a nominal variable.

Chapter Eight provides data analyses including data results tables, and discussion of statistical significance and findings. The findings indicated that sampled groups' responses confirmed earlier research that identified significant sociocultural factors contributing to individuals' life courses and ultimately their decision to enter the fields of veterinary medicine. Additionally, a counter-factual analysis and discussion followed to offer additional explanations due to the contextual influences on participants'

background characteristics embedded in the sociocultural matrix bounded by institutional racism.

The project's conclusion is presented in Chapter 9, and offers a comprehensive review of the inductive techniques, findings, and remedial actions that would address the persistent underrepresentation of minorities in the fields of veterinary medicine and research. The study's general findings suggested meeting the United States' future food production and consumer safety needs would require substantive efforts to develop and expand public education initiatives to bolster black students' participation in middle school and high school STEM-preparatory course, including expanding agricultural sciences course offerings at urban schools.

This remedial step could ignite a re-investment strategy in U.S. public schools systems at the national, state, and local levels that have large populations of underserved majority and minority students. Without additional public school course offerings in agriculture sciences and remedial STEM-preparation courses at the middle and high school levels, it is probable that the underrepresentation of poor majority and minority students in the veterinary medical and research fields would continue with deleterious consequences for the country's social and economic wellbeing.

Finally, expanded mentoring programs within discrete geographic locations to ensure that disproportionately marginalized minority students are provided the resources and opportunities to develop mentor or role model relationships with representatives from the various agriculture science and veterinary career fields is recommended.

Chapter 10 discusses the limitations of the project's findings and offers suggestions for future research to extend the findings and identify those variables that offer a more comprehensive predictive model for policymakers use in their efforts to address the country's food security needs.

Introduction

The purpose of this dissertation project is to address a significant gap in the scholarly literature regarding the effect of sociocultural factors on the underrepresentation of African Americans in the fields of veterinary medicine. Because race, social class, gender identities, and sexuality intersect at the individual and institutional levels, a critical cultural sociology¹ framework was proposed to investigate the autonomous and heteronomous structures informing survey participants' everyday social values and practices (Patterson and Fosse 2016). Because cultural sociology "is both reflexive and diagnostic", as a study framework, it provides a view into the nuanced factors that unconsciously inform individuals' practices in contrast to a sociology of culture "in which culture is a feeble and ambivalent variable" (Alexander 2003:12-13).

As a method, cultural sociology is like a jazz musician's interpretation of spontaneous notes affixed to a rhythmic thread that brings meaning, purpose, and practice to the musician and listener's experience. This is in stark contrast to sociology

¹ I define cultural sociology according to Alexander's (2003:4) description that, "Cultural sociology is a kind of social psychoanalysis. Its goal is to bring the social unconscious up for view. To reveal to men and women the *myths that think them* so that they can make new myths in turn" (italics added for emphasis). In this sense, a cultural sociology relies on a hermeneutical approach to Weber's *verstehen*—to understand by getting at the meaning that lies behind a symbol's façade.

of culture theorists, who like a symphony player or composer recognize that a composition has multiple distinct sections or movements, but hear only the consonance of the string, brass, woodwind, and percussion instruments; finding fault with the spontaneity of dissonance on the part of musicians and listeners. A cultural sociologist ‘hears’ the practical sounds emerging from an intersection of diverse symbols, structures, and agential forms; a musical ear that exposes the tones that represent the granular events of sociocultural formations² that create, contribute, sustain, and recreate everyday practices over time.

A cultural sociology then is necessary to comprehend and explain the ignored or dissonant meanings behind the long documented results of socioeconomic inequality and symbolic assaults on marginalized groups in the United States (Du Bois 1903/2014; Barth 1969; Katznelson 2005; Massey 2007; Newman 2007; Feagin 2013; Royce 2015; Bonsu 2017)³. Because cultural forms affix values and meanings to the structures of disadvantage—through symbolic violence—affecting social status among minority groups in U.S. society, it is necessary to interrogate and clarify individuals’ and groups’

² I use the terms sociocultural, sociocultural formations, and sociocultural structures interchangeably in this manuscript to denote an intersecting and dynamic space of “high culture” whereby “attitudes, preferences, formal knowledge, behaviors, goods and credentials” become repertoires of social and cultural exchanges transmitted from early childhood (Lamont and Lareau 1988:156).

³ A consequence of historical marginalization through institutions in the United States is often referred to as structural racism; the outcome of history, culture, the public sphere, institutional practices, and beliefs held by individuals that foster a racial hierarchy. For the most horrific acts of racial hierarchy in the United States, see the Equal Justice Initiative’s report (2017), “Lynching in America: Confronting the Legacy of Racial Terror” that details public acts of racial terrorism, including the murder of African American men, women, and children due to institutional racism. It should be noted that racial terror also persists as symbolic violence since the physical acts linger in the memories of affected generations through stories, pictures, and legitimized symbols such as confederate flags, statues of confederate leaders, and slave owners.

experience of these symbolic forms (Lamont and Lareau 1988). For example, Dubin (1987:123) has shown the negative and stereotypical representations that these signifiers of social meanings have on African Americans as persistent acts of symbolic violence.

Other research has examined institutional structures as places of racial domination, but few studies have set out to investigate the ‘differential affect’ White culture⁴ in the United States has had on the underrepresentation of minorities (URM) in the fields of veterinary medicine (Desmond and Emirbayer 2012). To that end, an empirically driven cultural sociology expands the under-studied cultural meanings embedded in contemporary ideals that inform social class, race, gender relations, sexuality, and occupational spaces such as veterinary careers in the United States.

The project takes a critical perspective as its starting point and defines race, not as a biological entity⁵; instead, race is an effect of racialized ‘cultural’ fields, socially constructed, symbolic formations affecting the framing of different groups’ racial identities⁶. Racial identities emerge because of ‘institutionally affixed’ social constructs that stratify individuals as they compete for economic, social, cultural, human, and racial

⁴ White culture is defined as “the dominant, unquestioned standards of behavior and ways of functioning embodied by the vast majority of institutions in the United States” (Gulati-Parte and Potapchuk 2014:27). White culture is an immaterial social phenomenon with coercive force because it implicitly values practices that are more familiar and come more naturally from a white, European tradition that has long devalued other ethnoracial groups.

⁵ Race, as defined in the text was drawn from the work of Desmond and Emirbayer (2009): “We define race as a symbolic category, based on phenotype or ancestry and constructed according to specific social and historical contexts that is misrecognized as a natural category.”

⁶ It is important to note here that the use of culture or cultural frames refer to ‘situated’ repertoires of symbolic and material goods that are sui generis to an individual’s birth that emerge from material conditions and learned ritualized practices (Durkheim 1912/1965; Weber 1905/2014; Marx 1867/1976; Bourdieu and Passeron 1977; Swidler 1986; McGuigan 2014).

capital resources (Ritzer and Stepnisky 2018). Defining race within a macro/micro sociocultural framework would provide transparency into the effects of institutional structures and the cultural conditions informing group values and identities over time (Durkheim 1893/1984; Weber 2001).

This framework is represented in solicited personal interviews from practicing veterinarians in the cities of Huntsville, College Station, Houston, and Beaumont, Texas. Survey questionnaires were made available to college of veterinary medicine graduate students and faculty over a two-year period at three colleges of veterinary medicine in Texas, Alabama, and Indiana. The micro-level analyses are derived from the study's participants responses to questions about their family ties, agricultural-related mentors, school experiences, and personal attitudes regarding race and sexual orientation as they moved from middle school through high school to university settings in pursuit of a career in veterinary medicine (Serpell 2005; Jelinski et al. 2008).

The survey instrument's questions asked White and Black practicing veterinarians and CVM students and faculty to describe their ecological, human-social-cultural capital assets, and sociocultural experiences that influenced their decisions to become veterinarians. This approach followed Bourdieu's oeuvre that was grounded in middle range approaches to empirical research that integrates qualitative and quantitative methods. The sample frames were designated CVMs in Texas, Alabama (historically

African-American university⁷), and Indiana; the sampling units comprised tenured faculty veterinarians and veterinary graduate students.

Eighty-nine anonymous survey participants (76 percent) of 117 were selected based on their having completed at least 75 percent of the 128-item questionnaires. There were no benefits offered to individuals solicited to participate in the research survey. An arbitrary cut-off was established at a 75 percent completion rate of the survey questions for inclusion in the data analyses. This seemed a reasonable assumption to ensure a more robust estimation to study for respondent characteristics. The findings provided a novel micro-level evaluative tool of minority participation in the fields of veterinary practice as well as white males and females cultural racial formations.

The dissertation's research question is divided along four cultural axes of importance: First, what are the relational interdependencies among key sociocultural factors found in particular community fields of interaction (ecological, i.e., urban and rural) that drive students' academic choices given the interplay of cognition and socioeconomic context on identity formation (Sampson 2013). Second, what are the relative weightings of the sociocultural factors associated with students' willingness to seek training in a science-related field of study? Third, as a profession, what are the distinct cultural ideals held by practicing veterinarians and CVM students that contribute

⁷ Tuskegee's CVM is a historically black accredited college that has offered doctoral degrees in veterinary medicine, and has graduated more than 75 percent of the African-American veterinarians worldwide (Tuskegee 2017).

to institutional biases such as racism and sexism that act as structural barriers and impede recruitment of minority students?

Finally, the project framework asked what legitimate sociocultural factors, i.e., institutional formations, including ideological belief systems (morals) embedded in dominant White cultural frames have upheld the differential and unequal treatment of non-Whites in the United States racial hierarchy (Span 2015). This is an important consideration given the recent alliances between the natural sciences and social science to examine and explain the epidemic in childhood obesity, persistent economic, racial, and ethnic disparities in healthcare termed the “millennial morbidities” (Shonkoff and Garner 2012:e233).

Although discussion of the data analyses relies on inferential standards, the data sets were also examined through an abductive approach that best fits a cultural sociology frame. An abductive process in comparison to an inductive method, allowed exploration of *as-yet* unconsidered empirical peculiarities and antinomies found in White cultural frames (Tavory and Timmermans 2014). This is important for two scientific reasons. First, today’s neoconservative project has been critiqued for fostering a ‘post-racial’, nonracist, or ‘color-blind’ normative frame that makes opaque the non-randomness of today’s culturally-informed racial inequalities. Second, research into the underrepresentation of minorities in veterinary medicine have been silent as to the effect

of cultural forms and meanings on racism that have reproduced structural opportunities⁸ related to the recruitment and retention of Blacks and minorities into the veterinary profession (Roediger 2007; Pager 2008; Bonilla-Silva 2014).

⁸ Throughout this manuscript, I use 'structural barriers' and 'structural opportunities' interchangeably to overcome Giddens (1984) critique of Durkheim's influence on structure as a constraining force over time. This follows Blau's (1994) understanding that structures are opportunistic, but distributed according to individuals' social positions.

CHAPTER II

RESEARCH PURPOSE

Given that greater social inequality was observed in ethnic minority populations, this project investigates how sociocultural factors affect the African American community's veterinary occupational opportunities, i.e., the effect of "allocative discrimination" on their employment chances in the fields of veterinary medicine (Peterson and Morgan 1995:330). How do the differences in social forces mark racial inequality in occupations generally, and how are these factors similar or dissimilar for Black students' entry into the medical treatment, research, and teaching fields of veterinary medicine. The significance of racism and sexism as contributing factors to the underrepresentation of the Blacks in the veterinary fields is an understudied phenomenon (see a systematic review of the veterinary workforce and college recruitment literature described in Table 2).

I have incorporated past research that examined the minority recruitment challenges for colleges of veterinary medicine (Russell and Erickson 2012). I ask how interpersonal relations, family history (including occupations), educational opportunities, neighborhood characteristics, professional mentor relations, and exposure to agricultural sciences classes affected recruitment and career decisions of whites and blacks currently attending colleges of veterinary medicine or currently serving as faculty.

Diversifying the Veterinarian Workforce

Generally, veterinary medical journals have published research that discussed student recruitment and retention rates that peripherally indicated structural and cultural conditions (Kearney 2006) related to school “selection procedures” (Ilgen et al. 2003:1591). However, a majority of CVM recruitment and workforce studies have underestimated or left unaddressed systemic racial discrimination as a contributing factor affecting Blacks and Latinos entrance into the veterinary profession (Ceci, Williams, and Barnett 2009; Willis et al. 2007).

As Rose (2015) reported following conversations with faculty at a predominantly white veterinary college of medicine, the low recruitment rates of Blacks and Latinos was explained by faculty who effectively ‘blamed’ minority students for self-selecting out of the profession’s substantively different cultural framework. Additionally, in my initial preparations for this project, I had conversations with practicing large animal and companion animal veterinarians in two rural and two metropolitan cities.

When I asked them why they thought Blacks and Latinos were underrepresented in the profession, I was provided consistent ‘anti-racist’ stereotypes as in Bonilla-Silva’s (2014) study of color-blind racism. In our conversations, veterinarians attributed minority underrepresentation to their urban upbringing, their poverty status, which excluded families from those who had discretionary incomes to care properly for companion animals, a general fear of dogs and large animals, and less attraction to work

in a field with low starting salaries. Interestingly, the U.S. Department of Labor's Bureau of Labor Statistics (2017) reported median annual salary for veterinarians at \$100,000.

Similarly, when asked about the underrepresentation of females in large animal practices such as caring for cattle or working for feedlot cooperatives, cultural forms of gender discrimination statements such as 'women could not handle' such large animals because of the physical requirements were used as justification. When pressed on these stereotypical conceptions by asking additionally why women overwhelmingly ended up in the fields of equine care where caring for horses could be much more physically challenging and dangerous than cattle, my veterinarian informants abruptly dropped our conversations.

The normative acceptance of cultural forms of racism and gender bias has persisted within contemporary institutions is an understudied phenomenon in the veterinary profession. Interestingly, a colloquium sponsored by the National Academy of Engineering (2010) formed panels to discuss expanding studies of racial discrimination and institutional linkages to explain the underrepresentation of minority groups in the natural sciences (Didion, Fortenberry, and Cady 2012). The NAE panel's discussants provided various theoretical frameworks meant to identify potential remedial actions to increase minority representation. In each case, panels acknowledged the importance of measuring social and cultural influences – the social contexts that construct and inform “an individual's social and cultural competencies (e.g., one's identity, race and

ethnicity⁹, and social status” (Didion et al. 2012:17; Epps, Cureton-Russell, and Kitzman 1993).

The research studies reviewed for this project have documented national and state level veterinary occupational ethnic diversity issues. However, these studies have only provided descriptive data referring to white males and females with few specifically investigating institutional inequality in CVM recruitment of minorities (see Tomlin et al. 2010; Villarroel et al. 2010; Lenarduzzi et al. 2009; Jelinski et al. 2008; Heath, Baguley, and Abbott 2006; Tyler and Larson 2006; Serpell 2005; Elmore 2003).

Moving Forward: Structure, Culture, and Agency

The research literature has documented that subfields in the veterinarian profession were more likely to demonstrate racial and gender inequalities compared to other health fields. This provided a strong rationale for examining the structural and cultural contexts that fostered barriers to minority students’ educational and occupational stratification in the field of veterinary medicine; i.e., those social positions that informed their exchanges as subordinate groups¹⁰ (Lowrie et al. 2013; Blumer 1969). Specifically, there is a need to address the formation, sustainability, and effect of social stratification

⁹ Due to resource restrictions and sampling costs, this project focuses exclusively on racial classifications and does not attempt to classify according to ethnic distinctions for Whites, Blacks, Native Americans, Hispanic, or Asian groups.

¹⁰ See Grodsky and Pager 2001:543, and Anderson and Roscigno 1995, on the interaction effects of race and occupational position associated with social stratification. From a micro-sociological or symbolic interactionist perspective, individual agency then develops by “linking social perception with identity, behavior, and emotion in interpersonal interaction”, referred to as “Affect Control Theory” in the social psychology literature (Rogers, Schroeder, and Scholl 2013:128). The symbolic interactionist perspective posits that “meaning” emerges “in the process of interaction between people” (Blumer 1969:4). Examining the micro-level processes provides insight into the reflexive and non-reflexive acts that agents require to make sense of their world.

on middle and high school student communities as cultural locations “that exist in space and that have [their own] social relations” (Fine 2010:357).

Understanding cultural capital, community/neighborhood spaces, and institutional assimilation among different groups (Iceland and Wilkes 2006), and then groups’ differential access to resources is critical to gaining an accurate explanatory metric to ensure a multicultural workforce across the veterinary medical fields (Lowrie et al. 2013; Willis et al. 2007; Adelman 2005). For example, Byars-Winston (2010:444) writes, “culture informs self-construals, like self-concept, which include cognitive, affective, and behavioral dimensions”; these are important distinctions to make “because racial and ethnic identities represent two types of cultural identity”. Analysis of these identities reveals how they are both products of “assignment (by others or society in general) and assertion (by the individuals within the group)”.

Without a clear map of the mediating effects of culture (Swidler 1986), there is an opaqueness to independent variables studied. Thus, scholarly research into the underrepresentation of minorities requires a cultural understanding of significant empirical data points that have had historically a largely negative effect on Blacks and brown-skinned groups’ opportunity structures within a White dominant cultural system.

Anderson and Kim’s (2006) study on racial minorities in the sciences, technology, engineering, and mathematical fields have confirmed that minority students’ academic success was linked to a student’s economic status, culture, and educational resources. Harmon’s (2000) study of students’ educational achievement and teachers’

skills found a significant negative correlation as teachers with less experience and training more often taught minorities. This is evident considering Rothstein's (2017) recent report that nearly 50 percent of all black students attend segregated public and private schools and 70 percent of black students attend schools in high-poverty school districts; with New York considered the most segregated state for schools.

Social and Ecological Inequalities

Critical of a lack of research into the underrepresentation of ethnic groups in the veterinarian profession, Elmore (2003) pointed out that minority participation rates were anecdotal at best because research ostensibly ignored ethnic minority graduation rates. However, extrapolating from available data nearly a decade earlier than the research previously mentioned, Elmore estimated that White CVM graduation rates at 91 percent, Hispanics at less than 5 percent, and African-American at less than 1 percent. He wrote that the findings significantly contrasted with other medical health field graduates' participation rates where African-American made up 58 percent and Latinos 59 percent—a finding that highlights a significant disjuncture between minority participation rates in other medical and science fields and veterinary medicine.

Similarly, in a recent census, the Texas State Department of Health Services (2015) showed that veterinarian graduation rates in Texas for 2004 and 2009 nearly mirrored Elmore's findings of a substantial underrepresentation of minorities in the veterinary medical and research fields. Specifically, Whites made up 92.5 percent and 91.3 percent of CVM graduates in 2004 and 2009, respectively. In contrast, Blacks

demonstrated a slight increase as a percent of total graduates from 2.0 percent in 2004 to 2.5 percent in 2009. Latinos did not improve significantly either, with CVM graduation rates at 2.8 percent increasing to 3.2 percent, respectively.

The research literature documents the deleterious consequences associated with disadvantaged urban settings for individuals living in segregated neighborhoods—formerly referred to as “social area analysis” (Poplin 1979:114)—throughout the country’s major metropolitan centers (Allen 2013). Studies have aptly described how neighborhood (urban, suburban, and rural) stratification contributes to racial segregation, significant instances of poverty, crime, poor health access, lack of civic political participation, social mobility, and increased social risks for youth (Day 2006; Morando 2013; Papachristos, Hureau, and Braga 2013; Quillian 2012; Peterson and Krivo 2005; Adelman 2002; Gandara 2002).

Additionally, researchers have long recognized that social and cultural factors such as minorities’ participation rates in the elementary and secondary schools indicate underlying social inequality barriers that lead to social identity issues (Vigdor 2013; Brewer 2010). Ecologically, structural barriers have minimized ethnic minorities’ integration into mainstream society (McKenzie 2013). For example, Moody (2004) reported that minorities’ educational success in mathematics was an outcome of their socio-normative perspective, how they “view and ascribe meaning to the world around them and how these orientations influence” their decision to commit to a specific subject of study.

Saint Onge and Krueger (2011) have also written that different educational experiences by ethnic group could reinforce significant health disadvantages by undermining acceptance of professional advice offered by perceived dominant groups. They recommended that public health interventionists “might balance” promoting various strategies by recognizing the social inequities that are part of minority group’s homophily (2011:209). Additionally, McPherson, Smith-Lovin, and Cook (2001:415) have written, “Homophily in race and ethnicity creates the strongest divides in our personal environments, with age, religion, education, occupation, and gender following in roughly that order”.

Similarly, Iceland and Wilkes (2006) compared two theoretical models of residential segregation – spatial assimilation and place segregation – for all U.S. metropolitan areas for the period 1990 to 2000 for Black, Whites, Hispanics, and Asians. The spatial assimilation model predicts racial and ethnic segregation based on socioeconomic status (SES). The place segregation perspective emphasizes cultural effects such as prejudice and discrimination as more likely to explain residential patterns. The authors found that upper SES racial and ethnic groups were less segregated, confirming the spatial assimilation model. However, place stratification demonstrated that Blacks at each SES level remained significantly segregated from Whites compared to the other groups; documenting that socioeconomic resources and cultural orientations were important dimensions affecting neighborhood formations and social interactions.

Roscigno, Tomaskovic-Devey, and Martha Crowley (2006) and Ingoldsby and Shaw (2002) have shown that place of residence as spaces of cultural diffusion provide a framework that shapes group identity and group affiliation linkages. Schmid and Hewstone (2010:300) reported that substantial evidence validates that increased interpersonal contact and the quality of that interaction, “determines the extent to which contact positively affects outgroup attitudes”. Other studies revealed social stratification effects on group identity and group behaviors holds explanatory power in addressing the occupational barriers emerging from race-based and social class group membership (Villarroel et al. 2010; Lenarduzzi, Sheppard and Slater 2009; Jelinski et al., 2008; Sterner 2006).

Strayhorn’s (2009) research on racial inequality in the field of veterinary medicine further discussed the effects of sociocultural factors and institutional racism on Black male attendance at elementary and secondary schools. He reported that Blacks school attendance was as low as nine percent compared to a total black male population of 48 percent. Pointing to a single social fact, Strayhorn (2009:351) reported that African-American male students accounted for the largest proportion of school suspensions although they “represent a relatively small proportion of the total student population”. Strayhorn’s findings demonstrated the unlikely probability that the marginalization of black students is a random event. Instead, his findings elucidated the force of covert cultural discrimination affecting minority students’ lives.

Other research demonstrated that a lack of role models¹¹, diminished interest in veterinary medicine due to limited personal knowledge, faulty social perceptions, and a lack of personal encounters with veterinary professionals were cumulative factors that affected entry into the profession across all student groups, including ethnic minorities (Asare 2007). For example, Kerbo (2012) and Crisp (2010) have provided detailed analyses and reviews of the various theoretical underpinnings of stratification, social identity formation, and its consequences for minority or disadvantaged groups; but left cultural interpretations aside.

Whether a less than proportionate participation rate could be the result of random occupational selection by qualified applicants or is due to structural conditions that exclude participation of specific groups requires expanded empirical observations; in particular, identifying how and why underrepresented minorities remains an unexplained issue in the field of veterinary medicine (Voigt 2007).

The Need for Informed Social Science

Thus far, the research literature examining the underrepresentation of minorities in the fields of veterinary medicine has been descriptive and anecdotal at best. More specifically, there is a need to fill a gap on the scholarly literature regarding the structural and cultural barriers affecting minority groups' entry into the field of veterinary medicine. Current research has provided correlations among salient college of

¹¹ The importance of role models cannot be emphasized enough in the acquisition of social and cultural capital. This is no more evident than was shown in a National Academies of Sciences, Engineering, and Medicine (2017) workshop that explored methods for bolstering students' recruitment and retention into science and medical fields through competent mentor relationships.

veterinary students attitudes (Heath et al. 2006), their curricula track selections (Chigerwe, Boudreaux, and Ilkiw 2010), and their socioeconomic backgrounds (Jelinski et al. 2008; Lareau 2003). However, these studies have not provided a critical framework to investigate racial inequalities or the cultural forms upholding and contributing to Blacks' underrepresentation into the veterinarian profession.

For example, as Grodsky, Warren, and Felts (2008) argued, correlational studies alone do not explain the interaction effects of manifest or latent institutional forces – structural and cultural (exogenous) factors. In this study, statistical tests were used to identify sociocultural factors that minimize minority groups' participation and foster gender and racial imbalances (endogenous variables) in the field of veterinary medicine. Hence, a multivariate approach that examines group differences by race, gender, educational opportunity, and socioeconomic status was proposed.

CHAPTER III

RESEARCH BACKGROUND

The Growing Importance of Ethnic Diversity

The Roadmap for Veterinary Medical Education in the 21st Century: Responsive, Collaborative, Flexible report by the North American Veterinary Medical Education Consortium (NAVMEC) (2011) highlighted a new crisis affecting colleges and universities of veterinary medicine that has not been documented since before World War II. Primarily, the crisis has occurred as the encroachment of neoliberal policies in the public sectors have worked to decrease State legislatures investments in college funding over the past few years, resulting in new forms of competition and contestation among post-secondary institutions (Saunders 2015).

Consequently, colleges of veterinary medicine (CVM) have reduced administrative staffs, faculty, and eliminated substantive programs in the veterinary medical and research fields. To mitigate the financial and material deficits, CVMs have had to increase tuition costs and bolster their recruitment efforts. However, the result has been to attract students who have access to some financial resources who can handle upon graduation additional student loan debt. The authors of the report stated, “This approach stems the tide (of declining economic resources) but also contributes to student debt load. The result is an unprecedented erosion of funds that seriously threatens the ‘gold standard of veterinary education’” (NAVMEC 2011:1).

Historically, a symbiotic relationship between humans and animal populations has evolved with the practice of veterinary medicine. In the mid-20th century, the typical veterinary medical student was white having been raised in a rural community who planned to become a large animal veterinarian or mixed (companion and large animal) practitioner. Today's post-industrial societies are much different and have a more diverse U.S. population residing in urban and suburban settings.

To meet the food requirements of ever-expanding industrial populations at an affordable cost, industrial animal food production systems have been developed and consolidated on a global scale, effectively undermining small farmers and ranchers from available markets. Companion animals have moved from the rural, outdoor setting to the indoor apartment living of today's urban populations. "Diseases that transmit between animals and people have been on the rise, with the majority of human foodborne and other emerging infectious disease outbreaks of the past 20 years originating from animal sources of infection (NAVMEC 2011:11).

However, as previously mentioned, efforts to address these growing concerns have left out of the solution the positive long-term effect of increasing ethnic minority students into colleges of veterinary medicine could have on food security and the contribution that would be made at the gross domestic product level, including the societal benefits accrued. To examine these potential increases in social welfares provides a comprehensive investigatory framework that offers pathways to increased ethnic diversity in the veterinary medical and research fields.

Veterinarian Workforce Shortages: a Cautionary Tale

The National Research Council (2012) undertook a comprehensive examination of the workforce requirements of the U.S. veterinarian profession in 2007. The primary focus of the research project was to evaluate the profession's ability to meet society's current and future veterinarian assisted needs. Specifically, after the outbreak of "West Nile fever, SARS, monkeypox, bovine spongiform encephalopathy, highly pathogenic avian influenza, H1N1 influenza, and a variety of food safety and environmental issues", serious concerns were raised as to the profession's ability to cooperate in the protection of the nation's food supply, "including the American livestock and poultry industries" (p. ix).

The NRC's study demonstrated that for the profession to meet its social and national security responsibilities, there are at least two major organizational challenges and one significant methodological issue that the veterinary medical profession faced in the near term. First, current veterinarian medical recruitment and graduation rates ostensibly were not sufficient to meet a significant shortfall in replacement veterinarians in the large animal, food animal, and public health sectors (Jarman et al. 2011). Secondly, exploratory studies described factors associated with unsuccessful recruitment and graduation of veterinarians, but had not addressed the underrepresentation of minority groups and gender imbalances in the field of veterinary medicine.

Third, current studies lack explanatory power and the inferential tools necessary for policy evaluation purposes (see Greenhill et al.2013 and Amass et al. 2011;

Chigerwe et al. 2010; Chubin and Mohamed 2009; Asare 2007; Gwinner et al. 2006; Carbajal 2005). As Blustein (2006:174) argued, “The complications that has arisen in public policy and intellectual circles has to do with unpacking racism, sexism, and social class...Attempts to view race, social class, and gender without attention to their overlapping impact are unrealistic and obscure the reality of life in Western cultures”.

Recent scholarship in applied public policy has attempted to address a crisis in the industrial food and companion animal systems of care and production, but have not focused on those sociocultural factors that could bolster the recruitment of ethnic minority students into veterinary medicine given their historically underrepresented participation in the profession.

Some studies described the underrepresentation of minorities into the fields of veterinary medicine because of institutional discrimination in the United States (Strayhorn 2009). However, since the Civil Rights movement, other researchers have pointed out that as a profession, veterinarians and colleges of veterinary medicine have established offices of diversity and increased their recruitment of racial minority groups' entrance into the career field (Scott 2012). Regardless, Chubin and Mohamed's (2009) study of racial diversity in veterinary schools has documented little progress having been made with White students generally comprising 90 percent of CVM enrollments.

Further, most studies attempting to address the underrepresentation of minorities in veterinary medicine have not examined how or in what direction the relative variability among external factors (socio-ecological) have had on marginal participation

by minority members or the cumulative effect of racial discrimination in the United States (see the following descriptive studies: Peterson and Morgan 1995; Heath, Baguley, and Abbott 2006; Kearney 2006; Willis et al. 2007; Ceci, Williams, and Barnett 2009; Didion, Fortenberry, and Cady 2012).

Why Not Diversity?

The U.S. Census in 2000 reports 39 percent of people under age 18 in the country fall within ethnic or racial minority groups and this population sector will continue to increase in the coming years. In fact, researchers claimed that young minority group members could become the next generation to affect significantly the United States' efforts to successfully compete in a global economy, bolster the country's democratic ideals, and contribute to the country's domestic and foreign food security interests (Anderson and Kim 2006; Shonkoff and Garner 2012).

However, sociologists have long documented that a wide variety of discriminatory barriers in housing and education have systematically denied blacks access to the necessary social capital resources required to bolster marginalized groups social attainment (Fischer 2003; Huffman and Cohen 2004). For example, Fischer (2003:670) has pointed out "If minorities are disproportionately located in isolated, low-resource neighborhoods, and if living in these neighborhoods restricts access to opportunity, then it is easy to imagine how residential patterns might translate into group differences in success".

Sociologists have also documented that negative stereotypes, stigmatization, and socioeconomic class conflict have minimized Blacks and Latinos access to those collective public resources that could bolster their educational attainment and socioeconomic integration (Conley 1999; Baumle and Fossett 2005; Logan and Stults 2011; DiMaggio 2012; Pedulla 2014; Quillian 2012; 2014). Writing 15 years ago, Hagedorn and Tierney (2002:1) criticized American education policymakers, writing that a significant achievement gap in minority college recruitment, retention, and graduation rates in the United States was “objectionable” given the number of funded outreach programs that had failed to demonstrate significant improvements.

Kozol (2005) has also argued that too little educational funding has affected lower-income, inner-city schools to overcome institutional deficiencies in the academic achievement of African-American and Latino students compared to Whites residing in neighborhoods with expanded economic tax bases. Kozol described a U.S. educational system that fostered an economic apartheid structure because of public schools’ embeddedness within ecological spaces that systematically racialized the under-funding of inner city schools composed of Blacks and ethnic minorities compared to White majority suburban school districts. This finding echoes Massey and Denton’s book (1993) *American Apartheid: Segregation and the Making of the Underclass*:

[Residential Segregation] systematically undermines the social and economic well-being of blacks in the United States. Because of racial segregation, a significant share of black America structurally experience a social environment

where poverty and joblessness are the norm, where a majority of children are (*sic*) born out of wedlock, where most families are on welfare, where educational failure prevails, and where social and physical deterioration abound. Through prolonged exposure to such an environment, black [and I assert minorities in general] chances for social and economic success are drastically reduced. (P. 2)

Kozol further identified the resource-poor condition of inner city schools linked to hypersegregated racial circumstances such as poor buildings maintenance, fewer pre-kindergarten and kindergarten class offerings, over-crowded classrooms, less qualified teachers, and where minority students were disproportionately assigned to lower academic achievement tracking systems. This included economically poor school districts that offered fewer outside of school resources to develop students' cultural and social capital compared to their white peers residing in higher-valued school district neighborhoods.

Farkas' (1996) study of human capital and cultural capital acquisition (a pathway to status attainment) among minority poverty youth revealed that students' early habitus shaped by systematic racism could affect their long-term school achievement. Similarly, Goldsmith's (2009) examination of a national longitudinal database of students from primarily Black and Latino high schools found their academic achievement significantly lower compared to White students, controlling for individual factors because of early performance deficiencies that statistically appeared cumulative over time.

In another study, Castleman and Page (2014:203) examined students' behaviors during summer break periods, and reported that "summer melt" – the transition to college following graduation over the summer months – for recent high school students who planned to attend college the following fall, found low-income students significantly less likely to matriculate successfully compared to students from higher socioeconomic status families. Analyzing a sample of 6,410 high school graduates, they found that low income, black and Latino students were at a lower probability of enrolling in college after the summer break.

They key problems related to summer melt for minority students are: a lack of 'quality' guidance as students consider colleges to attend; determination of financial aid sources; personal counseling to help with administrative paperwork such as housing applications, course registration, college registration deadlines; and academic placement tests. The authors suggested that high schools and colleges develop expanded recruitment outreach programs targeting students with fewer family resources – including students' deficit in cultural and social capital – to overcome summer melt processes.

Moreover, recent research into the success of school integration in the United States has revealed that nearly 60 years after the *Brown v. Board of Education* (1954) decision, Blacks, Latinos, and Native American students "are still concentrated in predominantly minority, high-poverty, low-achieving schools, while whites remain

concentrated in higher-achieving, predominantly segregated schools with less poverty” (Fiel 2013:830-831; Orfield and Lee 2004).

Sharkey’s (2013) national study of structural segregation in U.S. urban neighborhoods mirrors Wilson’s (2009) study of structural conditions that have contributed to the economic and political marginalization of Blacks and Latino minorities residing in metropolitan cities. Sharkey (2013:9) wrote that more than “70 percent of African Americans who live in today’s poorest, most racially segregated neighborhoods are from the same families that lived in the ghettos of the 1970s”, highlighting the rigidity of socioeconomic and cultural structures that disproportionately affected minority groups’ opportunities for social mobility in the United States.

Social Stratification and Inequality

Sharkey revealed that as a group, stratification forces¹² placed the urban minority poor within neighborhoods that for 40 years experienced significant social, political, and economic deterioration in terms of job opportunities, access to financial loans, educational resources, exposure to criminal activities, and access to political authority. He found that the children of multigenerational urban poor are more likely to go to state prison than attend college because of the social, cultural, and human capital resources constraints they faced from birth through at least their adolescent years.

¹² The use of the term stratification forces refers to the structural and cultural outcomes of power relations among a people. As Stinchcombe (1968:149) wrote, “Structural phenomena are characteristics of a system of social relations,” that inform groups’ dynamic interactions with “one important type...generally called power”. For example, Blacks, Latinos, and Native American people’s historical attempts to gain wealth and build fungible assets to promoter access to political and economic capital is structurally marginalized (Dalton 1999).

Other researchers have shown that persistent marginalization of the urban poor's socio-ecological environments was not randomly distributed (McKenzie 2013 and Vigdor 2013). Hall (2012) confirmed that the urban poor's early deficit socialization experiences cast a wide net, affecting the intersectionality of self-identity constructions¹³ related to the dynamic interplay of race, class, and gender within institutional contexts.

Similarly, Lochman's (2004) research into the early cognitive development and socialization experiences of children demonstrated that ecological domains or spatial fields of contextualized interaction such as family relations, neighborhood environments, schools' physical settings, and the cultural legitimation of an economic base significantly affect children's behavioral outcomes in general, and the likelihood of developing at-risk behaviors, specifically. Wilkins' (2014) research demonstrated that the collegiate success of black male students compared to white male cohorts was significantly lower because Black males' identity constructions do not transfer well to the four-year public university setting. Although Black women's participation and graduation from colleges has outpaced Black men, Hispanic men and women, and Asian men and women, Black women have remained underrepresented and have higher attrition rates than Whites of both genders.

¹³ Social psychologists arguably provide comprehensive definitions of self and identity roles. In this project, self-identity comprises a person's personality, cognitive capabilities, and cultural assets that emerge from the intersection of learned social roles embedded in social spaces (Goffman 1959; Wilson 2009). Essentially, self-identity is a fluid, relational construct because a person's identity "is a product of previous experiences that shaped the role and present experiences that creates (sic) consistency in behavior" located in cultural and structural spaces (Abrutyn 2014:198).

Moreover, Henry, Butler, and West (2011) reported that Black women experienced sociocultural barriers (overt and covert discrimination) that led to deficits in their “social, intrapersonal, and environmental interactions” with other college student groups. The authors also referred to prior research literature that highlighted the appearance of Black women performing better in a college setting could just as well be an artefact of declines in rates of Black men’s college attendance than to Black women’s reported gains.

Wilkins’ research also expanded on prior stratification studies by interrogating the consequences of racial inequality in terms of performance. She accomplished this by examining social and cultural capital acquisition and use from a perspective that illustrated working class white males in high school were already recasting their identities in anticipation of expected changes at the college level. Contrastingly, black male cohorts in Wilkins study experienced a sense of limited repertoires of action given the stereotypical cultural scripts afforded them by their college level cohorts¹⁴. Specifically, the Black male study participants reported increased emotional anxiety that appeared linked to their embeddedness within contextual frames that informed and marginalized their identity transformation choices¹⁵. Researchers’ findings also reconfirmed the earlier insights of Park and Burgess’s (1926) that neighborhoods

¹⁴ See Kao (2000:409) on the intersectionality of race, group images, and the fostering of public selves among adolescent youth. Specifically, Kao uses the concept of “possible selves” to demonstrate the learned motivational structures that affect adolescent youths’ future goal-oriented behaviors.

¹⁵ Kraus, Rheinschmidt, and Piff (2012) explain the micro-effects based on a theory that social classes’ identities emerge from the interplay of early perceptions of class relations that in turn become operant, subjective longer-term cognitive decision-making structure.

reflected the historical continuity of racial and socioeconomic class conflicts is as true today as it was then.

Neighborhood Residential Segregation and Social Inequality

Tigges, Brown, and Green's (1998) earlier study found that the ecological and financial contexts of urban minority poor fostered increased social isolation that in turn reduced neighborhood social network relations¹⁶. Similarly, Smith (2010:457) in a review of the research literature on race and trust found that significantly more African Americans report misanthropy (lack of social trust) compared to whites due to material barriers associated with "historical and contemporary experiences of discrimination, neighborhood and community context, and ethnoracial socialization"¹⁷. Finally, Smith (2005:5) details the minimizing of "social capital activation" within poor African American neighborhoods is a consequence of the "properties of the individual, the dyad, the network, and the community"; more specifically, a socio-ecological field¹⁸ of dynamic relations among actors and across groups.

¹⁶ See Sampson (1998) for neighborhood contextual factors that affect social network ties and relation and Hindriks, Verkuyten and Coenders (2014) on shared subordinate group identity and the asymmetrical relations linked to outgroup contact among majority members and minorities.

¹⁷ See Lewis and Weigert (1985) on trust as a phenomenon affecting group cohesion and institutional status. Also, see Lareau and Calarco (2012) on the nexus of cultural capital, social class, and institutional structures.

¹⁸ Pierre Bourdieu's (1990) field comprises actors' relational outcomes within a habitus organized and bounded by norms. In this sense, "actors' actions must thereby be understood in relation to these wider spaces of relations" that impinge on, are open to contestation, and "contains the seeds for their own transformation" (Go 2008:207, 210). Correspondingly, Niklas Luhmann's systems theory posits a dynamic process because "societies are increasingly complex and such complexity results in restructuring and adaptation" over time (Khan 2014:52).

Scholarly research has documented that more than 50 percent of African American students attend schools in urban centers with significantly declining material resources and make up a large portion of the total aggregate of students living in poverty conditions in urban settings (Obidah et al. 2007). Gandara (2002:87) finds that minority youth embedded in an ecology of poverty “are almost certainly handicapped by [their] neighborhoods that simply hold more risks” than experienced in middle class suburbs.

Furthermore, Chin and Phillips’ (2004) qualitative study of social class differences in students’ summer activities from a large urban elementary school finds that parents’ social class position affects students’ early development of human and cultural capital. However, they note that the differences between the classes were not necessarily large, but instead illustrated that working class parents diminished human, social, and cultural capital resources acted as constraints to the necessary activities that would help them assess and improve their children’s opportunities and meet challenges compared to middleclass, *better-capitalized* parents. In other words, parental motivations to improve their children’s chances for expanded human resources accumulation was not a qualitatively different goal; it was simply the outcome of differential access to social and economic capital that would inform parents’ efforts to learn about and gain admission to beneficent summer vacation programs for their children.

CHAPTER IV
SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS (STEM)
FIELDS: OPPORTUNITIES AND BARRIERS

Long-term, national studies focused on examining and identifying social and cultural factors that increase minority students' participation in science-related coursework from middle school through undergraduate education has demonstrated that "a legacy of exclusion and stereotype" in the form of socio-normative factors were significantly associated with a lack of diversity in the STEM fields (Chubin and Mohamed 2009:363). However, while gains in STEM participation have been made, the National Science Foundation reported (2013) that from 1991 to 2010, minorities, women, and persons with disabilities increased their share of bachelor's degrees earned in the social sciences in general and in computer sciences.

Minorities Show No Gains in STEM Fields

The NSF (2013) report documented that from 2000 to 2010, underrepresented minority groups' shares in the STEM engineering and the physical sciences fields remained flat, with participation in mathematics falling. A common factor reported in the literature on students' academic success and desire to enter the STEM fields mentioned previously, demonstrated the differential, disadvantaged pathways minority groups were affixed to upon entry to middle and high schools.

For example, George et al. (2001) identified racial and ethnic differences on standardized and college admissions tests and linked student scores to the quantity and quality of math-related courses students attended in public schools. They additionally found that teacher effectiveness and school resources, parents' combined income, assets, and educational achievement, and the availability of after-school programs contributed to students' academic participation. Thus, students' social and cultural capital, including educational and racial capital, were relational conditions that provide access to mentors and their self-beliefs regarding their ability to be successful in STEM fields (National Science Board 2010). These outcomes then contributed to students' decision-making processes as they contemplated their future academic and occupational choices (George et al. 2001).

In another study, Amos and Jani (2007:1) reported that minority students (especially males) were least likely to make it into STEM fields because they were under-enrolled in college preparatory studies during their high school years “despite outperforming their female counterparts on mathematics and science achievement tests”. The authors posited that minority males encountered “unique psychosocial barriers” that were deleterious to attempting academic challenges. Anderson and Kim (2006) also investigated those factors that appear salient to the increased success or lack thereof for minority students in STEM fields. They report that Blacks and Hispanics demonstrate equal interest in the STEM fields as their White student peers, but eventually lost interest in pursuing these studies.

The literature Anderson and Kim reviewed revealed that minority students' economic class position was the most significant predictive factor associated with academic success in STEM fields. They reported, "Low-income students are less likely to have completed a rigorous high school curriculum than those from middle- and upper-income backgrounds" (2006:13). However, Anderson and Kim's study assumed a simple economic determinist model that failed to address or explain the persistent achievement gaps of minorities that social researchers demonstrated were a consequence of other, interrelated factors.

For example, a study by The Committee on Underrepresented Groups (2010) identified significant differences in opportunistic structures accessed by racial/ethnic groups compared to their White counterparts. Specifically, the committee found that "family and community differences, school context, low expectations and lack of exposure to role models, information about career opportunities", and access to advanced courses that better prepare students' for success in the fields of mathematics and science all contributed to a lack of minority students participation in advanced fields (2010:53).

For more than a decade, STEM-driven research at the national level found students' across the ethnic and racial continuum face institutional and cultural barriers that lower their entry into university programs, especially in the veterinary-related fields. Most of the studies reviewed, however, do not address or clearly identify the relative

affect specific socio-normative factors have on students' decision-making heuristics when it comes to their committing to academically challenging fields.

In relation to science-related career choices, researchers have identified that minority students in general are “disproportionately impacted by at least seven specific aspects of participation in the veterinary medical field. Espinoza and Greenhill (2013:3) wrote that gender, race, geographic location, socioeconomic and educational disadvantage, coupled with a lack of sufficient minority role models were the outcomes of “legal, cultural, or social climate impediments” that have disadvantaged blacks and other minorities' entrance into veterinary graduate programs.

For example, from a public policy perspective, Swail and Perna's research (2002) finds an implementation paradox that demonstrates the persisting structural and cultural barriers that prevent minorities from achieving parity within educational institutions and thus society at-large. They point out those public policies' methods currently used in early intervention educational outreach programs target primarily *economically disadvantaged* students but fail to recognize *educationally disadvantaged* schoolchildren.

This provides a clear illustration of the one-dimensionality of public policy programs. As Friedman (2003:xii) succinctly states,

[F]or practical purposes the question at issue is not simply *whether* human capital policies on the whole are an effective policy approach to that end, but *which*

specific policy approaches offer the prospect of effectively serving the intended purpose and which do not [italics in original].

Subsequently, Stephens, Fryberg, and Markus (2012) as well as Horvat and Davis (2011) argue that educational resource programs that bolster efforts to foster improvements in students' habitus relying primarily on addressing either economic or educational structures often overlook significant differences in the socio-normative repertoires of socioeconomic classes that are embedded in power relations that ultimately informs students' cultural cognition¹⁹.

In other words, minority students' agency²⁰ is grounded in learned identity dispositions²¹ that minimize their beliefs that they are a legitimate competitor for the same opportunities afforded white middleclass students. This follows from W.E. Du Bois's (1903/2014) observation of a "double consciousness" that blacks (and correlatively some other groups of color) develop as a consequence of their social experiences first as slaves and then as a freed people who remain chained by invisible

¹⁹ Social psychologists term this 'affective control' whereby actors use impression management to "match culturally shared fundamental feelings" to control social interactions (Schroder and Scholl 2009:180). In this case, cultural cognition denotes the asymmetric flow of information available to individual's reflexive processes.

²⁰ Throughout this text, agency denotes the social psychological origin of actors' behaviors that can be novel but can only emerge within a given boundaries. The intent here is not to locate the individuals psyche, but instead demonstrate the correspondence of agency amid coercive structures.

²¹ The historical debate lingers among scholars about the causal direction of social structure (economic resources or class) and culture (values or practices) on inequality (Chin and Phillips 2004). My approach is not about conflating the two factors; I instead locate the two factors within a relational sphere termed "structural interactionism" (Stryker 2008: 19-20). This framing of social reproduction leads to identity formations (James and Amato 2013). In this study, structural interaction implies a Marxian perspective of gradients of social relations extending to larger group encounters whereby "People behave toward objects on the basis *not* of their concrete properties", but of the constructed "meanings these objects have for them" and consequently inform their "identities", resulting in observed "social and material consequences" that can lead to social inequalities (Howard 2000:371).

social forces developed by a white-dominated cultural ideology that undermined an individual's self-identity.

Similarly, Lareau and Calarco (2012) discuss the significant effects of social class as a social force that fosters and marginalizes access to, and use of, material and cultural resources. Mayer's (1997:12) findings preempt these distinctions. She writes, "*Once children's basic material needs are met*, characteristics of their parents become more important to how they turn out than anything additional money can buy" [italics in original]. The author does not claim that income does not matter; instead offering additional insights that contradict social policies that simply call for bolstering the poor's disposable income as a panacea to reduce social inequalities that undermine children's future academic and occupational successes.

In summary, researchers have found that differences in educational programs across states and the differences in teachers' credentials have contributed to the underrepresentation of students, and minority students specifically, in STEM fields (National Science Board 2007). However, aggregate studies were less effective at discovering and evaluating policy initiatives that implemented at the local level could promote increased student academic performance, irrespective of students' racial or ethnic backgrounds. Moreover, a lack of agreed upon standardized statistical models in use today in the social sciences has undermined efforts to offer predictive methods for testing the feasibility and dispersal of resources to minimize social inequalities. This failure has resulted in a latent structural barrier because a lack of consensus among the

scientific community on measuring sociocultural factors contributing to social inequality essentially places the burden of hypothesis testing on a single research event that is non-generalizable to the populations under study.

Macro-Social Forces and Stratification

Given the complexity of social influences on the opportunities and challenges policymakers face leads to a fundamental need to identify the macro effects of relational, discursive, or performative power structures that effect micro-social interactions.

According to Reed (2013) there are three macro social forms grounded in the distributive constructions of power. There is relational power that “derives from positionality in a structure of social relations”; discursive power that relies on symbols instantiated through culture that allow differentiation of norms; and performative power that is an emergent event that creatively legitimizes some action on a group without direct recourse to relationships or social constructions.

A nomothetic definition implies that relational power is the product of culture as “practices, meanings and discourse” and structure refers to the social patterns recognized by connected, legitimized groups (Mützel 2009:872). Discursive power relations are similar to institutionally defined rules of discourse that inform policy debates and thus foster logically consistent outcomes. On the other hand, performative power²² can be an

²² Performative power could be considered synonymous with liminality – that phenomenological threshold by which actors’ are capable of “suspension of normal structural constraints. In this sense, liminality can be seen as in an inverse relationship” with bureaucratized structures... “characterized by freedom, egalitarianism, communion, and creativity” (Yang 2000:383). Other theorists express this as most closely resembling agents’ habitus because these discreet actions are not simply abstract, emergent phenomenon

idiographic frame that expressed refers to agents' ability to negotiate within a given relational and discursive power structure that could alter policy within given status quo boundaries. Hence, policy implementation derives a great deal of legitimacy through these given structures or more generically, through these existing political and socio-normative stratification processes that effect agency (Hallett 2014).

Consequently, we can ask additionally whether public policy initiatives are evaluated according to the participating parties or institutions objective (nomothetic) or subjective (idiographic) goals. Worded differently, can we ask are the negotiations pertaining to resources allocation weighted more toward acceptable discourse (status quo) or performative outcomes? Answers to either question are likely opaque since the purported agenda's outcome remains contested amid different strata of political and economic actors²³.

Liu et al. (2004:95) suggested that social scientists studying the effects of social forces closely study the “multiple meanings in people’s lives” that are linked to social stratification or economic class circumstances²⁴. Conley’s (1999) study into racial inequality and wealth effects on the distribution of societal resources for blacks and

but are instead the outcome of “structuration processes that underlie particular decisions and channel decisions in systematic ways” that become observable (Michel 2014:517).

²³ See Hewitt 2004 regarding the increase in African American occupational parity in Atlanta, Georgia linked to increased political and economic power among African Americans residing there and efforts to contest white occupational hegemony.

²⁴ Although social theories of class generally imply economic differences between owners of capital and those who sell their labor to earn capital, contemporary categorical measures rely primarily on the construct of socioeconomic status (SES) comprised of three metrics: an individual’s earned income or wages, occupational position, and their educational credentialing. Conley (1999) posits that SES is a weak approximation because it fails to take into account individuals’ accumulated or opportunity structures that promote wealth.

whites also demonstrates the deleterious consequences linked to groups' socioeconomic class. For example, one significant ecological context that the National Research Council (1993; 2002) noted was individuals' neighborhoods, because of the particular socio-ecological conditions and geographic boundaries that embedded them within spaces of social advantage and disadvantage.

These findings confirmed earlier theories that located and interpreted individuals' actions within contextual frames of reference (or fields of action) that gave rise to varying and innovative modes of social interaction (Stryker 1980; Bourdieu 1990) that foster, extend, and/or inhibit human capital formation (Coleman and Hoffer 1987). As Massey (2014:8) stated, "Indeed, a growing array of studies demonstrate that social stratification in the United States is very much neighborhood-based, grounded in a rising tide of savage geographic inequalities with respect to material, emotional, and symbolic resources".

Similarly, research into social identity, affect control, structural-functional identity, and identity accumulation theories (Owens, Robinson, and Smith-Lovin 2010) demonstrated that individuals' decision-making heuristics were the outcome of a given society's cultural doxa. These pronounced, observable cultural forms for the most part contextualized identity structures and actors' commitment to stable self-meanings (Burke and Reitze 1991).

The methodological question is not about identifying a sociodemographic category, but instead becomes how to operationalize the various components of a social

group and its social space in order to develop probabilistic models. The end result is to conceptualize the subject²⁵ as embedded in a community or neighborhood's field of relations and specific social forces (Ikegami 2000; Kelly et al. 2013) as the subject of inquiry strives to acquire the resources needed to sustain a meaningful life.

²⁵ See Sampson, Morenoff, and Gannon-Rowley's (2002) systematic review of scholarly research into neighborhood effects on social processes involving the family, schools, adolescents, crime, and health. They found that neighborhood research has identified critical structures that led to processes that effected individual outcomes. However, they warned that too many socio-ecological studies were methodologically weak because of a lack of longitudinal studies and an inherent need to develop a "systematic collection of benchmark data on social environments that can be compared across communities" (2002:473). Hence, in this study, conceptualizing the subject required first recognizing that actors possess a full range of reflexive states (Emirbayer and Mische 1998).

CHAPTER V

LITERATURE REVIEW

An integrative literature review of the theoretical and empirical studies related to the socio-cognitive heuristics affecting students' decision-making and social positions within established social structures follows. This is an important methodological step because contemporary research has documented correlations between racial and ethnic discrimination and marginalized occupational participation by minority groups, but few studies have revealed the relative weighting of structural and cultural factors that bolster or marginalize Black and ethnic minorities' access to the fields of veterinary medicine.

For example, the annual survey of fourth-year veterinary medical students by the American Veterinary Medical Association examined 28 U.S. colleges of veterinary medicine and confirmed majority white student participants in graduate programs, documenting the distribution of general veterinary medical students was 88 percent white, 2.3 percent African-Americans, and 3.3 percent Latinos (Shepherd and Pikel 2011). They also reported a significant gender participation bias, with males at 22.3 percent and female participation at 77.7 percent. This is in stark contrast to national employment participation that shows that whites make up 64 percent of the labor force; African Americans comprise 12 percent, Latinos at 16 percent, and Asians at five percent (Burns, Barton, and Kerby 2012).

Minorities and Veterinary Medicine

In contrast to the robust growth in minority populations, the Bureau of Labor Statistics (2012) reported an expected 36 percent shortfall in the number of veterinarians required to meet attrition rates, the increased population of household pets, and public health threats linked to animal production and consumption of food products in the United States by 2020. For example, the Association of American Veterinary Medical Colleges predicts a “tenfold” increased need for public health veterinarians by 2020 that unmet can seriously jeopardize the nation’s ability to protect its food production and the public’s health given the high incidence of human infectious diseases that are zoonosis-related (Jarman et al. 2011).

Additionally, the BLS is estimating a pronounced shortage of veterinarians in large and food animal subfields that remains a significant concern of the U.S. veterinarian profession (Daly 2012; Amass, Davis, Salisbury, and Weisman 2011; Lenarduzzi, Sheppard, and Slater 2009; Walker 2009; Gwinner, Prince, and Andrus 2006; Sterner 2006). For example, the *Workforce Needs in Veterinary Medicine* report stated that from 1995 to 2007, the total number of veterinarians who exclusively or predominantly treated large farm animals declined 13 percent from 5,883 to 5,090 (National Research Council 2011:80). Addressing the veterinarian profession, Espinoza and Greenhill (2013:2) wrote, “The stagnating numbers of veterinary school and college applicants suggest the need for greater attention to increasing diversity in those STEM fields” with the intention of increasing minority groups’ representation.

In general, researchers have found that increasing minority representation in academic settings provides benefits to nonminority classmates, such as increasing cognitive and multicultural skill sets (Gandara 2002: 83).

Moreover, the National Research Council's (2011) study of the challenges the United States veterinary profession faces in the 21st century finds that the country's latest economic recession has undermined the profession's ability to lower students overall graduate training costs, which is an economic barrier for students from less entitled backgrounds who want to pursue a veterinarian medical career. The study also pointed out that increases in companion animal care are climbing higher – a positive note for that specialization – but does not address additional training requirements necessary to meet complex human resources developments in the large/farm animal specializations.

The study cited above highlighted that students receiving the Doctor of Veterinary Medicine designation would require more training than peers graduating in the last decades would. Because of the cost increases passed on to students, a major recommendation of the report stated that it is “essential that the colleges and schools of veterinary medicine engage employers and public and private funders in their efforts to target and strengthen particular fields of veterinary expertise and research” (National Research Council 2011:218).

Arguably, however, a recent econometric study of the veterinarian medical field questioned the likelihood of a shortage of veterinarians in most subfields of the

profession (Center for Workforce Studies 2013²⁶). This is in direct contrast to a plethora of research that a critical shortfall of students training in the large animal and research-oriented fields of veterinary medicine coupled with the number of retiring fulltime veterinarians, likely posed serious problems for the United States. Specifically, the country's cattle producers, cattle processors, workers in agricultural disease control, food production, and the safety of agricultural products in general (American Veterinary Medical Association 2013; National Research Council 2012; Atchison 2009; DeHaven 2008; Willis et al. 2007; Marshak 2005). As Lenarduzzi et al. (2009:7) warned, "The food quality and food safety of the United States cannot be well served without a sufficient and stable number of food animal veterinarians".

Willis et al. (2007) also note their concern for the future of the public's safety in the American Veterinary Medical Colleges *Foresight Report*, where they wrote:

The current number of veterinarians in food-supply veterinary medicine, in biomedical research, in public health, in companion animal medicine, and in other anticipated needs is inadequate to address current and future societal needs and well-being. (p. 2).

The scientific community's warnings are a precursor to the economic and social costs that would occur without the requisite preventive medical treatments; the medical

²⁶ However, contributors to the final report contracted by the American Veterinary Medical Association note that the findings could be skewed toward over capacity utilization because of the global recession and specifically the United States' prolonged economic recession. I am not faulting the econometric model, but only drawing attention to the fact that the report does not address historical or contemporary social issues affecting entry into LAV and research professions by minority groups.

assistance that the ranch and farm animal sector would need to counter reduced production, diminished profitability and sales, and the protected sustainability of the nation's food supplies. Accordingly, rising food prices due to animal food shortages and the "negative consequences of changing dietary habits to the growth of industrial consolidation in agribusiness and the threat of bioterrorism-agroterrorism" are catastrophic social scenarios policy analysts are necessarily concerned with addressing (Gwinner et al. 2006:1693).

Addressing Critical Veterinarian Shortages

A key response to the veterinarian profession's shortages of trained personnel is to increase the rate of minority students' early academic preparation, undergraduate and graduate recruitment to veterinary medical colleges, and successful acceptance and retention into the veterinarian profession. Although the U.S. workforce is becoming more diversified across employment sectors, there are sufficient studies documenting various social conditions that demonstrated the fragility of minority groups' employment participation; especially in the fields of veterinary medicine and research (D'Amico and Maxwell 1995; Sørensen 2004; Dickerson 2007; Wilson, Roscigno and Huffman. 2013).

Although the country's population demographic shift from a White-Anglo-Saxon-protestant majority to a more diverse population comprised of Hispanics, African Americans, and Asians presents unique multicultural challenges, today's pressing task is to identify and develop "appropriate methods" that would bolster the positive

contributions associated with multicultural diversity by exposing systemic racism in the United States and in the veterinarian profession (Jackson and Daniels 2007:115).

National and state veterinarian associations have acknowledged that the profession lags significantly in its methods of recruitment and retention of minority groups. For example, Reed (2013: ix) writing in *Navigating Diversity and Inclusion in Veterinary Medicine*, criticized the profession for having “the dubious distinction of being the least diverse of all health professions” with minority veterinarians accounting “for approximately 10 percent of the 92,000 in the U.S. veterinary workforce.”

It is important to point out here that Reed’s comments are a stark finding given that in the report, *Future Direction for Veterinary Medicine*, commissioned by the Pew National Veterinary Education Program (1988) echoed these same sentiments 25 years ago. The Pew study documented that of the 2,219 doctor of veterinary medical degrees awarded in 1987, minority men, and women comprised only six percent of the total. The Pew report strongly recommended at that time that “Veterinary medicine is running the risk of becoming an enclave of Whites in an ethnically and racially pluralistic society...Extraordinary efforts...New approaches, new techniques and new strategies must be employed as a very high priority” to increase minority participation in the profession (1988:157).

Moreover, the shortages in “well-paid positions” in “biochemistry, biochemical mechanisms of diseases, basic pharmacology and toxicology, pathology, laboratory-animal medicine, and regulatory toxicology that are currently facing shortages could

benefit from increased minority student representation in veterinary schools ” (National Research Council 2011:219).

More specifically, the studies previously cited recommended a better-informed public (i.e., taxpayers) could bolster financial commitments to increase students, faculty, and research funding for veterinarian schools. However, increased public awareness would depend on a partnership among academe, private industry, and the veterinary profession’s leadership institutions. Recently, Greenhill (2009:361) writes that colleges of veterinarian medicine demonstrate improved minority recruitment efforts, but adds that the “relative number” of underrepresented minority veterinary medical students “remain low”. In a more recent study, Lloyd (2013:81) writes,

“At the very least, it is clear...that changing the demographics of the veterinarian population is a complex, long-term process that begs a structured, carefully designed, disciplined approach. *Success will require thorough consideration of critical determinants for recruitment and retention across cultures.*” (Italics added for emphasis).

Sociocultural Influences: Students’ Career Paths

The anticipated shortfall in practitioners and researchers in the large/food animal practice previously documented fosters divergent descriptive studies of students’ heuristic decision-making biases as well as significant sociodemographics inequalities that have affected students’ selection of academic pathways to a career in veterinary medicine. However, as shown in Table 2, contemporary studies examined the

sociodemographics characteristics and attitudes of White students, but generally did not question or address how or why these variables were interrelated and differentially affected minority students' participation rates (Daly and Erickson 2012; Chigerwe, Boudreaux, and Ilkiw 2010; Lenarduzzi et al. 2009; Jelinski et al. 2008; Narver 2007; Gwinner et al. 2006; Heath, Baguley, and Abbott 2006; Carbajal 2005; Serpell 2005; Ilgen et al. 2003).

The studies however, did find that structural and cultural variables such as: (1) students' place of residence, (2) exposure to animals, (3) mentor relations, (4) financial considerations, (5) gender-shift biases, (6) generational shifts in lifestyle choices, and (7) veterinarian school recruitment efforts were closely aligned with students' decisions to enter veterinary medicine. These findings afford an interesting baseline for comparative purposes in the non-minority community, but do not address how salient these factors are in the African American, Latino, Native American, and Asian student populations. This is a critical oversight according to Liu et al. (2004:96) who warned that it is critical for academic counselors to have an understanding of the "multiple ways that economic history, situations, and circumstances motivate people to behave and think" in ways that foster "stratification and inequity" if social progress is to be forthcoming.

Referring to Table 2, it is apparent that there were too few studies regarding school recruitment practices targeting the recruitment of ethnic minority students to the fields of veterinary medicine. In addition, given the limited scope and lack of statistical power of the studies examined, the generation of explanatory hypotheses is highly

unlikely²⁷. The studies that did examine linkages among subjects' decisions to pursue a career in veterinarian medicine overlook the variability of significant contributions linked to the differences in social, cultural, and human capital that existed between dominant and subordinate classes of students (Loughran et al. 2013). This includes the under theorization of the effects of social class origin and parenting beliefs (Streib 2013) and social networking perspectives that recognized that relations among actors construct the meanings that emerge and are communicated in a socio-normative milieu that informs students' academic career choices (Pachucki and Breiger 2010).

All of the variables mentioned are important to consider given individuals' access to, use of, and accumulation of the social and cultural capital necessary to the construction of individuals' acquired social roles. For example, actors' decisions and interactions are informed by their sociocultural frames of reference that afford actors' the opportunities to select positive or negative returns in a specific social milieu (Thirutnurthy, Kirylo, and Ciabattari 2010).

For example, Malone (2004:203) pointed out,

Roles are part of a social grammar that makes action predictable and meaningful. Just as people use words and rules shared by their language community, they act in the context of roles and conventionally defined situations that provide choices

²⁷ Studies examined from Table 2 are Lloyd 2013; Posey et al. 2012; Scott 2012; Amass et al. 2011; Shepherd and Pikel. 2011; Marshak 2010; Tomlin, Brodbelt, and May 2010; Villarroel 2010; Chubin and Mohamed 2009; Strayhorn 2009; Asare 2007; Schmitz et al. 2007; Prince, Andrus, and Gwinner 2006; Elmore 2003.

and meanings. The concept of role is the pivotal relation between social structure and individual agency.

Hence, the literature reviewed for this study demonstrated that prior veterinarian student research was opaque at best regarding the acquisition of scarce or constrained resources (social, cultural, human capital) and the social networks that objectify the total capital assets available for minority students and their parents²⁸. As Weller (2010) stated,

Further work is required to examine in more depth the inter-connections between children's and adults' social capital acquisition and identity formation over time. It would also be fruitful to develop such analyses to explore inclusionary and exclusionary practices within the context of young people's diverse and dynamic social networks. (P. 885).

Diversity Research Shortcomings in Veterinary Medicine

The contemporary studies' findings into the social and cultural forces that contributed to a lack of underrepresented minority student recruitment in the veterinarian profession reviewed for this project, however, appeared anecdotal at best. Contemporary research acknowledged that there is a need to determine a more effective strategy for the recruitment of minority students (see Greenhill et al. 2013; Chastain, Horrell, and Seay 2007; and Haynes 2007). However, because prior studies were primarily descriptive of white males and females, and did not address comparative sociocultural differences, the

²⁸ Similar to Bruno Latour's Actor-Network Theory, which recognizes "the instabilities in social life—the uncertainties in social connectivity"—social and cultural capital are relational traces primarily discoverable at the micro-level (Pachucki and Breiger 2010:214).

findings were less than meaningful concerning racial discrimination and inequality in the profession.

Moreover, the research studies reviewed for this project did not offer reliable parsimonious measures for evaluative purposes from a policy initiative perspective. For example, researchers identified that minority students in general are “disproportionately impacted by at least seven specific aspects of participation in the veterinary field (gender, race, and ethnicity, and geographic, socioeconomic, and educational disadvantage, and a lack of sufficient role models of color)” that are contextualized via “legal, cultural, or social climate impediments” (Espinoza and Greenhill 2013:3).

Nevertheless, the studies reviewed did not directly refer to persistent institutional racism or the general nonracist stereotypes embedded in the veterinary profession that act as latent structural forces that reinforce race as “a fundamental axis of social organization” in the United States (Omni and Winant 1994:13).

Diversity Research Shortcomings: A Remedy

The research project proposed addresses a serious gap in the literature regarding the identification, empirical testing, and substantive effects of key sociocultural factors that foster students’ interest in veterinary medical fields. To accomplish this, the following chapter discusses several key theoretical frames from which testable hypotheses are generated.

CHAPTER VI

HUMAN CAPITAL, THE REFLEXIVE SELF: STATUS-ATTAINMENT AND THEORIES OF INCLUSION AND EXCLUSION

Research studies into the underrepresentation of minorities in the veterinary fields cited do not address the relative affect socio-ecological factors²⁹ as contextualized frames has on racial majority or minority groups' life choices. For example, Leary's (2007:318) designation of "hot motivational and emotional self-processes" that include the associated concepts of "self-esteem, self-enhancement, self-verification, and self-conscious emotions" revealed the multidimensionality of individual's acts. Investigating such a process is complex operationally (Fiske 1993). However, decades of research confirmed the dynamic structure of self-concept and self-efficacy (see Davies and Kandel 1981; Bandura 1993; and Bandura et al. 1996) and the effects of "(socio)racial socialization" on interpersonal relations within and between group participants (Helms and Cook 1999: 7).

Social psychologists have pointed out that self-identity formation was the locus of mediation in "intrapersonal processes (including information processing, affect, and motivation) and a wide variety of interpersonal processes (including social perception; choice of situation, partner, and interaction strategy; and reaction to feedback)" (Markus

²⁹ In this study, I borrow from Irwin and Berigan's (2013:444) definition of "culture as systems of ideas, meanings, and practices common" to a society's members. This is similar to Thorstein Veblen's concept of culture as a complex of "habits and thought and of conduct by which [a society's] own routine of life is regulated" (Mestrovic 2003:3).

and Wurf 1987:300; Woike and Aronoff 1992; Nora 2002). For these social scientists, to ignore the interaction of personality and social identity formation in a stratified society was to ignore the social forces by which individuals take advantage of opportunity or constraint structures to meet labor force specialization needs.

Sociologists studying how social class differences effect educational and occupational positions that promote or minimize social mobility have long relied on status-attainment models (Hill and Duncan 1987). These models posited that socio-normative attributes (such as socioeconomic status, ethnicity, and cultural capital) differentially effect an individual's educational expectations over time, which in turn affect job outcomes and life experiences over the long term (Sørensen 1979; Jencks 1983; Lareau and Calarco 2012).

Status-attainment research has demonstrated that students' class attributes emerged as a consequence of intergenerational resources (including a child's equal or unequal access to parental resources) that informed the cognitive, noncognitive, and communicative abilities underlying a child' social and educational expectations (Buchmann and DiPrete 2006; van de Werfhorst 2010; Kim 2014). Scholars have also demonstrated that marginalized groups with low socioeconomic status linked to their gender, and race were disadvantaged in terms of dominant forms of cultural capital. Students with these background characteristics often were embedded in school settings that result in comparatively lower achievement test scores marginalizing their probability of sufficient preparation for science, technology, engineering, and math-

related (STEM) careers (Walpole 1997; Lareau 2003, Jao and McKeever 2006; Goza and Ryabov 2009; Harper, Patton, and Wooden 2009; Jacob and Wilder 2010; Feagin 2013; Mann and DiPrete. 2013).

Specifically, status-attainment theory at the public school level includes the various sociocultural factors affecting students' learned dispositions structured by normative standards found in and between particular groups in their social exchanges (Swartz 1997). Thus, socio-ecological factors were operationalized as independent variables that denoted the kinds of contextualized relations (and the density, thickness, or permeability of those relations) that were characteristic of social groups, e.g., social group identity constructions used in everyday social exchanges (see Leary 2007).

This includes temporal experiences such as a child's social class orientation to a particular "pace of life" that affords them opportunities for social interaction across racial and ethnic boundaries (Lareau 2003:35), as well as their socialization via parental involvement (Mandara and Murray 2007).

Trust Relations and Social Identities

Consider, for example, trust relations and the consequent effect that emerged as cultural beliefs among and across groups (Bourdieu 1986). Amiot, Terry, Wirawan, and Grice's two studies (2010:820) into changes in social identities over time demonstrated that "social support and need satisfaction" work concurrently (interpersonal and intrapersonal fields) to bolster integration or assimilation of individuals. Wagner et al. (2006) investigated majority prejudice and demonstrated that neighborhood, workplace,

and social networks that increased contact with out-group members mediated negative stereotypes. Al-Fadhli and Kersen's (2010:380) study of black students' educational aspirations found that family social capital and religious capital contributed to "higher levels of cultural capital" and later helped to mitigate their academic challenges.

Empirically then, sociality³⁰ emerged from situations or contexts (micro) located within institutional boundaries (macro) that demonstrated "the powerful impact of people's social identities" on their interpersonal behaviors within specified settings (Ellemers, Spears, and Doosje 2002:163; see also Lin 1999 on social capital and social status attainment). Hence, "sociologists can gain substantial explanatory leverage" by observing closely the emergent behaviors that arise from context-dependent actions (Smith and King 2013:477; Simmel (1907/1986).

For example, social structure and culture denote the historical/temporal conditions of social existence for a group's members—their context-dependent behaviors. Whereas the micro conditions – community-as-place and individuals-as-socially-constructed identities – demonstrates the equally important, but variable dispositional effects of symbolic exchanges (oftentimes conceptualized as human, social, and cultural capital³¹) among individuals within their structural milieu (Simmel 1971).

³⁰ Overall, this project theorizes sociality within a field of *social space* (social contact) and *institutional space* (sanctioned space) whereby the quality of social interactions found in social networks – both social and institutional – has upper and lower limits (Weller 2010).

³¹ Pierre Bourdieu (1986:242) explains that capital represents an accumulation process embodied in the "immanent structure of the world" transformed into material aspects that are observed beyond simply its economic signifier; these forms of capital are arranged in social space as "cultural (knowledge, skills, and education), social (personal networks), and economic (financial resources)" (Demetry, Thurk, and Fine

Unfortunately, researchers often conflate the two regimes of social forces with use of bivariate statistics either by denoting micro forces (individual agency) as dominant fields of interaction or by selecting the bounded rationality of structural conditions as informing the ‘structural context of opportunities’. In contrast to macro approaches, Mayer (1997:7) used an “investment model” and a “parental-stress or “role-model theory” to identify micro-related processes affecting minority group’s life chances. Her work demonstrated that macro-level studies were inadequate for explaining how specific social and cultural factors’ relative contributions at the individual level affected student’s life choices.

Counterfactuals and Statistical Techniques

However, there is sufficient support that structural conditions play a significant role in constraining individuals’ social mobility such as residing in a poor neighborhood or receiving less ‘distinctive’ educational resources (McKenzie 2013 and Vigdor 2013). Unfortunately, structural studies alone cannot as Creswell (2009:12) has pointed out, explain individual and group behavior with empirical markers representing “the collective strength of multiple variables” effect on individuals and groups in diverse populations.

2013:1). For Bourdieu (1977:11), students begin their educational socialization with different deposits or savings of cultural capital that they inherit from their social class backgrounds. Because a dominant social class commands pedagogical authority (“symbolic violence”), students from the dominated classes do not gain equality per se, but instead must struggle against the structural barriers that enforce and exasperate the inequalities that contextualize their lifeworlds.

However, counterfactual thought experiments have provided insights into the masking of potentially important, but undetected variables that are generally accounted for mathematically as biased error terms in current statistical parlance (Alquist et. al., 2015; Levy 2015). Conceptually, statistical methods require interpretive theories that not only contextualize social outcomes in the public sphere, but also consider the likelihood of alternative explanations³². At the same time, scholars have recognized that counterfactuals are methodologically problematic.

Causal statements about the observable world appear much more responsive to Feldman and Conee's (2000:170) "evidentialism" or at the least, provide an often-touted transparency for rejecting or accepting hypotheses (Hauska 2008). However, rationalists and pragmatists have often successfully inserted counterfactual processes in their research to test for and explain conditions found in a particular sub-population³³ (Moss 2012). The use of abductive analysis and counterfactuals throughout the statistical analyses and discussion sections to follow rely on past acceptance of these techniques of social inquiry. Counterfactual claims made in relation to empirical outcomes posit an interpretive stance that requires understanding the consequences of an action and its possible variations had the actor selected another course of action given a different social context.

³² Counterfactuals have a dynamic role in everyday life. Who hasn't asked What if I had done this instead of that? In fact, counterfactual thinking is reflexive and additive as changed dispositions observed for individuals as described by Bourdieu that inform agential conditions of habitus. Counterfactual thinking allows for the "possible, parallel, or alternate world in which key features of the real world were not present or took on different values" (Levy 2015:379).

³³ For example, see Jemai et al.'s (2007) use of counterfactual markers to test for progression of the human immunodeficiency virus infection in a subpopulation exposed to an imperfect HIV vaccine.

On occasion, neorealist perspectives have incorporated counterfactual thinking in their critique of functionalist and structuralist arguments (although they are unlikely to make such a claim). Margaret Archer (1995; 2007) has criticized post-structuralist explanations of group conduct and individual choice as an effect of central conflation linked to sociocultural experiences into a structural reductionist perspective by eliding culture and agency. For Archer, the dynamic interplay of agent and structure must originate first with individuals' inherited cultural understandings.

Arguably, Sewell (2005, 1992) and Kanjirathinkal (1990) on the role of symbolic (cognitive) interaction, heteronomous cultural forces, human agency, and social structure as forces making up individuals' lifeworlds have used counterfactual thought experiments as they theorized social conditions leading to particular outcomes. Regardless of the ontological and epistemological arguments surrounding these social theorists, there is no escaping the observation that racial inequality and institutional racism, including denials of racism held by individuals play coterminous roles affecting the deleterious life outcomes of subordinate groups.

The analyses to follow expands on critical theory in general and critical race theory in particular, by asking counterfactual questions about the subpopulation of African American veterinarian students, faculty, and practitioners sampled for this study. This is important because the responses by minorities who have successfully joined the ranks of veterinary medicine can reveal more than simply their stories of success. From

their stories we can then ask What do the variations in their everyday practices mean for other minorities decisions to become veterinarians?

Why Culture?

Sociocultural factors in my research project were defined foundationally as *sui generis* forms of society's structured interrelationships that Durkheim (1893/1984) wrote preceded individual self-awareness. The intersection of these institutionally bound relationships is that space whereby Mead's (1956/1977) 'me' and 'generalized other' emerged. As a construct, sociocultural factors signify the diffused and relational repertoires individuals make use of to comprehend macro- and micro-level belief structures about race, gender, social class, and self. Contemporary social psychologists have referred to these as important components of "interpersonal identity" construction (Kaplan 1986; Tice and Baumeister 2001:71).

These sociocultural repertoires represent Bourdieu's embodied individual preferences (dispositions) that enable individuals to navigate the varying trajectories available to them as they decide on life paths (Webb et al. 2020). Menardoa, Balbonib, and Cubellic (2017) have analytically defined sociocultural as that "set of preferences, knowledge, and behaviors that characterize an individual's way of life and depend on his or her cultural, social, and economic resources". This includes "self-knowledge gained from the standpoint of a significant 'other'" in their daily social interactions, especially in terms of racial formations or legitimized racial stereotypes (Van Ausdale and Feagin 2001; Higgins and May 2001:48; Sedikides and Brewer 2001).

As a prototypical case, van de Werfhorst and Hofstede (2007) empirically investigated two explanatory factors of affecting educational inequality outcomes: an exogenous condition (cultural reproduction) and an endogenous condition (relative risk aversion). For purposes here, it is simpler to consider this a macro and micro level affect. They found that cultural reproduction was most pronounced in early childhood socialization as a 'primary' effect while relative risk aversion was a 'secondary' effect that developed later in a child's life.

Conceptually, the authors pointed out that secondary school affects were relatively more significant for student outcomes than their earlier socialization. Analytically this makes sense as individuals are first grounded in a rule structure and then act within that structure given more information as they grown more experienced. Imagine the preference for and use of tools. Such an encounter is inextricably bound up with the available repertoire of cultural forms as much as recognizing a tool's material, physical attributes.

Primates can learn and transmit material knowledge about different sized tools for particular uses, but for humans, the distinction between a tool's materiality also takes on substantive, experiential dimensions through rituals learned during socialization. Simply, humans use tools to manipulate their material existence, but rely on their culture to make sense about the origin, purpose, and sacredness of meaning a tool has in particular social settings (Durkheim 1893/1984:288).

Conceptually, the first step in my sociology of culture study required delineating the sociocultural factors affecting children's life trajectories that have structurally marginalized Blacks and ethnoracial³⁴ groups' recruitment to colleges of veterinary medicine (CVM) while maintaining Whites dominance in the fields of animal care and research. As a first step, I begin with a theoretically informed study of culture that relies on "enculturation", with emphasis on "cognitively motivated theories of cultural meaning" (Lizardo 2017:91). As Massey and Brodmann (2015) have written,

The social settings experienced during childhood and adolescence are especially powerful in shaping the physical, cognitive, and social capacities of human beings. In contemporary postindustrial societies, the key social settings for human growth and development are the family, the school, the neighborhood, and the peer group. Together they are the four fundamental social contexts within which human capabilities are nurtured and expressed. (P.3)

Why So White?

My research expands on a critical sociology of culture that has examined the persistence of social inequalities arising from heteronomous structural³⁵ barriers, but has

³⁴ Throughout this paper, reference to 'ethnoracial' groups is an attempt to move beyond singular meanings of race and ethnicity and instead represent the dynamic social character that race and ethnicity becomes through the "social, economic, and political forces that continually shape and redefine the meanings affixed to race and ethnicity (Aldana and Byrd 2015:565).

³⁵ Although, social structure remains a contested and ambiguous construct in the social sciences (Porpora 1989; Gorz 2003/2010), I posit that a definition of social structure requires acknowledgement of its *sui generis* character (Sayer 2010) and subsequent effect on individuals' social interactions through varying sociocultural fields of experience (Bourdieu 2005). Thus, definitions of social structure used in this paper will reflect different vector points of individual/collective selves and social structure/social contexts emerging from their everyday practices (Spears 2001).

less consistently identified the cultural ‘declarative and nondeclarative’ dimensions of everyday life (Lizardo 2017). These two analytically distinct but interconnected processes are responsible for individuals’ stereotypical views based on family wealth, occupation, education, gender, and race (Lincoln 2010; Hällsten and Pfeffer 2017).

According to Lizardo (2017), declarative cultural forms are representations of the symbolic systems of meaning individuals rely on to make sense of their world (Patterson 2014)³⁶. Nondeclarative cultural forms are the life-long learning processes that Bourdieu (1990) addressed as individual, yet learned, dispositions embedded in a person’s habitus, i.e., perceptions, motor skills, contact with stable forms of experience. Declarative forms comprise spoken and/or written language, including collective memories, moral systems, perceptual intentionality, and is “open to inspection via reflective cognitive acts” (Lizardo 2017:92).

A declarative empirical analysis holds a “high degree of fine-grained detail in relation” to individuals’ cognitive process. Thus in my study, identification and explanation of the social and cultural conditions that bolster or hinder occupational participation based on a group’s racial and ethnic identities in general, and more

³⁶ Patterson (2014:5, 16) writes, “I understand culture as the conjugate product of two interconnected, componential processes. The first is a dynamically stable process of collectively made, reproduced, and unevenly shared knowledge about the world that is both informational and meaningful... Its basic processes are shared schemata that are internally embodied and externally represented”. The second makes up “the pragmatics of culture reflect power and status differences between individuals and affirm social identities in terms that vary not only by class but also by the major ascribed categories of gender, ethno-race, and age “

specifically, in the veterinary medical fields (Strayhorn 2009) will rely on consider both forms.

Social Fields of Interaction

Horvat and Davis (2011) suggested that social research models into academic barriers required a system of verification that incorporates an understanding of students' self-identity (relational), their willingness to accomplish socially sanctioned goals (discursive), and their capacity to care for themselves and others (performative relations) within a given field³⁷ of activity. Asencio's (2013) research into the salience of self-esteem as a moderating influence for workers or criminals' identity is instructive here. His research found that individuals reporting high self-esteem was more likely to align their perceived self-view with others' stated impressions of them. In other words, individual behavioral outcomes *are relationally, discursively, and performatively affected* (italics added for emphasis) by parents, peers, and teachers, and vary according to a person's comfort or willingness to accept, change, or modify specific behaviors given their varying social contexts.

³⁷ Borrowing from Bourdieu's cultural perspectivism, interaction refers to "striving in the fields" as a coordinated act "by the habitus, a cultural unconscious, a matrix of dispositions that serves to organize perceptions" (Martin 2009:23). This is the embedded power of stratification. Further, the use of field denotes group actions within social spaces without attempting to give precedence to mechanistic or formalistic accounts of existential relations (see also footnote 3). This method instead conceptualizes fields of interaction as those spaces that delimit temporal subject-object possibilities of innovation (such as playing games), controlling for socio-normative factors. This approach is strongly related to William James's "radical empiricism" (Emirbayer and Maynard 2011:225) whereby explanations of the social world are verifiable findings inferred from social experiences. Fine (1992:102) describes this, as "people comprehend things-in-context."

A logical weakness however, remains because social constructs generally do not provide a direction of casualty, leaving public policies contested. Conversely, the studies cited previously have provided important socio-normative parameters that offer context to exogenous factors in a study affording salient discussion points for policymakers concerned with increasing minority student populations' inclusion into the science, technology, engineering and mathematics (STEM) fields.

Consider Howard's (2007:19) review of research studies on the academic achievement of African American K-12 students that showed steady increases in high school graduations, but finds these descriptions paradoxical because of "the severity and persistence" of structural barriers that left African American students' achievement gap steady compared to other racial groups. Equally, Hossler, Schmidt, and Vesper (1999) in earlier research that is further exemplified by Horvat and Davis's suggestions (2011) argued that there was a critical need for closer study of the social, economic, and educational factors that affect African American students' decisions to enter college.

Chen and Soldner (2013:5) returning to an aggregate model indicated, "Students' decisions to leave STEM fields were likely to arise from a variety of external factors, underscoring the need to examine models of STEM attrition that include multiple factors simultaneously". In their longitudinal study consisting of a sample of 13,400 students, Chen and Soldner (2013) acknowledged that significant sociocultural factors remained outside their study parameters. They wrote that exogenous variables such as the "institutional context, climate, and support for STEM learning" students were exposed to

such as the “characteristics of STEM faculty, STEM-related preparation, experiences in high school, and noncognitive factors such as motivation, interest, confidence, and beliefs” were not addressed (2013:8).

Further, the authors described that of the total number of African American students selecting a STEM major in four-year programs, 29 percent left without obtaining a degree and 36 percent switched to non-STEM majors. Considering the relatively small percentage of STEM students of African American origin, the attrition rates as a total proportion of the relatively small numbers of minority students underscores the need for better insight into the socio-normative factors affecting African Americans decisions to enter and remain in STEM fields.

Thus, given the effect of stratification forces on the distribution of human capital resources³⁸ – including future academic and occupational networking opportunities and challenges (Jiménez and Horowitz 2013; Erickson 1996) – it is important to delineate the network path of cultural resources accumulation and implementation as independent variables that contextualize³⁹ students and parents’ social interaction (Howard 2000;

³⁸ Sociologists recognize the theoretical significance of examining individuals’ opportunity structures in light of acquired human capital resources embedded in culture and ecologically bound (Loughran et al. 2013; Kwon, Heflin, and Ruef 2013).

³⁹ Arguably, contextualization is an opaque construct unless located within a formalist (*a priori*) or relationalist (*a posteriori*) theoretical framework. Erickson (2013:227-229) explains in the context of network analysis the two theories are somewhat incompatible because a relationalist perspective posit “meanings constitute relationships” through interaction “between things rather than in things themselves” while formalists portend that “social forms or relationships, presuppose interactions”. The formalist asserts that social forms produce varying kinds of interaction that manifest properties heretofore empirically unsubstantiated. Sidestepping the epistemological argument, I argue that context represents fields of interaction whereby social meanings are enacted, contested, accepted or rejected, modified, and reproduced; i.e., they have lower and upper limits. Thus, I am less concerned with justifying the origin of

Emirbayer and Goodwin 1994). For example, a key factor to consider is the causative relations linked to a family's neighborhood (Hill et al. 2013) and parents' academic or occupational expectations for their children and how these factors affect students' performance in high school and their decisions to attend two-year or four-year college programs (Jerrim 2014). As Somers (1994:605-606) argued, research contributing to the sociological understanding of social agency needs expanding beyond aggregate or "fixed essentialist" categories of investigation such as ethnic and gender descriptors. Somers suggested that research needed to place social relations within historical situations to bolster "our understanding" of cultural identities.

More recently, Ridgeway (2014:1-2) pointed out that studies that failed to address status "as an *independent* force in the making of inequality" were ignoring salient sociocultural factors that "link micro and macro processes". In her presidential address to the American Sociological Association, Ridgeway said that status arises from cultural norms in contrast to simply objective, material conditions. For Ridgeway, status beliefs imperceptibly shape behaviors based on biases informed through status and cultural hierarchies⁴⁰, in-group alliances, and status beliefs maintenance in the form of resistance by status holders challenged by groups with inequality grievances.

sociality and meaning construction; instead I prefer to focus my attention on the dialectical outcome of structure and agency on social networks of opportunity in educational settings by identifying the various cultural frames or meanings (Goldberg 2011) informing group decision-making (Reed 2010).

⁴⁰ Throughout this research, the construct of culture, cultural hierarchies, cultural networks of relations and subsequent actions represents Bourdieu's (1991:106) commentary on the "performative or magical intention" of social interactions and outcomes whereby individuals replicate and legitimate symbolic power through their daily practices. More succinctly, Farkas (1996:5) explains observed cultural outcomes

Social Networks: the Ties that Bind

Social network theories do not detail specific epistemological laws or propositions, but instead take the constructs of social structure, culture, and agency as empirically verifiable social forms (Law 1994). As a methodology that lends itself to empirical testing, social network theories are based on classical sociological paradigms in the Kuhnian (1962) sense that rely on the Weberian practice of *verstehen* (Truzzi 1974) to inform and extend general propositions that historically have identified social structure, culture, and agency as deductive inquiries into constrained social relationships (Blau 1964/2008; Law 2004). For example, the tracing of a social network via nodes of contact based on theorized social distances once reassembled become substantive emergent patterns of sociality (Latour 2005).

However, social network theories also reflect the essential element of George Herbert Mead's pragmatic social behaviorism that the self is an emergent entity whose sociality is dependent on symbolic interactions that are "the product of an I-Me dialectic" (Stryker 2003:97). Hence, social networks are 'theories of relationality' used to describe and explain the variability of human action that emerges from cognitive, reflexive processes that include novel interpretations of social phenomena.

Simmel (1971) would likely find these actions are reflective of social forms; for Stryker (1982), they are the result of symbolic interactions constrained by structure. In either case, reflexivity and the consequent action in a social field are bounded by societal

as "skills, habits, and styles" emblematic of groups' varying orientations, their subjectivity as it relates to an external world predicated on the coercive power of stratification.

norms (the generalized other), by individual agency, and the socio-ecological relations that contextualize individual's behavioral choices. We can theorize this as something akin to agency as a probabilistic but indeterminate action that leads people "to stamp the pattern" of their future "developing self" though a dialectical relationship⁴¹ of structure and cognition (Mead 1934:263).

The relational networks that emerge because of the interactions between structure, culture, and agency are empirically identified through groups' symbols that represent emergent meanings and associated behaviors. This is a theoretical orientation that allows for a diversity of competing channels of discovery and explanation as it relates to people's experiences, including their inter- and intrapsychic contextualized existences (Liu et al. 2004). Social networks, *qua* socio-ecological factors, allow an investigation into social structure, a network's centrality, its distance relations among participants, and the temporal cohesion of social interactions from multi- and interdisciplinary perspectives.

As Emirbayer and Goodwin (1994:1414) explained in their use of network relations, social networks theories "holds to a set of implicit assumptions about fundamental issues in sociological analysis such as the relationship between the individual and society, the relationship between 'micro' and 'macro' and the structuring of social action by objective, 'supra-individual' patterns of social relationships".

⁴¹ Theorizing aside, the above can be empirically described in terms of role-identity merger or discordance that social psychologists term "role repertoires [that] are organized into hierarchies" of action and meaning (Turner 1978:1). Thus, we can study the correlation or alignment between the self-as-individual and the self-as-role to better comprehend the social interaction that emerges from of structure, culture, and agency.

As Stryker, Serpe, and Hunt's (2005) study into the stability of a person's commitment based on their relative roles within their family, work, and voluntary group associations, the effect of social structure on social networks is significant on the dynamics of self-identity and the consequent social interaction that persists (Ridgeway and Fisk 2012). Thus, the investigation of socio-ecological factors allows for explicating social behaviors and processes through webs of "social relations that link actors" – processes that are "independent of the actors' wills, beliefs, and values" (Emirbayer and Goodwin 1994:1417).

The investigation into social structure then considers the routinized patterns of interactions among these concrete entities – organisms and material artifacts within a web of social action within social fields – that objectify the probable sets of social relations that link actors and non-actors.

Relational Sociology

A social relational approach offers insights into the performative character of social behaviors, but not in isolation from socio-ecological structures; similarly, the development and use of factor analyses in the social sciences allows the verification and replication of deductive structures of social actions (Cattell 1978). This fosters a synthesis of the micro- and macro- competing theoretical orientations thus far presented in this dissertation of the social forces that stratify individual and institutional conduct.

Thus, the way in which social actions are conceptualized allows for operationalizing institutional structures and group outcomes; a generalized and verifiable

form that is more robust than a simple social network approach standing alone. It is more general because many different kinds of groups, relations, and institutions that supposedly organize social conditions can be studied through various relational analytic tools.

For example, Burt (2004:354) refers to “structural holes” found within specific network groups. Structural holes exist as a condition of variability among group actors. In say Network Group A, John minimizes variability among members to increase the density of homogenous forms of social capital while Jane appropriates members’ variability to enlarge bridging social capital opportunities that lead to broader social innovation.

Moreover, network analysis provides testable observations that re-integrate structure with agency, eliminating the methodological weaknesses often-describing structure hidden within a Black Box of human cognition by revealing traces of the simplest actions of actors and their subsequent relations (Emirbayer and Goodwin 1994). The significance of relational networks as operationalized through the identification of socio-ecological factors could significantly expand scientific comprehension of substantive social relations affecting groups’ opportunity structures and access to limited resources. For example, a relational network analysis offers, “The structure of relations among actors and the location of individual actors in the network have important behavioral, perceptual, and attitudinal consequences both for the individual units and for the system as a whole” (Knoke and Kuklinski 1982:13).

Relational network analyses provide insights into “the constraining and enabling dimensions of patterned relationships among social actors within a system” (Emirbayer and Goodwin 1994:1418). This also provides a comparative approach to examine the factorial quality of relationships that give rise to unique social encounters. Thus, a socio-ecological framework could help identify those transactions of structured social interactions and subsequent progressions through its focus on “social connectivity itself- as well as through the density, strength, symmetry, range, and so on, of the ties that bind” societal members, groups, neighborhoods, communities etc. (Emirbayer and Goodwin 1994:1419). A relational socio-ecological analysis would promote discovery within the murky and relatively isolated social transactions that enable varying collective identities and social ties that makeup everyday life to emerge.

Fundamentally then, a relational framework that goes beyond simple social network node classifications of human behavior and social forms can explain social interaction based on common attributes such as ethnicity, income, norms, and dyadic connections, by focusing on what Wellman (1983) described as “involvement in structured social relations” (original citation in Emirbayer and Goodwin 1994:1414). As a tool of inquiry into the relationships grounded in everyday exchanges, a sociocultural framework can borrow from social networks theory and pass beyond the non-relational attributes, the abstract, deterministic social structures often described in the work of Marx (1867/1976), Durkheim (1893/1984), Parsons (Ritter 2008), and Merton (1996) – grand theoretical schemes that located social conduct within a demographic leviathan called society. This includes the forms of social and cultural capital.

Self and the Social Forces of Inequality

In this study, sociocultural variables investigated are marked as components, differentials of observable behaviors that study participants reported as influencing their respective academic choices and those structural conditions that provided or restricted access to institutional resources⁴². Taking into consideration that space and temporal characteristics organize social interactions of studied groups is a fundamental requirement to identify the cultural conditions contributing to a group's dominance or subordination (Giddens 1984).

For example, Japanese Americans internment in concentration camps following the bombing of Pearl Harbor is instructive. In spite of Japanese – Americans' (known as *Nisei*) beliefs in equal access and opportunities, and their subsequent overt behaviors that demonstrated their abilities to succeed in their adopted country, institutionalized social forces contradictorily marginalized their status and severely restricted their access to legitimate recourse. Although general social science assertions at the time discussed “the race relations cycle” in terms of assimilation, American-born Japanese discovered that assimilation or ‘Americanism’ also required acceptance from the dominant White majority (Kurashige 2008: 188).

The relevant research reviewed demonstrated the substantial influence social structures play in the formation of life choice opportunities and challenges students face,

⁴² As a variable in a social field of interaction, the above signifies the value cultural capital as a social commodity through “a principle of cumulative disadvantage (from the perspective of those beginning without any cultural capital) or of cumulative advantage (from the perspective of those already possessing it)” Aschaffenburg and Maas (1997:575).

especially regarding access to the sciences, technology, engineering, and mathematic (STEM) disciplines in general⁴³, and the veterinary sciences in particular (National Science Foundation 2011; Greenhill 2007; Pew National Veterinary Education Program 1988). Research findings consistently show the availability of school enrichment programs throughout students' elementary to post-secondary school years has significant positive effects on student development and academic preparation (Hooper 2013; Lowrie et al. 2013).

However, Amos and Jani (2007) investigating students' likelihood to excel or receive adequate science-based preparatory training, also found significant associations among institutional (macro) and social psychological (micro) externalities that negatively affected students' career opportunity paths. The authors pointed out five key variables associated with the success or failure of student achievement in science-related topics. Specifically, they revealed that (a) students "low expectations" of self-efficacy; (b) their "access to college preparatory work"; (c) having learned from "underqualified teachers"; (d) their parental "home– school disconnect"; and (e) "a lack of role models" (Amos and Jani 2007:6).

Moreover, studies of minority group students⁴⁴ (including gay, lesbian, bisexual, and transgender individuals) who experienced overt and covert forms of marginalization

⁴³ See the Committee on Underrepresented Groups and the Expansion of the Science and Engineering Workforce Pipeline, 2010 report for complete details on this systemic issue facing the United States.

⁴⁴ I should note here that the underrepresentation of ethnic and racial minorities is a historically long societal issue. The "Colloquy on Minority Males in Science, Technology, Engineering, and Mathematics" (STEM) held in 2010 encouraged new research to address these same problems across all scientific fields.

or stigmatization by faculty and student peers, reported less willingness to pursue their educational goals (Larkin 2012; Nolan 2012). Similarly, Gandara (2002:87) found that minority youth embedded in an ecology of poverty “are almost certainly handicapped by [their] neighborhoods that simply hold more risks” than experienced in middle class suburbs.

Furthermore, Chin and Phillips’ (2004) qualitative study of social class differences in students’ summer activities from a large urban elementary school found that parents’ social class position affected students’ development of human and cultural capital. However, the authors noted that the differences between the classes were not necessarily large, but instead illustrated that working class parents’ diminished human, social, and cultural capital act as barriers to the necessary resources that would help them assess their children’s challenges and improve their opportunities compared to middleclass, better-educated parents.

In a field experiment that examined the effects of stereotype threat, Gooda, Aronsonb, and Inzlicht (2003:645) studied seventh grade students by introducing intervention methods (mentoring by college students with purposive narratives) to bolster female, minority, and low-income adolescents ability to overcome anxiety associated with social stigmas and, consequently, measured for improvements in students’ standardized test scores.

The colloquy’s participants were particularly interested “in framing a research agenda to study how interactions between minority males and societal and educational systems (both formal and informal) encourage or discourage the young people’s interest and persistence in STEM” (Didion, Fortenberry, and Cady 2012: v).

In the treatment groups, mentors encouraged students to view their difficulties as concretely related to the subject matter or the “novelty of the educational setting” (2006:646) to minimize students’ feelings that they were not as capable as others was to successfully master study materials. The results documented significant improvement in the treatment groups compared to the control groups, providing evidence that teaching effectiveness bodes well for students’ confidence and the minimization of racial and ethnic stereotypical social exchanges.

In a related research project that examined self-identity formation across a person’s lifespan, Yip, Sellers, and Seaton (2006:1504) studied a large sample of African Americans’ (N = 940) identity status by operationalizing four typologies – “achieved, foreclosed, moratorium, and diffused” – identity statuses across the sample’s three age groups: adolescent, college age, and adult. Specific to this research project, however, was the identity status researchers found most appropriate for understanding the role of race and ethnicity in the development of individuals’ self-concept, self-efficacy, or “social identity” in college-aged students (Rotheram-Borus 1990:1075) and their subsequent ability to perform in a competitive academic environment.

According to Yip et al., (2006:1504) a diffused identity status means, “individuals have neither explored the meaning of their ethnicity nor committed to a particular identity meaning”. They concluded that negative psychosocial affects are correlated with college age subjects with a “diffused” identity status (2006: 1515), providing anecdotal evidence that identity formation was significantly linked to

adolescents' level of communicative interactions in social settings. Additionally, other studies have identified the importance of parent's social class as a predictor of children's academic success and life opportunities (Lareau 2003).

Theorizing Social and Cultural Capital

Decades of research into the theoretical development, allocation, and use of social capital is another key component that is missing in current research on the underrepresentation of racial minorities in the veterinarian field. Bourdieu (1990) explained that individuals exist within cultural spaces that are external, coercive, and inform individuals' social practices. Bourdieu offered a theoretical framework from which to investigate the societal and cultural contexts that inform individuals' decision-making. For example, Bourdieu (1998:32) claims, "All societies appear as social spaces, that is, as structures of differences that can only be understood by constructing the generative principle which objectively grounds those differences".

As an epistemological statement, Bourdieu's approach established that social stratification frames or structures a group's patterns of behaviors, irrespective of individual agency so often linked to novel social actions. Thus, this project examined the contribution of social and ecological capital during the formative years of a household's children and parental relationships. The key contextual conditions studied were family kinship, neighborhood attachment and location, educational opportunities, mentor networks, and conditions of racial bigotry, gender, and sexual orientation experiences (Serpell 2005; Jelinski et al. 2008; Chubin and Mohamed 2009).

Lin (2001) has defined human capital as an individual's embodied labor-oriented knowledge and skills used in the promotion of material existence. Specifically, these structures of social capital relations can be theorized to have emerged from actors' efforts to use immaterial labor, i.e., human knowledge, or intelligence to navigate their life trajectory was identified through a critical cultural lens (Gorz 2003/2010). As a sociocultural framework, it was reasonable to delineate the various forms of social capital. For instance, individuals' behaviors are oriented by social patterns that facilitate or impede the acquisition of social and cultural knowledge; mostly through postindustrial stratification forces effecting kinship relations, i.e., the 'ties that bind' individuals to Durkheim's (1893/1984) organic society.

This is in contrast to the rigid mechanical solidarity found in primitive social groups. These learned implicit traits become explicit through everyday practices and were transmitted as cultural capital according to Bourdieu (1986). Cultural capital formations then are legitimated modes of symbolic and physical activities that Bourdieu described as learned dispositions. This dynamic interaction between structure and agency becomes observable in the everyday actions of individuals and its reproduction in individuals' fields of life experience, i.e. their *habitus* that leads to the formation of social identities.

Conceptually, then, cultural capital simply refers to the sense making repertoires transmitted that allow navigation of social encounters. For example, individuals or groups interrelationships exist along a continuum of material and immaterial encounters

that include the distribution, use, and accumulation of different forms of capital. Each form of or position along this continuum is infused with relational social power; that is, power that is qualitatively different and differentially accessed from a person's social position circumscribed by a 'structural or institutional matrix' encountered and reproduced through their social practices. In this sense, habitus is "understood as the values and dispositions gained from our cultural history that generally stay with us across contexts (they are durable and transposable)" (Webb, Schirato, and Danaher 2002:36).

This capital matrix of social spaces is a metaphorical lens to locate subjects' physical encounters/events within sociocultural fields of interaction that makeup the institutional conditions (political, economic, and social) of individuals' lifeworlds. Social capital is just one construct that represents these relational dividends based on the outcome of intra- or inter-group activities. For example, parties to social exchanges form behavioral expectations because each group was governed by similar 'intuitive' normative (symbolic and linguistic) rules that inform their social interactions (Beaudoin 2011); but none can claim a social dividend until a later date.

Social capital defined in this way is a multifarious concept, but applied in a network of social relations was locatable in the cultural fields whereby singular practices take place amid varying dyadic social exchanges. Although this philosophical dilemma of delineating the intersection and dynamic play of structure and agency has remained a hotly debated topic in the social sciences, a proverbial 'Gordian knot' of sorts, does not

preclude empirically describing the minutiae of such nested social processes. Individuals may encounter the *other* from different cultural perspectives, but the outcome labelled social capital has represented a ‘mediation of sorts’ that occurs during individuals’ negotiations bound to and within their cultural fields.

Thus, the social capital shared among ethnic minorities is similar and dissimilar to the social capital shared among political elites, but the structure of each group’s exchanges and types of resources and dividends earned remain allocated similarly, but particular to the group’s shared habitus and everyday social practices. This is not to say that social capital ‘must be’ exchanged across groups; simply, the intentions that guide reciprocity is governed by inherited or transmitted cultural standards that inform subjective notions of what dividends might be anticipated and earned under contested conditions.

For example, a soldier saves the life of a comrade in a heated battle versus a stranger who puts their arm out to prevent an unobservant person from walking out onto a busy street. The soldier likely earns group social capital and a life-long dividend from their saved comrade. The stranger likely earns a ‘thank you’ from the unobservant person and possibly nods of approval from other pedestrians, but that dividend was offered, accumulated, and spent nearly simultaneously. Consider another example of social capital exchanges between different and yet similar groups. Each group within a social field of course forms trust, alliances, and allegiances embedded in normative, rule-

bound conditions that have qualitatively different social values (dare we say moral) and thus, offer differing forms of social capital.

The trust and social capital relations among professional football players who are relying on a game's referees to 'call' a penalty for infractions is similar but different from players who strictly adhere to the rules and those who believe the rules are simply there to be enforced by an outside agency. In both of the above examples, the sociocultural formations of habitus (the rules of the game) were the same in terms of stratified cultural fields (Bourdieu 1986), but the extant, relational properties of the social capital exchanges were qualitatively different and thus earned different dividends or more specifically, received different terms of reciprocity. Two professional football players discussing the import of trust in the rules of the game would come to different understandings (and expect different social capital dividends) in their 'relational' interaction, *ceteris paribus* (Donati and Archer 2015).

A plethora of metaphorical theorizing of social and cultural capital in the research literature has ignored the complex normative frameworks that affect students' decision-making heuristics. Social and cultural capital is human commodity forms emerging from dynamic fields of experience. The dividends obtained by dominant groups and marginalized group members are subject to, acquired within, and limited by macro and micro forces.

Sanders and Campbell (2007) reported on the positive affect a Black student's community has when role models emerged that fostered increased concern for students'

achievement and overall wellbeing. How was this different from studies of white students? The weakness in the methodology was not investigating and then explaining the cultural capital assets differentially acquired between blacks and whites, if there was a difference at all.

Flowers (2007) reported on Black students' increasing college-level success as significantly correlated with their level of involvement (quantitatively and qualitatively) in the university community; again, how was this different from white college students. In both cases mentioned, the efficacy of macro and micro interconnections provided the nexus of positive or negative forms of social capital that influenced student experiences, but the cultural context was left unexplained.

Socio-Ecological Capital and Social Forces

The research literature reviewed into the underrepresentation of minority groups and gender imbalances in U.S. veterinarian schools has not offered empirical evidence into the social or cultural capital⁴⁵ differences that vary in effect or inadvertently support those institutions that marginalize underrepresented groups (Kraaykamp and van Eijck 2010; Grodsky and Pager 2001; Borjas 1992; DiMaggio and Ostrower 1990; DiMaggio 1982). As Anderson and Roscigno (1995:640) wrote, "Inequality is not only about

⁴⁵ Bourdieu (1986) explained that cultural capital embodies three forms: individual traits (tacit or explicitly obtained), symbolic objects or cultural artifacts, and institutionalized cultural capital, which bestows legitimation on objects of authority, such as licenses, professional degrees. A form of social capital refers to trust and reciprocity among group members versus others. Irwin and Berigan (2013:427) revealed consistent empirical support existed that demonstrated the strength of social trust among group members and the lack of trust for others because of the "strength of cultural factors" on determining or informing generalized trust.

small-scale interactions, but is about the domination of rules, formal and informal, shaped and recreated by national and local organizational institutional and political structures and processes”.

Social stratification studies illuminated structural conditions and delineated stratification forces that led to “systematic inequalities between groups of people” associated with the consequences – latent or manifest – of their social interactions (Scott and Marshall 2005:639). The foundation of structure and the consequent social forces are unrealizable outside a society’s culture. Thus, societal structures legitimate an “understanding of mechanisms or processes that carry the effect of culture on beliefs and behavior” (Byars-Winston 2010:443). The result is the institutionalization of stratification forces as purveyors (ideologies) of the differential access to social resources and accumulation of heritable human capital.

Social contexts are *sui generis* for groups and yet, foster varying ethnographic findings across cultures and historical periods; e.g., subjects’ performativity, language creation, morality, aesthetics, religiosity, materialism (Abbinnett 2003; Habermas 1979), and the human species’ “*cultural break* with nature” (Habermas 1971:312). Although observance of cultural behaviors also reflect increased differentiation among social groups across time, social interaction remains a behavioral input arising from group necessity.

As necessity or instrumental requirements, at the very least a modicum of social reciprocity appears as the output needed to enable the species continued survival as

cultural anthropology has well documented (Adams 1998). For example, two different studies – Byun et al. (2012) examined the role of social capital in the educational aspirations of rural children and Smith, Anderson, and Moore (2012:380) who demonstrated individuals’ “resilience to climate change” – demonstrated the differential effect of bonding social capital versus bridging social capital networks in very different contexts with the same rudimentary outcome.

Researchers have operationalized social capital as the stock of human resources individuals have at their disposal based on their social space and social networks. In their study of place-based influences, they used bonding social capital as a metaphor to represent localized, intimate associational social networks comprised of significant others (kinship networks, friends, neighbors, local religious affiliations) that exert normative forces (either positive or negative) on group cohesion. Bridging social capital metaphorically represented the less immediate but no less important external network ties that provide information about societal norms that are primarily linked to diverse groups (professional, educational, government, media, and community organizations).

Smith et al. (2012: 398) found a negative relationship between bonding ties (associative) and individuals’ ability to learn about the localized impacts of climate change” in contrast to individuals “with a greater stock of bridging social capital”. Both studies in effect, demonstrated varying degrees of influence on decision-making based on a person’s social capital networks within specific cultural contexts.

Additionally, education researchers investigating students' academic success significantly rely on social and cultural capital ideal types to operationalize the distributive effects of family interaction and income resources on students outcomes in terms of "academic capital" (Hagedorn and Fogel 2002:170-171). The import of the research cited was not intended as a criticism of theorizing social and cultural capital. The point was to draw attention to the unspoken epistemology that silently frames the usefulness of social capital as a context-dependent relation.

Social Capital and Relational Social Networks

Although the use of social capital and social networks appeared relatively late in the social sciences literature, the study of institutionally structured contexts already gained currency early in the last century. American sociologists Robert E. Park and Ernest W. Burgess ([1921] 1969:797) wrote in their seminal work "Institutions may be created as laws are enacted, but only when a social situation exists to which they correspond will they become operative and effective". Anderson and Roscigno (1995:641) likewise expand on the institutional concept and write that recognizing inequality as "situationally contingent" acknowledges the need for a multidimensional methodology that can study the "historical, contextual, and interactional" processes that lead to inequality stemming from stratification forces.

More recently, DiMaggio and Garip (2011) investigated how network externalities affected inequality in a cross-cultural study that included Internet use in a technologically advanced country and migration behaviors in an underdeveloped nation.

Their study identified “system-level inequality as a consequence of individual choice under varying structural conditions” (2011:1889). They found that differences between “general network externalities” and “identity-specific network externalities” acted as mechanisms of both social cooperation and social inequality (p. 1890). Although the authors’ do not address social capital in their findings, it is apparent that general and identity-specific networks fall within the theoretical frame of bonding and bridging social capital exchanges.

Additionally, Massey and Brodmann (2014:247, 253) have shown nonviolent crime “is largely the province of upper-class whites” and “blacks in the lower and lower middle classes display significantly high levels of criminal involvement. Indeed, they display the very highest values on the violent crime index”. The authors’ provided a counterfactual analysis that asked what if blacks experienced the social ecology of whites. They concluded that black households lack of material resources, the cumulative effects linked to “more materially disadvantaged schools characterized by less social efficacy, more disorder, and access to fewer-school-based mentors,” seriously undermined blacks social mobility and thus minimized the accumulation of social and cultural capital resources (2015:309).

Similarly, McPherson et al. (2001) found in their study that “segregated social networks combined with the disparity in assets possessed by Blacks and Whites” is a source of wage disparities among and between the two groups. Whether ‘assets’ are economic capital or a configuration of human capital, is not a point of contention here.

Nevertheless, the authors demonstrated that inequalities developed and persisted in relation to external conditions that comprise opportunistic social structures. For example, Crowder, Pais, and South (2012) provided additional evidence that the human capital perspective explains economic and social resources (including education) as significant contributors to neighborhood integration patterns.

In a study on social stratification and crime, Burt, Simmons, and Gibbons (2012:649) found that ethnic and racial groups relied on “ethnic-socialization – a class of adaptive and protective” strategies to “promote functioning in a society stratified by race and ethnicity”. Interestingly, they found some support that these parental strategies of “cultural socialization” do compensate for “some of the negative effects” of racial discrimination (p. 663). However, parental socialization alone was not enough to reduce dynamic field experiences, those interpersonal effects of racial discrimination that led to a higher risk of committing criminal offenses.

Correlatively, Banaji and Prentice (1994:311) demonstrated that social identity formation was a key filter or lens that informed individuals’ behavioral and communicative responses (including acceptance or rejection of implicit or explicit norms) within dynamic in-group or out-group occurrences “and the consequences of such categorization”. Other researchers found that stigmatized groups are then likely to interpret their experiences in terms of majority-conceived labels that in turn negatively affect marginalized groups’ self-identity (Bernard, Snipes, and Gerould 2010:228-230).

Nguyen and Martinez (2010) enlarged on the notions of stigma and labelling and found that the interactional complexity of acculturation that racial and ethnic minorities' faced created additional intrapersonal and interpersonal difficulties. Specifically, they wrote that individuals seeking to integrate successfully within a dominant culture likely wanted to retain their culture of origin while adopting "the mainstream dominant culture" (2010:91). Problems arise if socio-normative barriers minimized minority groups' attempts at a bicultural existence by most notably, failing to comprehend the complexity of minority groups' lifeworlds; e.g., their "process of negotiating" extended kinship relations, religious orientations, moral ethos, and "identity confusion, dual expectations, and value clashes" (Nguyen and Martinez 2010:96-97; Kraaykamp and van Eijck 2010: 210)..

Hasan and Bagde (2013) have found that students' peers effect academic performance beneficially among roommates, regardless of their class or caste position. They attributed better student performance among college roommates as indicative of acquired social capital through their proximate interactions during their first year in college. Although the effects are not long-term relative to a student's overall college career, the implication was reciprocal relationships were beneficial, further validating the importance of social capital in pursuit of goals.

Thus, prior studies into social, cultural, or human capital accumulation and social mobility have demonstrated that group-specific normative conduct arising from cultural artifacts affects interactions across social strata, including "multiple contexts" such as

environment (Yonezawa, Jones and Mehan 2002:151) and “may persist across generations” as structured behavioral outcomes (Borjas 1992:148).

Human Capital Development

Klaczynski (1991) wrote that during adolescence educational institutions significantly affect students’ goal-oriented perceptions. He pointed out that education establishes and maintains stratification within a given society by legitimating functional distinctions among the various occupations. Bourdieu (1993) also made this distinction as a form of cultural capital bestowed by an institution’s authority to grant licenses, certification, etc. Klaczynski’s (1991:465) research showed that students from different educational and economic backgrounds rated “education, intelligence, and the type of occupation an individual applied for as the most important determinants of occupational attainment”; additional confirmation that the interplay of educational and familial institution have on normative outcomes.

Moreover, Shanks and Destin (2009) demonstrated in their linear and logistic regression study that a Black family’s net household wealth was the most significant predictor of young Black adults’ parental expectations, high school graduation, and college attendance controlling for parental income, education, and gender. Equally, Dunkley, Wertheim and Paxton’s (2001) larger study measured friendship networks, dating, depression, and anxiety among adolescent girls and found that body image and dietary habits were significantly affected by sociocultural factors such as a girl’s peer networks, their parents, and the media portrayals of thinness.

For example, Harvey (2007: xiv) wrote that Black adolescent students fared better academically and demonstrated improved emotional wellbeing “when they operated in settings where their sense of identity and self-concept has been affirmed”. Serpell (2002:291) has since confirmed the effect of a family’s “guided participation” that promotes adopting the appropriate or normative “cultural meaning system” that enables them to maneuver successfully in different social contexts.

Additionally, with parents arguably the dominant source of cultural and social capital accumulation for children, Hossler et al.’s (1999:23) multivariate analysis in their longitudinal study of nearly 5,000 high school students and their parents consistently showed that “parental support and encouragement to go to college” were the best predictors of students’ educational goals.

The literature thus far cited revealed the dynamic processes of social structure, culture, socially constructed identities, community, and intimate relationships, including family, peers, and mentors. Lareau’s (2003) ethnographic study of middle class and working class White and minority families further documented significant sociocultural differences in a child’s academic and lifeworld orientations. Specifically, Lareau (2003:2) emphasized that middle class parents generally, “engage in a process of *concerted cultivation*” that empowered their children to challenge institutional structures in contradistinction to working class parents.

Working class parents do not develop a discourse of entitlement with their children; instead, they focused on ensuring their children are aware of the challenges

they face in the manifest form of social inequalities and economic constraints. The author wrote, “As a result, while children whose parents adopt strategies of concerted cultivation appear to gain a sense of entitlement...[the children of working class parents] appear to gain an emerging sense of distance, distrust, and constraint in their institutional experiences” (2003:3).

Social Identity and Human Capital

Wilkins (2014) stated that the collegiate success of Black male students compared to white male cohorts is significantly lower because Black males’ identity constructions do not transfer well to the four-year public university environment. Her research demonstrated that from a social identity perspective, working class white males in high school were already recasting their identities (painful as these transformations seemed to them) in anticipation of expected changes at the college level. On the other hand, Black male cohorts in Wilkins study reported they experienced a sense of limited identity adjustment skills given the stereotypical cultural scripts afforded them by their college level audiences. Specifically, the Black male study participants reported increased emotional anxiety because of the socio-normative barriers, i.e., the marginalized contextual frames that informed their identity transformation choices.

Smith (2010:457) in a review of the research literature on race and trust found that significantly more African Americans report misanthropy (lack of social trust) compared to whites due to material barriers associated with “historical and contemporary experiences of discrimination, neighborhood and community context, and ethnoracial

socialization. Smith (2005:5) detailed the minimizing of “social capital activation” within poor African American neighborhoods is a consequence of the “properties of the individual, the dyad, the network, and the community”. More specifically, these are condition affecting the development of African American human capital (Lareau and Calarco 2012).

Affect-Control Theory and Self-Referent Behavior

Hall (2012) proposed an affect-control theoretical approach that identified early socialization experiences for the urban poor significantly affects the intersectionality of self-identity constructions where intersectionality refers to the dynamic interplay of race, class, and gender within specific contextualized frames of social interaction. As in relational networks of interaction, Hall demonstrated that stratification forces differentially affect the inequalities associated with resources distribution across societal groups.

Similarly, Kaplan (1986:4) referred to particular modifying behavioral outcomes linked to subjects’ reflexivity that led to responses that he terms as “self-referent behaviors” whereby individuals develop “response patterns” that serve to inform self-identity in conjunction with the “collective responses of others”. Extending Mead’s (1934) assertion that the I-me process entails a negotiated external reality that constitutes the generalized other, Kaplan re-classified this social psychological process with his more parsimonious self-referent construct.

This is an important empirical step because Kaplan's definition describes observations of individual adaptive responses including cultural systems or social forms that inform patterns of behavior instead of relying on the ambiguous and difficult to falsify conceptual connotations that surround psychic internalized states. Kaplan (1986) writes:

Behavioral scientists study not the determinants and consequences of the self but rather the determinants and consequences of self-referent behaviors. They are not primarily interested in how the self comes to be, but rather how the person comes to perceive himself (his own person) in a certain way, to hold certain beliefs about himself, to feel positively or negatively about himself, to evaluate himself as of great or little worth, and to present himself to others the way he does. (P.9)

CHAPTER VII
SOCIAL CAPITAL AND SELF-IDENTITY STRUCTURES: THEORETICAL
FRAMEWORK

Proposition 1

Relational social networks, affect-control, and self-referent behavioral theories describe group and individual actions as the outcome of social and cultural influences that are coterminous, i.e., coextensive or coincident in terms of range, time, and scope of social relations in specific social settings. Thus dominant group members' family, peer, teacher, and mentor social relations establish relational conditions affecting social and cultural capital exchanges.

Proposition 2

Dominant social groups' relations organize the selectivity of institutional norms that are embedded in neighborhood/community experiences that 'undervalue' or 'disfavor' the human capital resources of marginalized groups. In the United States and post-industrial societies generally, a group's social class position is a function of historical socioeconomic and political structures that effect allocation of institutional resources that become objectified as human capital. Empirically, we can recognize institutional influences as independent effects on individuals' emergent behaviors and attitudes. Thus, the variability in the effects are measurable by examining the relational

exchanges between social groups stratified by their race, class, status, gender, and sexual orientation characteristics (Blau 1964/1986; 1994; Kontopoulos 1993).

Proposition 3

Dominant groups establish relational conditions affecting social and cultural capital exchanges (proposition 1). A group's social class position is a function of historical conditions effecting allocation of human capital (proposition 2), thus it is reasonable to posit that phenomena that constrain access to and accumulation of social resources, irrespective of claims of individual freedom, talent, and rationality, foster conditions of social inequality⁴⁶.

Conclusion

Thus, culture of poverty, neoliberal, and individualists arguments has incorrectly theorized that a lack of socioeconomic mobility and equality is the responsibility of individuals and is outside the sociocultural structures informing the conditions of their material existence. The weakness of individual reductionism lies with an ontology that posits social development can only be comprehended by asking 'how' instead of 'why'

⁴⁶ According to Prokhovnik (1999), reason and the activities associated with rational freedom as interpreted from the presumptions of modernity have failed to establish a transparent view of human intentions and equality within the public sphere. Thus, reason (as a legitimizing force of normative conduct) today and its underlying ontology of human behaviors remains embedded in an anachronistic legitimacy that emerged out of the transition from feudalism to mercantile capitalism. Reason's functional axiom simply stated posits that a stable social system requires that practitioners submit to the rules and constraints central to the practice of rationality. The resulting essentialist view ignores the contested characteristics of historical conditions that require a critical investigatory framework to escape the one-dimensionality of western, capitalistic rationality; i.e., fail to consider the counterfactuals that emerge from everyday social practices (Alquist et al. 2015).

questions. For example, individualism operationalized as relative deprivation ignores the emergence of social inequality as an institutionally dependent condition.

As Willhelm (1971) wrote, western myths of individual freedom answer the how question of social discontent by pointing out disenfranchised groups exist because they incorrectly compare themselves to groups of favorable status. This is the how question. On the other hand, cultural sociologists instead comprehend social discontent as an emergent condition (how) and want to know why this might occur as a nonrandom event.

As propositions 1-3 have illustrated, the why is inextricably linked to the historical conditions that foster and maintain a society's material culture and the everyday social practices of its people. To that end, the forthcoming methodological and analytical sections address the sociocultural factors that foundationally inform the normative structures that both dominant and subordinate groups are embedded.

CHAPTER VIII

RESEARCH METHODOLOGY

The study methodology provided a research framework to facilitate an investigation into the underrepresentation of African Americans and Latinos in the fields of veterinary medicine. The results of the study would bolster policy discussions generally focused on mitigating social structural barriers that have marginalized racial and ethnic minorities access to science, technology, engineering, and mathematics (STEM) educational programs in the United States, and more specifically to address the historical dominance of white males in the large animal and research fields of veterinary medicine.

The research techniques chosen offered statistical methods for identifying and monitoring current policies designed to distribute scarce institutional and cultural resources targeting African American, Latino, Asian, and Native American students' entry into colleges of veterinary medicine. Additionally, the methodology provided a comparative benchmark for broadening future research into sociocultural and demographic forces effecting the formation of social and workplace differentiation among dominant and marginalized groups.

Methods

This study was conceived as a pilot study for later use in the inclusion of a large number of colleges of veterinary medicine (CVM). The choice of CVMs for the pilot

study included Texas A&M University, Purdue University, and Tuskegee University, all of whom were concerned about the lack of minority diversity in the fields of veterinary medicine—both companion and large animal medical fields. The Dean of Veterinary Medicine at Texas A&M and the administrators at Purdue and Tuskegee universities were contacted. Once they understood the goals of the research, reviewed, and commented on earlier drafts of the survey questions, they agreed to allow their faculty and students an opportunity to participate voluntarily. The primary role of each CVM was to announce the study to students and distribute an online link to the student or faculty Qualtrics questionnaire designed for the study.

The Texas A&M University IRB approved of the study # IRB2014-0269 on June 5, 2014 before it was made available to CVM faculty and students from the three sampled schools. The study concluded on March 1, 2017. As mentioned previously and will be further discussed in the conclusion, it became clear in the first year of the study that two of the participating schools made minimal effort to neither promote the study survey nor even monitor the success of the email distribution of the Qualtrics web link to the survey instrument. In fact, no students were logged visiting the survey website from one of the sampled veterinary schools.

The number of survey participants was relatively small from two CVMs compared to Texas A&M University's participating respondents. The lack of participation was disheartening given that 66 students were awarded a Doctor of Veterinary Medicine at Tuskegee in 2017. Texas A&M recently reported 146 as its

graduate enrollment. On average, about 325 CVM students graduate from these programs each year (National Research Council 2005).

Measurements and Variables Operationalization

Establishing criteria to control for Type I and Type II errors remains an important step in the evaluation of empirical findings and inferences. Arguably, methodological individualism has held a hegemonic force in the social science literature. In hypothesis testing, a Type I Error occurs when an acceptable null hypothesis is rejected, generally referred to as a ‘false positive’. A Type II Error occurs when an unacceptable null hypothesis is accepted, generally known as a ‘false negative’ (Gray 2009:467-469). The concern with inferential errors is traceable to the early 17th century. However, the concept of “statistical significance” in the scholarly community was left to Karl Pearson who began his work in 1893 “of fitting observed distributions to theoretical curves. The work led eventually to the formulation of the chi-square test of goodness of fit in 1900” (Cowles and Davis 2016:260).

Surprisingly, few scholars today recognize that the establishment of a probability value of 0.05 for determining the likelihood of a Type I error was an arbitrary designation halfway between the 0.10 “not very improbable” to the 0.01 “very improbable result” that has since gained favor in the social science community (Cowles and Davis 2016:260). The point here is not to argue the epistemological and methodological validity of Type I p-value of 0.05, but is instead mentioned to provide a foundation for the use of a p-value of 0.10 in the statistical analyses for this project. For

example, the sample size in the analyses used in this study is relatively small ($N = 89$). Additionally, the survey instrument comprised some 128 items. Moreover, the subgroups examined (male/female and black/white) further complicates the notion of probable outcomes. Thus, a 0.10 p-value was used as an indicator of “practical significance” (Bothe and 2011:233) in small group analyses to control for Type I errors, but admittedly, leaves open the question of Type II fallacies occurring. Arguably, addressing this issue adequately would be necessary in future analyses with larger samples drawn from the appropriate study population.

The primary independent variables in the study were gender and race. Race was a nominal variable based on the question “what is your race” with choices of Black/African American, white, Asian, Native Hawaiian/Pacific Islander, or American Indian/Alaska Native. A second question asked about whether the person was Hispanic/Latino/Latina.

The variables measuring the various types of social capital of research interest in this study are discussed below. The social capital constructs were dependent variables in the statistical tests that examined for differences between genders and racial categories, but later were used as latent independent variables with the dependent variable whether study participants had demonstrated a preference for working with large animals.

Ecological Capital

Measurements of this construct required developing questions that solicited participants’ geographical sites of their childhood to adolescence years. For example,

‘During my childhood, I felt a strong attachment to my neighborhood (clearly describes my feelings to clearly does not describe my feelings)’; ‘during your middle and/or high school years, would you characterize your neighborhood where you spent the most time as a) rural; b) suburban; c) urban. ‘During your middle school and high school years, how many times did your family or primary caregivers change your neighborhood residence’; ‘during my middle and/or high school years, my family changed residence so I could go to an academically challenging school’: yes or no. ‘As a child I sometimes wished I was raised in a rural setting’; ‘as a child I sometimes wished I was raised in an urban setting’. These two questions included a 5-point scale from clearly does not describe my feelings to clearly describes my feelings.

Family Capital

This form of family capital focused on the degree to which the respondents’ families were connected to farming or ranching. The questions involved, for example, owning livestock, fathers’ employment in agriculture, and mothers’ employment in agriculture. The measurement scale utilized ‘yes’ or ‘no’ responses.

Racial Capital

The questions measured concerns and beliefs about current public policy emphasis on creating a more diverse veterinarian profession, such as: the need to recruit more minorities into veterinarian medical programs; and whether whites enjoyed an ethnic majority privilege in the United States. Other examples included: ‘there is too much discussion about minorities in the veterinary medical profession’; ‘Blacks are

unlikely to have properly cared for household pets when they were in middle or high school'; 'I believe that the American Veterinary Medical Association should develop more outreach programs that increase awareness among minority groups living in urban cites (major cities) about technical veterinarian careers'; 'white people generally enjoy privileged status in the United States'. The answer choices followed a 5-point scale.

Cultural/Educational Capital

For this latent construct, questions focused on participants' exposure to agriculture in general and veterinary medicine specifically. Questions included: 1) were you ever a member of the Future Farmers of America, 4-H, other agriculture or agriculture sciences in high school; 2) thinking back to your middle or high school, who you remember as mentors or as role models the helped spark your interest in becoming a veterinarian or pursuing a career in agricultural sciences. The response categories were 'yes' or 'no.'

Moral Capital

These questions included issues such as the cultural differences between rural and urban areas, exposure to racial slurs, LGBTQ discrimination, and participants' comfort with LGBTQ or heterosexuals willing to talk openly about their sexual orientation.

Social Capital

Examples of questions used to measure this concept included: 1) during my childhood my neighborhood was a safe place for children to play; 2) in my neighborhood, our neighbors got together often to socialize; 3) my neighbors looked out for one another; 4) my neighborhood my neighbors were friendly; 5) my high school was a safe place to learn. These questions followed a 5-point scale from strongly disagree to strongly agree.

Survey Instruments

The survey items comprised the social, ecological, and cultural dimensions documented in the research studies reviewed systematically as given in Table 2. The studies reviewed demonstrated key factors correlated with individuals' decision to enter the veterinary profession. In the following sections, hypotheses guiding the selection of given factors that influenced the decision-making heuristics (cognitive, social, and cultural resources) of survey participants is presented. Each set of factors (social, ecological, and cultural) guided construction of the survey questions. Figure 1 provides a theoretical framework for the project and Figure 2 provides a hypothetical path analytical structure of those identified socio-ecological variables that were considered to significantly contribute to students' entry into veterinarian medicine.

Two survey instruments were developed – one for faculty and practicing veterinarians and one for students. Study participants were solicited via email at the three colleges of veterinary medicine pre-selected. The faculty survey instrument

comprised 128 items and the student instrument made up 135 questions. The survey questionnaires asked White and Black practicing/faculty veterinarians and graduate veterinary students to report their general demographic details and answer sets of questions intended to characterize their educational, social, and neighborhood experiences from their childhood to their late teen years while living at home.

Additionally, survey questions were designed to solicit participants' attitudes regarding racism, sexism, the veterinary profession's policies, and their respective colleges' diversity climate. A total of 117 survey questionnaires were initially tracked online with 85 surveys completed. There were no benefits offered for individuals volunteering to complete the survey instruments. An arbitrary cut-off of 75 percent completion of the survey instrument was set. STATA software package was used to complete statistical analyses presented in the study results section.

Sampling Rationale

The project's goal is to identify significant socio-ecological variables that veterinarians reported contributed to their decision to enter veterinary medicine. Because veterinary medicine requires graduate training and specific skills, purposive samples from three colleges of veterinary medicine (CVM) were deemed appropriate sampling frames (Clark-Carter 1997). Purposive or theoretical sampling techniques provide researchers the option to sample groups or individuals based on an 'assumed' relevance to the topics studied (David and Sutton 2011).

The sample frames were designated CVMs in Texas, Alabama (historically African-American university), and Indiana; the sampling units comprised tenured faculty veterinarians, practicing veterinarians affiliated with a CVM, and veterinary graduate students. Tuskegee's CVM was selected because of its historical distinction as a predominantly black college accredited to offer doctoral degrees in veterinary medicine. Tuskegee has graduated more than 75 percent of the African-American veterinarians in the world (Tuskegee 2017).

The initial sampling purpose was to draw enough Black participants for reliable comparative estimates. Tuskegee's black participants totaled no more than 19 individuals. Overall, the online survey solicitation of participants from the three colleges fell well below prior power estimates used to compute meaningful margin of error estimates, severely restricting the generalizability of the study's findings.

Statistical Techniques

Due to sample size limitations, contingency tables and Chi-square tests of independence were computed to assess response differences by the race and gender of survey participants. The research examined the potential sociocultural contexts or factors that affected minority students' decisions to seek, and gain access to, undergraduate universities' programs that are necessary for their preparation and entry to a graduate program in veterinarian medicine. The analysis provided a first-step toward evaluating educational policies intended to improve minority participation in veterinarian professions, uncover the precursors of racial and gender imbalances in American society,

and explain how and why the associated sociocultural forces marginalizes minority students' decisions to seek a degree in veterinary medicine.

Exploratory Factor Analyses

To extend Lamont's cultural-structural framework, my project identified a salient sociocultural matrix that informed individuals' opportunity structures. Specifically, the survey instrument sought to correlate survey responses into patterns of latent factors representing survey participants' ecological, family, racial, cultural/educational, social, and moral capital social spaces informing their life chances during their early to late teen years. Although the prior Chi-square tests for independence by study participants' gender and race revealed substantive differences as summarized in Table 11, the variables offered no reliable estimates as to the construct validity of the hypothesized sociocultural factors or capital matrix.

To establish the construct validity and reliability of the scale's measurements, exploratory and principle components factor analyses were computed for each of the sociocultural latent constructs. The analysis provided adequate covariance approximations of latent constructs and variables that emerged from the survey questionnaire items⁴⁷ (Rummel 1967; Osborne 2014). As a long-approved multivariate statistical procedure, factor analysis can significantly decrease the number of variables in

⁴⁷ The statistical literature recommends a sample size of at least 100 observations and a subjects-to-variables ratio of randomly selected subjects at five times the number of survey items for use in EFA, including principle components computational analytics (Bryant and Yarnold 2008). The sample size for my study ranged from 85 to 89 participants responding to approximately 128 survey items, a significant departure from the recommended sampling and observation boundaries, severely limiting claims of generalizability to a larger population.

a survey instrument into a smaller subset of manageable variables, i.e., latent factors. Exploratory factor analysis (EFA) is a data-driven procedure with no set specifications established with regard to “the number of latent factors (initially) or to the pattern of relationships between the common factors and the indicators (i.e., the factor loadings)” (Brown 2006:14).

EFA then links the underlying dimensions between measured variables and latent constructs, promoting “theory creation, confirmation, and refinement. In addition, EFA offers evidence of construct validity in self-reporting scales” (Rosen 2013:35). For example, the EFA models which fit the data well allowed for understanding the covariation among a set of indicators, i.e., how opinions, attitudes, or beliefs were intercorrelated with the study’s stated theoretical capital matrix. This fostered an explanation of the latent factors and constituent parts as signified by survey participants’ responses to the questionnaire items (Brown et al. 2017).

However, before attempting an exploratory statistical procedure, Cronbach’s alpha was computed to test for the reliability (internal consistency) of the survey items along hypothesized latent constructs (of which I have previously termed a ‘capital matrix’). Generally, Cronbach’s alpha demonstrates internal consistency or reliability of a scale’s items when $\alpha > 0.70$. This is necessary as failure to provide a test of the assigned variables inter-correlations would prevent replication of stated findings (Acock 2016). As will become evident in the following sections, in some cases, some theorized variables fit to a hypothesized dimension (latent sociocultural factor) did not

demonstrate $\alpha > 0.70$, but in most cases was numerically close enough to warrant consideration (values ≤ 0.10 below the generally accepted Cronbach alpha level).

The exploratory factor analysis allowed for an extraction or identification of a latent construct based on each variable's factor loadings. Factor loadings are interpreted similar to standardized regression coefficients (0 to 1 scale) with the coefficient closest to 1 considered to have the strongest association with the general factor. Additionally, eigenvalues were reviewed because these computations provided a summary of the variance in the correlation or variance/covariance matrix of survey items fitted to specified factors.

After an initial review of the factors and variable loadings for each factor, a principle components factor (PCF) analysis was performed. PCF allowed a reduction of the survey items along a single latent dimension of the proposed latent constructs (capital matrix) by solving for all the variance among the variables, substantially reducing the complexity of the scale's items (Acock 2016). It is important to note that the PCF method is not based on a common factor model.

Instead, PCF quantitatively accounts for the variance in the observed measures by producing a more manageable composite of examined variables for later analysis, e.g., through the computation of factor scores or factor coefficients for each item linked to the latent factor. Factor scores can be used later as "proxies for latent variables, and to determine a participant's relative standing on the latent dimension" (Brown 2006:36).

For example, the purpose of PCF analysis is to account for all the variance and covariance of the items examined instead of the portion of the covariance the items have in common. Statistically, PCF analysis does not consider there is unique or error variance in each of the indicator variables (Acock 2013). Similar to multiple regressions, the first principle component extracted accounts for total variance explained as a linear function of data points that lie on or near a line passing through a multidimensional space.

The multidimensional space was represented by each variable's location included in the analysis (commonly referred to as an eigenvector). Thus, each subsequent eigenvector (or factor) explains some remaining part of the total variance of the scale items until all iterations of the linear function are completed and the interrelationships among the variables are accounted for (Bryan and Yarnold 1995).

PCF scores were then subjected to an orthogonal or oblique rotation, with variables' coefficients loading at 0.30 or higher examined for coherence with a theorized latent dimension as well as how much variance the item and the eigenvector shared (e.g. loading of 0.30 would have a shared variance of $(0.30)^2 \times 100\% = 9\%$). These "stopping rules" may be set *a priori* to explain some hypothesized percentage of the total variance—more commonly referred to as the "percentage of variance criterion"—intended to estimate a single latent factor or scale dimension (Bryant and Yarnold 1995:103).

For this study, factor loadings above 0.40 were considered high enough to include an item in a scale because these loadings represented an acceptable correlation structure between each item with its extracted factor (Acock 2016). Additionally, a chi-square model fit test was computed to confirm the model's parameter estimates. The purpose here was to generate support for the latent sociocultural factors—capital matrix—by explaining the total shared variance among the scale's items.

PCF also allowed for computing a weighted factor score and mean score for each sociocultural factor's survey item for further analyses. Acock (2016) explained that a factor score (or coefficient) can provide a better indicator of a scale's measurement efficiency than the mean or total score because factor coefficients are weighted differently for each item instead of simply numerical averages.

However, some researchers were critical of the use of factor scores or mean scores computed from exploratory factor analyses as variables that would provide additional explanatory metrics. The issue for Osborne (2014:98) revolved around explaining “whether you compute factor scores using all the variables (a proper factor score) or just the variables that compose a particular factor”. He posited that the ‘proper factor score’ included all the items in an analysis instead of focusing on those items particular to a given factor.

Simply, factor scores “estimate what individuals *might* score on a factor” [italics in original] (2014:99). It is, however, arguable whether Osborne's critique is justified because he acknowledged that some items contributed significantly more to latent

constructs (have higher loadings on a factor) than other items (those with lower loadings). Suffice to say that Osborne's objections are well beyond the scope of this project. And as stated previously, acceptable factor loadings were established a priori in an attempt to extract the most parsimonious linear explanation for the survey items theorized to fall within a specified capital matrix's dimension.

Linear Regression Models

To address the issue of underrepresented minority groups in the fields of science and in particular, the field of veterinary medicine requires an inferential statistical procedure (Grimm and Yarnold 1995). Applying a multiple-variable statistical technique is considered the most reasonable methodological approach to delineate the mediating and intervening structural and cultural factors that affect students' decisions to enter the science and veterinary medical fields (George, David, Van Horne, and Malcom 2001). Adopting this approach is necessary because it incorporates and allows for multiple endogenous and/or latent variables' in the analysis (Kolenikov 2011).

A simple logistic regression model allowed identifying an equation that best predicted the value of the Y variable for each value of the X variable along an S-curve instead of a straight line. What makes logistic regression different from linear regression is that you do not measure the Y variable directly; it is instead the probability of obtaining a specific value of a nominal variable (Acock 2016). In this study's case, the values of a survey question are "agree" and "disagree". The Y variable would then be

the probability of race and gender conditions effecting agreement with a survey question. The probability obtained ranged from 0 to 1.

Simple logistic regression models were computed in those instances where survey items could be efficiently recoded into categorical and ordinal categories using a binary coding (0 or 1). In most cases, logistic regression techniques were used to measure two relational outcomes: the relationship between survey respondents' gender and their responses to survey questions and responses based on race. For example, the study's independent variables (gender or race) were used to examine for variation in the measurement of the dependent variable (agreement or disagreement with a survey question).

In this study, my goal was to find the predictive probability of the nominal variable's association on dichotomous dependent variables, i.e., participants' agreement or disagreement with a stated survey item differed significantly by gender and/or race (McDonald 2014). The use of the OLS and logistic regressions analyses allowed for predicting the outcome of theorized capital matrix variables' influence on survey participants' life course opportunities.

Research Hypotheses

The following hypotheses investigated the sample's response variability across survey questionnaire items. As previously mentioned, the survey instrument was designed to solicit participants' attitudes on sociocultural factors that could be located in a multidimensional social space, including characteristics related to racist and sexist

formations. As mentioned previously, I have coined a descriptive label of my framework ‘a capital matrix of social spaces’. This framework follows Bourdieu’s methodology of establishing a field analysis that extends to identifying the various forms of human capital in use and the affective, microstructures of an individual’s habitus (Grenfell 2010).

The sociocultural field of inquiry locates respondents’ ecological, family, racial capital, cultural and/or educational capital, social capital, and moral capital intersecting axes in social space that is at once homologous and distinctive as objective structures (see Figure 1). Pursuant to that, each capital construct is considered for its relational influence through forms of symbolic power acquired through their material existence and reinforced by their daily practices; for example, as objectified in a society’s stratification system whereby assets and resources are metaphorically spoken of as forms of ‘currency’ exchanged in given social settings.

Each capital formation then informs actors’ intentions and purposes that lead to the development of a habitus of routinized dispositions that allow sensemaking under dynamic social exchanges. These dispositions or attitudes regarding social perceptions and behaviors were identified through survey participants’ responses to survey questions⁴⁸.

⁴⁸ It is important to note here that Kaplan (1986) provided a transparent and inclusive framework of the habitus that demonstrated the importance of social context in the evolution of individuals’ self-referent behaviors. Specifically, he wrote, “Self-referent cognitive processes are directly affected by the person’s own traits, the system of concepts the person uses to structure his perception of these traits, the person’s

The following null hypotheses were developed based on prior research that documented significant associations between students' early exposure to companion and large animals and their likelihood of pursuing careers in veterinary medicine or research (Amass et. al., 2011; Villarroel et al., 2010; Strayhorn 2009; Serpell 2005). Additionally, researchers have shown that inadequate mentor relationships affected black students' career choices and life decisions (Asare 2007; Lenarduzzi, et al. 2009).

Other research findings have pointed out that social and economic background experiences can also significantly contribute to students' academic and occupational pathways and ultimately their social mobility (Daly and Erickson 2012; Jarman et al., 2011; Chigerwe, et al. 2010; Tomlin, et al. 2010; Walker 2009; Gwinner, et al. 2006; Prince, et al. 2006; Sterner 2006; Heath, et al., 2006; Ilgen et al., 2003; Lareau 2003). The hypotheses were ordered based on the theoretical capital matrix previously discussed.

Ecological Capital Resources

H1a: There are no significant differences in survey participants' childhood residential geography by gender or race.

H1b: The type of household survey participants' were raised does not significantly differ by gender or race/ethnicity.

perception of the situational context that defines the social significance of these traits, and the self-protective responses that influence favorable self-perceptions. These influences, in turn, are socially determined" (1986:180).

Family, educational, and cultural capital

H2a: A participant's family relationships and agricultural related experiences are not significantly different by gender or race on the human or cultural capital assets, resources, or opportunities afforded them. The analyses included examining for significant differences on the following survey items: their age at first exposure to farm/ranch animals, family members' agricultural-related organizations, parents agricultural, occupational, and educational backgrounds, and grandparent's agricultural backgrounds.

H2b: The opportunity to participate in agriculture-related organizations during their high school years was not significantly different for survey participants regardless their gender or race.

H2c: The opportunity to attend agriculture science courses during their high school years was not significantly different for survey participants regardless their gender or race.

H2d: Survey participants' opportunities to establish agricultural-related mentor relationships during middle and high school was not significantly different by gender or race.

H2e: Survey participants did not experience significant differences in their high schools' promotion of careers in veterinary medicine and/or research by gender or race.

Racial Capital

H4a: Study participants' belief that blacks received unfair college of veterinary medicine admissions did not significantly differ in their responses by gender and race.

H4b: Study participants' belief that racial discrimination is an issue for the veterinary medical fields did not respond significantly different in their responses by race and gender.

H4c: Study participants' beliefs that whites have a privileged status in American society were not significantly different by race and gender.

H4d: Study participants' selection of a college of veterinary medicine based on the college's racial composition mirroring their race was not significantly different by respondents' gender or race.

Social Capital

H5a: Study participant did not demonstrate significant differences by gender or race that their neighbors socialized often and well together.

H5b: Study participant did not demonstrate significant differences on their responses that their neighborhoods were 'friendly places' to live during their youth by gender or race.

H5c: Study participants did not differ on their perceptions that their neighbors demonstrated care and concern for one another by gender or race.

H5d: Study participants did not differ on their perceptions that their neighbors were a 'close knit' group during their childhood years by gender or race.

Moral Capital

H6a: Study participants were not significantly different on their early adult beliefs that people living in rural and urban settings exhibited substantial cultural differences by gender or race.

H6b: Study participants were not significantly different on their exposure to racist comments in social settings by gender or race.

H6c: Study participants were not significantly different on their acceptance of discussions about LGBTQ relationships by gender or race.

H6d: Study participants were not significantly different on their having heard LBGTQ derogatory comments by race or gender.

CHAPTER IX

DATA ANALYSIS AND RESULTS

Demographics

Survey Participants: Descriptive Statistics

Faculty and graduate students' gender and racial percentage distribution is shown in Table 3a. The survey sample was an approximation of the racial distribution of students who graduated in 2009 from colleges of veterinary medicine (CVM) in Texas (93 percent white compared to seven percent Blacks, Asian, and Latino students – see Table 1). Faculty and/or practicing veterinarians comprised 35 percent of survey participants and CVM students made up 65 percent of the total sample. Males comprised 30 percent of the sample (n = 25) compared to females at 71 percent (n = 60).

As noted in the literature review section, White female participants are an overrepresented group compared to males and other minorities in the veterinary fields of companion animals and equine care. White survey participants (n = 69) had an 81 percent share of the sample versus 19 percent for Black participants (n = 16).

Geographic Distribution of Sample Participants

Table 3b provides the percent distribution of the survey sample's childhood residential locations (N = 83) by race and gender. Of those reporting their childhood residences, 45 percent of the total sample were from rural (n = 37), 47 percent from suburban residences (n = 38), and eight percent from urban homes (n = 8). Of the total

number of Blacks reporting (n = 16), six percent were raised in rural areas, 10 percent from suburban areas, and three percent from urban designations. White survey respondents (n = 67) from rural areas comprised 39 percent, 37 percent of suburban locations, and five percent of urban settings. Twenty-percent of the total number of male respondents was raised in rural households, eight percent from suburban settings, and one percent from urban areas. Twenty-five percent of the females in the sample were raised in rural residences, 39 percent from suburbia, and seven percent from urban locations.

Chi-square and Fisher's Exact Tests for Group Differences

The chi-square and Fisher's exact tests for gender and residential location found significant differences based on respondents' gender [$X^2(9.45)$, $p < 0.001$ and Fisher's Exact, $p = 0.01$] (see Table 3c). Seventy-one percent of males in the sample reported they were raised in rural settings compared to 34 percent of females surveyed. However, because there were data cells with less than recommended minimums (cell size ≤ 5), the Fisher's Exact test was used to test for significance (McDonald 2014).

Throughout the data analyses, when a chi-square test is performed, a Fisher's Exact test will be computed as well. On examination of row percentages from Table 3c, females were more likely to grow up in suburban neighborhoods (54 percent) compared to only 25 percent of male respondents.

A chi-square and Fisher's Exact tests for independence for race and residential location (Table 3d) were not significant (X^2 , $p \leq 0.2311$, Fisher's Exact, $p \leq 0.201$),

indicating no difference in response categories by racial group. However, Black participants were overrepresented from urban neighborhoods, indicating an ecological disadvantage compared to whites who were raised in rural and suburban settings.

Based on prior research into neighborhood segregation and its associated social outcomes (see Fossett 2011 and Mickelson 2014), it is important to consider if other social and cultural capital assets related to agriculture were less available to students from urban areas. This suggests that a more granular approach to evaluating current public school agriculture science course and mentor relations availability requires further study.

Survey Participants' Kinship Ties

The sampled groups' family kinship structure by gender and race as presented in Table 4a showed that a small percentage of males (12.5 percent) and females (6.6 percent) were raised in a single parent household. Overall, both genders were raised in traditional, two-parent families. A chi-square and Fisher's Exact assessment revealed no significant difference between a respondent's gender and type household they were raised in [χ^2 (0.6642), $p \leq 0.415$ and Fisher's Exact, $p \leq 0.336$].

However, Table 4b showed that a larger percentage of Blacks were raised in single parent households (21.1 percent) compared to Whites who reported living in traditional family units (94.3 percent). A chi-square and Fisher's Exact tests revealed Whites in the sample were most likely raised in traditional households [χ^2 (4.30), $p \leq 0.04$; Fisher's Exact, $p \leq 0.06$].

Additionally, Table 4c examined ‘family residential stability’ by asking survey participants to report how often their family moved during their middle and high school years. Males were more likely to have stated their families had never changed residences compared to female respondents (84 percent versus 55 percent). Because some cell totals were less than five, the Fisher’s Exact test was used to test for significance between gender and the survey item. The results showed that males were more likely to have been raised from childhood through high school in the same home [χ^2 (7.1306), $p \leq 0.068$ Fisher’s Exact, $p \leq 0.027$].

Table 4d provided percentage distributions for ‘family residential stability’ by race of respondents. A chi-square and Fisher’s Exact revealed no significant differences by survey participants’ race on the residential stability factor [χ^2 (4.8919), $p \leq 0.180$ and Fisher’s Exact, $p \leq 0.268$]. Overall, a substantial majority of the Black and White survey respondents’ residential locations was stable with 56.2 percent of Blacks and 65.2 percent for Whites having never moved during their childhood to late-teen years.

In summary, the findings discussed in the above tables lends support to social ecology theories that have suggested a child’s kinship structure and stability of residential setting were significant factors contributing to the sample participants’ successful life trajectories (Webb et al. 2002). In this case, the sample comprised of CVM students and practicing/faculty veterinarians, supported claims that find educational attainment was associated with youths’ stable home life.

To examine further the affect family residential stability and type residential setting might have on CVM students, faculty, and practicing veterinarians, a multinomial logistic regression was computed for sample respondents' preferred residential locations (DV) controlling for gender, race, and their childhood residence (IVs). The relative risk ratios (similar to odds ratios) demonstrated that males were about four times more likely or had a 323 percent greater likelihood than females in the sample to prefer a suburban setting at this point in their life *ceteris paribus* ($\Omega = 4.2314$; $p \leq 0.123$).

Acquiring Cultural Capital on the Farm

A key contextual factor that was identified in the general agricultural population provided additional support that national policies can contribute to the cultural capital deficits of African Americans. Between 1920 and 1997, the number of African Americans farmers dropped by 98 percent compared to a 66 percent drop in White farmers (Reid 2003). Historically, racial discrimination was embedded in the federal government's rejection of agricultural loans to black farmers through the Farm Service Agency (FSA) of the U.S. Department of Agriculture (USDA) (Escalante et al. 2006). The FSA is the federal agency that provides direct and guaranteed loans as temporary sources of agricultural credit created to bolster farmers' credit worthiness during times of financial duress.

USDA policies for many years had denied or delayed black farmers' access to farm loan programs, including Farmers Home Administration loans that were made available to white farmers. The National Association of Black Farmers sued the federal

government in 1997, which was partially settled in 1999 for \$1 billion⁴⁹ (Shauk 2010). Some of these government practices were cited as discriminatory and fostering declines in the number of small farms owned by African Americans.

For example, the denial of loans to black farmers at higher rates compared to white applicants was the result of discriminatory efforts by local and county agriculture extension agents. Government representatives erected barriers to credit sources by stalling loan processing times and the use of highly conservative yield calculation methods that understated projected crop yields (Escalante 2003; Hinson and Robinson 2008).

As a contextual factor, the marginalization of the adult black farming population had also affected black youth. Loss of farms pushed black families to urban areas in search of work and severely limited black youth's opportunity to learn and experience a rural-based agricultural life. For example, there were 1.2 million individually owned farms in the United States, but fewer than 18,000 of those farms (less than one percent), were counted in black stewardship in the late 1990s (Rural Minority News 1998). To investigate further the possible consequences of structural conditions affecting the human capital acquisition of students considering a career in the veterinary fields follows.

⁴⁹ However, the Environmental Working Group (2006), a non-profit research advocacy organization in Washington D.C. reported that of 100,000 farmers who applied for claims against the agreed upon \$ 1 billion settlement, 9 out of 10 black farmers were denied their claims.

Survey Participants Affiliation with After-School Agriculture Programs

The percentage distribution of the survey sample who reported participation in high school agricultural-related organizations such as the Future Farmers of America (FFA) by gender and race are given in Table 5a and Table 5b, respectively. An analysis by gender for so-called after-school clubs showed that males held a 23-percentage point advantage over females in the survey (68 percent versus 45 percent).

More than 50 percent of the female respondents reported not belonging to after-school programs during their middle school or high school years. A chi-square and Fisher's Exact test of significance demonstrated that gender identity, i.e., males were more likely to participate in extra-curricular after school agriculture programs than females were (χ^2 (3.74), $p \leq 0.05$ and Fisher's Exact, $p \leq 0.04$).

Table 5b provided insights into the percentage distribution of persons who belonged to an after-school agricultural organization. Whites were nearly twice as likely as Blacks were in the sample to report group membership in afterschool programs during their middle and high school years (55.7 percent versus 26.3 percent, respectively). Overall, about 74 percent of the Blacks in the survey had never joined such organizations. A chi-square and Fisher's Exact tests of significance demonstrated that race, i.e., Whites in the sample, were more likely to have participated in afterschool programs than Blacks in the survey were (χ^2 (5.1669), $p \leq 0.023$ and Fisher's Exact, $p \leq 0.021$).

Given the survey respondents as a group comprised CVM students and/or veterinary faculty/practioners, one important consequence from the data analysis needs mentioning: the findings in Table 5a and 5b provided *counterfactual support* of the contribution after-school groups make in the acquisition of social and cultural capital. The accumulation of social and cultural resources for young people indicated a likely significant contributing factor that bolstered students' interest in agriculture sciences.

The findings above combined with residential location pose additional questions. First, because blacks in the survey were less likely to have affiliated with after-school programs that were tailored to agricultural-related knowledge and skills, further studies are needed to measure the relative weight participation in ag-related programs has for students in general and minority groups.

Second, having identified the relative importance of after-school programs, a census that identifies which if any suburban and urban school districts have offered similar extra-curricular activities would allow for comparisons. Finally, school districts would be identified that were primarily serving minority populations would be identified for further comparative purposes.

To address partially the questions above, this project asked sample respondents if they had attended middle school and high schools where agricultural science courses were offered. Additionally, they were asked if they had developed agricultural and/or veterinarian mentor relationships during their middle and high school years.

Exposure to Agriculture Science Classes in High School

Table 5c showed that more than half of the males and females surveyed were likely to have attended a high school where agriculture science courses were offered (64 percent versus 57 percent). A chi-square test assessed differences between the two categories ‘gender’ and having ‘attended a high school that offered agriculture science courses’. The results demonstrated there were no significant differences based on sample respondents’ gender identity (X^2 (0.3918), $p \leq 0.531$ and Fisher’s Exact, $p \leq 0.353$).

Table 5d examined whether survey participants’ race and their high schools offered agriculture science curriculum were independent categories. From the sample, 61.4 percent of Whites reported attending schools that offered ag-specific courses compared to 36.8 percent of Blacks. A chi-square test revealed significant differences by race on the agriculture sciences course offerings (X^2 (3.6694), $p \leq 0.055$ and Fisher’s Exact, $p \leq 0.007$). Overall, the percentage distribution by racial group demonstrated that access to agricultural courses during high school allowed Whites to accumulate human and cultural capital, but also ‘racial capital’ advantages; an 18-percentage point benefit.

This finding lends support to Massey’s (2007:220) description of “horizontal” and “vertical” stratification that position groups based on essentialist cultural definitions of what it means to be male and female, white and black, and the separation of groups based on “income, prestige, power, and authority” that bolster structural forms of racial and gender segregation.

Respondents' Public School Years: Mentor Relationships and Exposure to Livestock

Table 6a and 6b provided participants' exposure during middle- and high-school to veterinary or agriculture-related mentors by gender and race. A chi-square test for independence as shown in Table 6a found partial support for significant differences by respondents' gender (males = 64 percent, females = 48.3 percent) regarding mentor or role model relationships during their middle and high school years (X^2 (1.7386), $p \leq 0.187$ and Fisher's Exact, $p \leq 0.140$).

A chi-square test of independence as shown in table 6b found significant differences by respondents' race on the public school mentor relationship category (X^2 (4.369), $p \leq 0.037$ and Fisher's Exact, $p \leq 0.033$). In other words, Whites were more likely to have attended schools that afforded them an opportunity to develop ag-related mentors than Blacks in the sample (58.6% versus 31.6%, respectively).

To examine this finding further, a follow up question examined segregation in students' public school experiences. Table 6c presents the percentage distributions by gender on survey responses to the racial makeup survey participants reported for their middle and high schools years. Eighty-two percent of the females and 76 percent of the males in the sample had attended schools that primarily reflected their racial identity. A chi-square assessment as shown in Table 6c found no significant differences by respondents' gender given the majority of both groups answered in the affirmative (X^2 (1) = 0.3542, $p \leq 0.552$ and Fisher's Exact, $p \leq 0.563$).

However, Table 6d provided a different story related to the percentage distributions by race on the survey item related to attending middle and high schools. Eighty-seven percent of the Whites and 50 percent of the Blacks in the sample had attended schools that primarily reflected their racial heritage. A chi-square assessment as shown in Table 6d found significant differences by respondents' race on the survey item ($\chi^2 (1) = 11.0870, p \leq 0.037$ and Fisher's Exact, $p \leq 0.033$).

This gap in attending schools with a similar race (87 percent versus 50 percent) demonstrated two key but different effects of segregation on educational opportunities for minority students. First, the differences in cultural identities formation that Blacks encountered during socialization experiences was qualitatively different compared to Whites most likely as a result of residential segregation patterns (Pope-Davis et al. 2000). Blacks attending majority white schools have had to develop coping mechanisms to navigate the everyday microaggressions⁵⁰ they encountered (Hudson et al. 2016; Lain 2016). Thus, in schools where blacks remain a minority population, integration fostered increased likelihood of social isolation and thus diminished social and cultural capital exchanges as earlier data analyses have demonstrated.

Secondly, 73 percent of the Black students in the sample reported they attended public schools compared with 84 percent of Whites sampled. Juxtaposing these two

⁵⁰ According to Lain (2016:286), microaggressions can take three objective forms as “microassaults, microinsults, and microinvalidations”. These emerge as “unconscious comments, putdowns, or insults”. Blacks’ experiences of microaggressions in schools include a conscious feeling of ‘being the other’, or seeing a female student pick up their walking pace as a black male approaches them from behind, or when a white student or faculty compliment a minority student for their ‘articulateness’.

findings in terms of public school racial composition, it became apparent that Blacks in the sample were most likely raised in segregated neighborhoods and school districts. Although this is not a new finding in education or demography (Wilkes and Iceland 2004), further analyses of school district locations and neighborhood residences were not solicited of survey participants.

As has been discussed, outcomes related to high-poverty, hypersegregated settings were structural and institutional barriers that disadvantaged ethnic minorities in academic settings, especially STEM-related educational pathways. The cultural forms embedded in structures and institutions have affected the acquisition of human capital and have had direct and indirect effects on students' achievement (Bourdieu and Passeron 1970/1977; DiMaggio 1982; Lamont and Small 2008).

For black students, opportunity structures were minimized compared to their white peers because they would have had fewer options in terms of educational course work in the agriculture sciences. African American students were less likely to have joined social groups affiliated with agriculture or have had parents experienced enough or with household assets that would allowed parents to counsel them about the potential benefits of a career in agriculture sciences (Farkas 1996; Klem and Connell 2004; Morrissey, Hutchison, and Winsler 2014); a significant cultural capital deficit.

To that end, the next section further examined survey participants' structures of opportunity to develop and acquire cultural capital by identifying additional sources of

kinship ties: sample participants' families' livestock ownership, grandparents' agriculture background, fathers and mothers' occupational and educational backgrounds.

Family, Cultural, and Human Capital Acquisition

Decades of research has demonstrated that students overall success in school was correlated with their academic self-perception, relationships with teachers and parents, parental education levels, family income, and social class (Goldrick-Rab 2006; Balkis, Arslan, and Duru 2016). A key family characteristic detailed in Chapter 3 noted strong positive relationships between veterinary student recruitment and family-ownership of livestock. The results shown in Table 6e and 6f provided empirical support of past research claims that ethnoracial capital' as a cultural trait was transmitted not only by parents, but also through extended social networks (Borjas 1992). This is an important sociocultural factor given that CVM students in the sample were more likely to have been raised in family settings where livestock were cared for, especially in the field of large animal veterinarian practices that have remained overwhelmingly biased in favor of White males.

The percentage distributions for family-owned livestock illustrated that males enjoyed a 1.7/1 ratio advantage over females (72 percent versus 43.4 percent) and Whites in the sample had nearly a 4/1 advantage of exposure to an agricultural lifestyle in the home compared to Blacks sampled (58.6 percent compared to 15.8 percent, respectively).

A chi-square test assessed the independence of the sample's gender and race categories for differences on the survey question. In both cases – gender and race – the chi-square and Fisher's Exact test statistic was significant [X^2 (5.8080), $p \leq 0.016$; Fisher's Exact, $p \leq 0.014$ and X^2 (10.942), $p \leq 0.001$ and Fisher's Exact, $p \leq 0.001$, respectively].

How does a family's ownership of livestock or farm animals bolster a child's early development of agricultural-related human and cultural capital? To explore further this relationship, CVM students, faculty, and practicing veterinarians in the study sample were asked at what age they were first exposed to farm animals such as cattle, horses, swine, and poultry. The sample responses were analyzed by gender identity and race. The results were recoded into five categories: never (0 years exposure), toddler (one year to five years), child to middle school years (six to 12 years), teen (13 to 19 years), and adult (20 to 30 years).

Table 6f1 provides the percentage distribution of respondents' age categories by gender. Twenty-seven percent of the females and 76 percent of the males in the sample reported exposure to farm animals during their formative and early school years (one year old to 12 years old). A chi-square assessment and Fisher's Exact results as shown in Table 6f1 confirmed males in the sample were significantly advantaged compared to females regarding their earliest childhood experiences (X^2 (3) = 7.7050, $p \leq 0.05$ and Fisher's Exact, $p \leq 0.05$).

To illustrate the contrast between males and females on the earliest age of exposure categories, a one-way ANOVA tested whether gender identity was the same across all age categories. The ANOVA F-statistic (2.69) was significant at the 0.05 level, confirming the earlier chi-square assessment of differences across age categories by gender. The mean value for each category was computed by gender identity and was plotted as shown in Figure 1. The graphic depicts the significant advantage males have in terms of their earliest exposure to farm animals compared to females in the survey sample.

The next step examined for differences on the age of exposure categories by survey respondents' race as shown in Table 6f2. Sixty-four percent of the Whites in the sample reported exposure to farm animals during their early childhood to middle school years (one year old to 12 years old) compared to only 26 percent of Blacks surveyed. A chi-square assessment and Fisher's Exact results as shown in Table 6f2 confirmed Whites in the sample were significantly advantaged compared to Blacks regarding their earliest childhood experiences ($\chi^2 (3) = 19.8783, p \leq 0.001$ and Fisher's Exact, $p \leq 0.001$). Moreover, only three percent of whites surveyed reported 'never had exposure' to farm animals compared to 32 percent of the Blacks sampled.

To demonstrate the contrast between Blacks and Whites earliest age of exposure categories, a one-way ANOVA tested whether racial identity was the same across all age categories. The ANOVA F-statistic (8.150) was significant at the 0.0001 level, confirming the earlier chi-square assessment of differences across age categories by

race. The mean value for each category was computed by racial identity and was plotted as shown in Figure 2. The graphic highlights the significant advantage Whites have regarding exposure to farm animals compared to Blacks in the survey sample.

The prior tables investigated a child's family experiences to agriculture. However, past research has overlooked the possibility that students recruited into veterinary programs might also have had exposure to agricultural settings from extended kinship ties (paternal and maternal grandparents). For example, Møllegaard and Jæger's (2015) study of Scandinavian families and their children, found that after controlling for parents' social and cultural capital variables, grandparents' cultural capital also contributed significantly to grandchildren's' academic choices during their later secondary school years.

To examine for potential cultural capital advantages sample participants might have gained through association with their grandparents, Tables 6g and 6h provided the percentage distributions by gender and race with chi-square and Fisher Exact assessments. The results of the percentage distributions and chi-square tests were significantly different by gender and race.

Seventy-six percent of the males compared to 55 percent of females responded their grandparents had agricultural backgrounds. The Fisher Exact test partially confirmed significant differences between gender identities on the survey question with males exceeding females on the background characteristic [χ^2 (3.1989), $p \leq 0.074$ and Fisher's Exact, $p \leq 0.06$]. The Fisher's Exact test statistic was chosen because a cell

count was below generally accepted levels. Although the Fisher's Exact p-value was 0.07, I believe this is a reasonable indicator of significance differences between the groups as the p-value is ≤ 0.10 .

The percentage results by race also demonstrated that 65 percent of Whites surveyed compared to 44.4 percent of Blacks in the sample had grandparents with agriculture backgrounds. A chi-square assessment partially supported differences between the two racial categories significantly favored Whites [X^2 (2.4442), $p \leq 0.118$ and Fisher's Exact, $p \leq 0.175$]. Overall, the results partially supported extended family ties were significant contributors to students' likelihood of acquiring the necessary cultural capital resources (Beck 1983; Connell 2004; Davey, Savla, Janke, and Anderson 2009). However, the transmission or inheritance of cultural capital is often focused on male heads of households—primarily fathers—as a statistically significant variable, the results demonstrated that grandparents also offer significant support and opportunities to their grandchildren.

Continuing the examination of family characteristics effect on children's exposure to agriculture, Table 6i and 6j provided the percentage distributions of sample participant's fathers' agricultural background. Fifty-two percent of males surveyed reported that their fathers had an agriculture-related background compared to only 22 percent of females. The results of the chi-square test was significant [X^2 (5.8943), $p \leq 0.015$ and Fisher's Exact, $p \leq 0.02$]; demonstrating that males were more likely to have a

distinct human and cultural capital advantage in father-son relations regarding agricultural life experiences.

Examining fathers-sons relations by race is given in Table 6j and revealed that only six percent of the Blacks surveyed had a father with an agriculture background compared to 34 percent of the Whites in the sample. A chi-square and Fisher's Exact test revealed significant advantage for Whites whose fathers had an agricultural background [χ^2 (5.8110), $p \leq 0.016$ and Fisher's Exact, $p \leq 0.018$]. The findings further highlighted the family contexts that directly contributed to a child's ability to take advantage of social and cultural capital resources directly related to the agriculture industry.

Although the sample of Black CVM students, faculty, and practicing veterinarians has overcome some of the sociocultural variables identified that advantaged Whites, it is important to recognize that the sample respondents are an 'exemplary' group and do not represent the general population of Black students who have not been introduced to an agricultural-related academic and career path.

For example, White families were more likely to have property assets they could use, but not necessarily, as a primary occupation and source of income compared to the declining number of Black farmers and ranchers who historically faced institutionally sanctioned discriminatory policies in the agricultural sector (Escalante 2003; Hinson and Robinson 2008). As farm and ranch ownership and production significantly shifted to corporate entities in the 1950s, blacks were pushed from the land because they could not garner sustainable loans that white farmers enjoyed in times of need.

Combined with the country's racist occupational structure that effectively barred backs entry into the middle class income and wealth generating social class, it makes sense that the earlier findings demonstrated that Blacks responding to the survey questions would have had later or no exposure to agricultural lifestyles through their parental and extended family networks⁵¹.

To further study immediate family relations on the sample's academic choices leading to a career in veterinary medicine, I rely on past social stratification findings that the American occupational structure embodies significant cultural and economic resources that workers can attain as they learn new skills and successfully navigate work-related social exchanges (de Graaf and Kalmijn 2001).

To investigate the effect of occupational background characteristics of the sample's fathers, participants were asked to describe their father's work. The texts were coded into three relevant occupational categories: STEM, Agriculture, and All Others. Percentage distributions and chi-square assessments were performed by gender and race for the survey question 'father's occupation'.

First, significant differences by gender identity emerged. Forty-four percent of the males in the sample reported their father's occupations were agricultural related compared to 8.3 percent of females [χ^2 (14.714), $p \leq 0.001$ and Fisher's Exact, $p \leq$

⁵¹ It is interesting to note that the United States Department of Agriculture (USDA) began recently adding new farm and ranch categories to their census typology to account for the demographic shift away from small productive agricultural properties to more retirement, residential lifestyle, and 'hobby ranches' that were primarily not-for-profit (Gosnell and Travis 2005).

0.001]. Second, comparing the two racial categories, 20 percent of the Whites in the sample reported their father's occupation was agriculture related compared to 11 percent of Blacks surveyed; a Fisher's Exact statistical test revealed no significant differences by race on the three occupational categories.

It is interesting to note that Blacks and Whites sampled were nearly identical in percentages for their fathers' occupational categories of STEM (33.3 percent and 30 percent) and All Other (56 percent and 50 percent).

The examination of fathers' highest education level attained by gender and race was reported by survey participants and is presented in Table 6m and 6n. Survey respondents were given the following categories to select from middle school to some high school, high school graduate, some college, bachelor's degree, and master's degree or higher. Thirty-six percent of males surveyed reported that their fathers had achieved a bachelor's degree and 20 percent with a master's degree or better. Forty-percent of females said their fathers achieved a bachelor's degree and 32 percent reported their fathers had attained a master's or higher.

A Fisher's Exact test statistic was used to test for independence among the category responses and confirmed females had a significant advantage compared to males when it came to fathers with bachelors or post-baccalaureate degrees [Fisher's Exact, $p \leq 0.02$; due to frequency counts of below six in some category cells]. A simple odds ratio logistic computation with gender (male = 1; female = 0) as the independent variable and father's education (recoded 1 = bachelor's degree or better; 0 = all other) as

the dependent variable indicated that the odds of females was 0.503 times that of males *ceteris paribus* when it came to having a father who achieved a higher education degree. Similarly, the negative coefficient ($\beta_1 = - 0.686$, $p \leq 0.165$) demonstrated that a one unit change in gender results in a 0.686 decrease in the log of the odds, which contextually shows that the predicted slope of males' father post-secondary education trend was lower than for females.

A slightly different picture emerged comparing Blacks and Whites in the sample. Table 6n revealed that 56 percent of Blacks compared to 34 percent of Whites had fathers who achieved a bachelor's degree. However, 34 percent of Whites compared to only six percent of Blacks surveyed had fathers who achieved a master's degree or better. Additionally, 17 percent of the Blacks reported their fathers had only attended middle school compared to three percent of Whites surveyed.

A Fisher's Exact test ($p \leq 0.02$) confirmed significant differences between the racial groups—with Whites percentages higher in all categories except for the middle school education level. The findings from Table 6n demonstrated that Blacks in the sample were significantly disadvantaged compared to Whites.

Perhaps a more transparent illustration would best demonstrate the significant structural advantage Whites in the sample gained from their fathers' educational achievement. A simple odds ratio logistic computation with race as the independent variable and father's education as the dependent variable demonstrated the odds of

Whites was 1.38 times that of Blacks *ceteris paribus* of having a father who achieved at least a bachelor's degree ($\beta_1 = + 0.3643317$, $p \leq 0.07$).

The social science literature has well documented the significance of paternal educational achievement on children's educational and occupational trajectories (Hopcroft and Martin 2014; Sikora and Pokropek 2012; Erola, Jalonen, and Lehti 2016). As explained in the literature reviewed for this project and demonstrated in the previous section analyses of fathers' educational attainment demonstrated a parent's background characteristics affect a child's educational and occupational trajectories.

Researchers have confirmed that in the United States, because education and skills result in higher economic and status attainment returns, the pathway through parents and their offspring is an important contextual variable (Blanden et al. 2014). However, recent research has expanded on prior paternal studies of intergenerational transfers of social and cultural capital because an increasing number of women—married or single heads of households—have entered the labor force and have provided significant contributions to their family's economic wellbeing (Marks 2008).

To further explore this relatively nascent context, I examined the effects of mothers' agricultural background, occupation, and educational attainment as reported by sample respondents and presented in tables 6o to 6t.

Table 6o showed that 82 percent of females surveyed reported their mothers had an agricultural background—exposure to farming, the care of farm animals, horses, and/or cattle. Similarly, 56 percent of males sampled also reported their mothers had

agriculture-related experiences in their family home. However, 44 percent of the males reported their mothers had no such exposure compared to only 8.3 percent of females. The results of the chi-square test was significant [χ^2 6.0602), $p \leq 0.014$ and Fisher's Exact, $p \leq 0.028$]; confirming that women were more likely to have had a mother with agricultural backgrounds.

Comparing the findings from table 6o above and table 6i (males were more likely to have fathers with an agricultural background than females) provided a more granular view of parents agricultural background as a cultural advantage for students' academic preparation. The results of both tables revealed different sides of a single sociocultural coin—each parent had the potential to transfer human, social, and cultural capital assets that would benefit the sample participants' likelihood of choosing an agricultural sciences field.

Interestingly, a majority of both racial groups surveyed did not have mothers with agricultural backgrounds as shown in table 6p (94 percent of Blacks and 70 percent of the Whites). However, a chi-square and Fisher's Exact test revealed that Blacks were significantly disadvantaged compared to their White peers in this category [χ^2 (4.2111), $p \leq 0.04$ and Fisher's Exact, $p \leq 0.022$] given that 30 percent of Whites sampled reported their mothers had agricultural backgrounds. This finding mirrored the earlier significance found in table 6j where fathers agricultural backgrounds were significantly favored by Whites over Blacks.

In summary, comparing the two tables that examined parents' agricultural-related experiences, Black CVM students, faculty, and practicing veterinarians reported a deficit in those contextual circumstances where cultural capital assets could be transferred. However, Blacks in the study sample had overcome any cultural capital deficits given they were successfully recruited into the veterinary fields. Nevertheless, it seemed reasonable to ask how many more black students would have been recruited into the veterinary fields if they were as advantaged on the background characteristics as whites were.

The analyses presented in table 6q provided percentage distributions of participants' responses to their mother's occupations by gender. Participants described their mothers' occupations in the survey. The responses were coded into four job categories: STEM-related, Agricultural-oriented, General Employment, and Homemaker. Forty-eight percent of females in the sample responded their mothers had worked outside the home in jobs ranging from clerical to accounting and financial services (General Employment) compared to 44 percent of males whose mothers were 'housewives'.

Interestingly, 26 percent of females reported their mothers had STEM-related jobs compared to only 16 percent of males. Moreover, only two percent of females reported their mothers worked in agriculture compared to 12 percent of males. Chi-square and Fisher's Exact tests confirmed significant differences based on gender [χ^2 (8.7177), $p \leq 0.03$ and Fisher's Exact, $p \leq 0.04$]. The percentages indicated that in the

sample, males were more likely to have a stay-at-home mom and/or a mother who worked in agriculture compared to females. Females in the sample were more likely to have had mothers with STEM-related occupations, which indicated mothers' role model influences likely contributed to their daughters' academic path toward science-related fields of study⁵².

Given the increasing trend of women in the labor force, social researchers have examined this phenomenon in terms of its effects on a child's identity development, a single parent's ability to acquire and extend their human and cultural capital for transmission to their offspring, and children's comprehension of traditional gender roles (Hao and Britton 1997; Sinno and Killen 2009)⁵³. Table 6r provided percentages of participants' responses regarding their mother's occupations by race and was coded as stated previously.

Blacks and Whites in the sample overwhelmingly reported their mothers' occupations in the 'General Employment' category if they worked outside the home (63 percent and 37 percent respectively). However, 32 percent of Whites sampled reported their mothers were fulltime caretakers in the home compared to only 19 percent of Blacks surveyed. Twenty-six percent of Whites reported their mothers had STEM-

⁵²Females sampled had significantly more mothers with a STEM-background than males surveyed leaves unanswered which pull factors brought females to the veterinary fields instead of other healthcare medical fields. As mentioned in the literature review, female veterinarians in companion care and equine care hold a majority position in those fields. This raises additional questions as to which parental contextual variables have relatively more weight in terms of bolstering a student's interest in veterinary medicine compared to other science endeavors.

⁵³ An analysis of the psychological effects on children's contextualized family relations in single working mother households was beyond the scope of this project. However, by race, 21 percent of Blacks sampled compared to four percent of Whites reported living in a single parent household (see Table 4b).

related jobs compare to 13 percent of Blacks in the sample. A Fisher's exact test revealed no significant differences between groups across occupational categories [Fisher's Exact, $p \leq 0.242$].

The cultivation of academic pathways remains a key responsibility for parents and differs substantially by parental race, ethnicity, socioeconomic status, and parental sociocultural investments among their children (Conley 2008). These background parental characteristics have direct effects in children's educational disparities or in the "intergenerational transmission of inequality" so often documented in the research literature (Crosnoe et al. 2016:61).

More recently, sociologists have focused on the contributions of maternal background characteristics on their children as workforce participation has climbed for middleclass women (Domina and Roksa 2012; Martin 2012; Augustine 2014). To that end, the next tables examined mother's educational attainment by gender and race. Table 6s presented percentage distributions of mother's educational attainment by sample respondents' gender categorized as described for fathers' educational attainment.

Fifty-three percent of the females surveyed reported their mothers had a bachelor's degree and 23 percent reported their mothers had a master's degree or higher compared to 32 percent of the males whose mothers had a bachelor's degree and 16 percent with a post-baccalaureate or doctoral degree. A Fisher's Exact test for independence was significant [Fisher's Exact, $p \leq 0.043$], indicating that female

respondents held a distinct advantage over males in the sample on this contextual variable.

To better illustrate the advantages gained by females in the sample, a logistic regression analysis of gender (female coded 0 and male coded 1), indicated females in the sample had a significant structural advantage over males ($\beta_1 = -0.68683$, $p \leq 0.165$). A simple odds ratio logistic transformation with gender as the independent variable and mother's education as the dependent variable demonstrated the odds of females was 0.28 times that of males *ceteris paribus* when it came to having a mother who achieved at least a bachelor's degree.

Table 6t presented percentage distributions of mother's educational attainment by sample respondents' race. Forty-seven percent of Whites surveyed reported their mothers had a bachelor's degree and 21 percent reported mothers with a master's degree or higher compared to 42 percent of Blacks whose mothers had a bachelor's degree and 16 percent with graduate degrees. A Fisher's exact test indicated partial support that Whites and Blacks differed significantly on the response categories [Fisher's exact, $p \leq 0.143$]. To further demonstrate the contextual influence of mothers' educational background, a logistic regression analysis—where Blacks = 0 and Whites = 1—was performed ($\beta_1 = +0.3281734$, $p \leq 0.549$). The coefficient indicated that the slope in the White trend line was higher than for Blacks, although the predicted relationships were not significant.

A simple odds ratio logistic transformation demonstrated the odds of Whites was 1.388 times that of Blacks when it came to having a mother with at least a bachelor's degree. This is the same odds level obtained for father's educational levels discussed previously. Overall, the results from table 6t indicated that Black and White participants could inherit cultural capital from their mothers; an advantageous contextual condition. Interestingly, the findings presented above coincided with prior research that demonstrated an increasing trend in marriageable couples selecting partners that matched their educational and social status backgrounds (termed "educational assortative mating") (Blossfeld 2009; Shafer and Qian 2010:661).

To summarize, the findings revealed that fathers and mothers educational levels were significant macro- and micro-level background factors that contextualized CVM students, faculty, and practicing veterinarians formative school years⁵⁴. This is an important contextual factor because as reported in Table 4b, 79 percent of the African American CVM students, faculty, and practicing veterinarians in the sample were raised in traditional, heterosexual two-parent families.

Juxtaposing the traditional family's advantages with both parents having achieved college degrees, demonstrated that the success of black students was not a

⁵⁴ However, researchers have found that African American women were disadvantaged within the educational assortative marriage framework. Researchers identified two key factors constraining black women's marriage partner selection: a high sex-ratio imbalance (81 black men to 100 black women) and a "shortage of 'marriageable' black men, defined as men who possess the social or economic characteristics that black women seek in a marriage partner" (King and Allen 2009:571). Although this topic has received substantial interest in sociology, an analysis of Black sample participants' reports that they were raised in a single parent, female-headed household was beyond the scope of the data obtained.

random outcome; instead, similar to Whites in the sample, Blacks parents apparently were just as likely to invest their human and cultural capital in ways that helped their children set academically challenging academic goals.

For example, juxtaposing the sample's gender and race responses to family background characteristics reasonably suggested that to overcome family background disadvantages in the general minority student population would require identifying schools in need of agricultural sciences courses and provide schools with the resources to develop and offer alternative social networking opportunities to capture student interests in STEM fields, including veterinary medicine.

Summary of Educational Experiences Analyses

Overall, the cross tabulations in the background educational experiences section revealed that a smaller percentage of Black students in the sample had fewer opportunities to participate in agriculture-related coursework compared to White respondents. However, the finding that Blacks' whose early public school experiences were significantly deficit in social and cultural capital opportunities, appeared somewhat mitigated by the time they matriculated from high school to the university.

This does not diminish the fact that minority students in general during their public school years were less likely to have opportunities to develop social and cultural capital specific to the veterinary profession. It is important to remember that the survey respondents who overcame family background deficits in college were the same students who went on to colleges of veterinary medicine.

The family-background data analyses have demonstrated that Blacks in general were not afforded opportunities to develop educational capital that would have increased their likelihood to consider a career in veterinary medicine at an early age. Without the social networks associated with attending agriculture-oriented courses, or the youth agriculture organizations such as the Future Farmers of America chapters in each state, it would appear unlikely that Black students or minority students in some suburban and urban settings would have developed interests in the agricultural sciences or the veterinary profession.

This finding is in stark contrast to culture of poverty arguments that blame the underrepresentation of Blacks in veterinary medicine to individual failings or a lack of willingness to sacrifice leisure time for rigorous school studies mentioned previously by researchers. What does this mean for this project?

Counterfactually, the data thus far have demonstrated that the underrepresentation of minorities in the fields of veterinary medicine is an institutionally maintained pedagogic doxa. How does this occur? As a doxa, the historical domination of White culture in the agriculture educational sphere has fostered an embedded status that public school administrators and minority students follow without question.

Consider standing before a school board meeting in any major city and asking the elected officials to target funding to attract Blacks and other minorities into agricultural science courses. There is little likelihood school board officials would find such a request reasonable—and not because they believe themselves racists—but because they

would not be able to see the rationale behind such a request. That is the power of doxa—the decisions leading to action or inaction of school officials, teachers, counselors, students, and parents invisibly constrained by the consequences of dominant sociocultural forms informing the institutional fields they are embedded in (Royce 2015).

Respondents' Neighborhood Contextual Affects

The percentage distribution in Table 7a demonstrated that a substantial majority of the survey participants were 'pleased' with their childhood residential location (91.7 percent of the females and 84 percent of males in the sample). A review of the percent distribution by race on the neighborhood-pleasing factor was similar to the gender distribution, with 89.9 percent of Whites and 88.9 percent of Blacks reporting positive impressions. Chi-square analyses of the neighborhood-pleasing factor by gender and race was non-significant ($p < 0.295$ and $p < 0.905$, respectively); indicating that both groups were similar in their perception of their neighborhood's physical attractiveness.

Table 7c and 7d assessed whether survey respondents perceived their childhood residential neighborhood as a 'friendly place by gender and race. The chi-square test demonstrated that survey participants did not differ on their perceptions by gender or race ($p < 0.8875$ and $P < 0.826$, respectively). Eighty percent of the males and 81.7 percent of females surveyed responded their childhood neighborhood was a friendly place. Similarly, 86.9 percent of Whites and 88.9 percent of Blacks in the survey also perceived their neighborhoods as friendly spaces.

A chi-square test of the variable ‘neighbors socialized together’ by gender revealed no significant differences [χ^2 (1.887), $p < 0.170$, and Fisher’s Exact, $p = 0.131$.] However, Table 7e showed that a majority of the males and females responding in the survey were less inclined to report their neighbors socialized together (52 percent versus 67.8 percent, respectively). Is it possible that changes in community attachment, i.e., neighborhood characteristics have affected social interaction nested within neighborhoods? This characteristic was not controlled for in this study, but deserves scrutiny in the future.

Table 7f provided a chi-square assessment of the variable ‘neighbors socialized together’ by race demonstrated a significant difference between Whites and Blacks in the sample [χ^2 (6.2134), $p < 0.013$ and Fisher’s Exact, $p = 0.014$]. Black survey participants were more likely to report socializing with their neighbors compared to White respondents (64.7 percent versus 31.9 percent, respectively).

To clarify further the racial difference, however, would require additional neighborhood demographics, especially how segregated neighborhoods were in terms of race and income. In addition, respondents’ neighborhood characteristics would need to be controlled for as a nested racial characteristic within census blocks. For example, the checkerboard style of race-based distributions that occur within census tracts (see Crowder and South 2008) has shown contiguous neighborhoods have larger percentages of blacks close to majority white neighborhoods. In those cases, neighborhood

interaction would be embedded within the neighborhood's nested, homogenous structure.

From a cursory review of Table 7g, it is apparent that a majority of both gender groups (88 percent of males and 63.3 percent of females) reported their neighbors 'looked out' for one another. A chi-square test confirmed that gender responses were significantly more positive than negative [X^2 (5.1718), $p < 0.23$ and Fisher's Exact, $p = 0.019$]. However, data in Table 7h was subjected to a chi-square assessment on the variable and was not significantly different by race [X^2 (0.8235), $p < 0.364$ and Fisher's Exact, $p = 0.272$].

Nearly 78 percent of the Black survey participants and 68 percent of the Whites in the survey reported their neighbors looked out for one another. This finding also relates to a lack of neighborhood segregation controls as mentioned in the previous findings (Table 7f).

Table 7H₁ provided percentage distributions on the variable 'I felt a strong attachment to my neighborhood growing up' by gender. From table 7H₁, 88 percent of the males responded that they had 'strong attachment' to their residential neighborhoods compared to only 58 percent of the female participants. A chi-square test for independence by gender on the 'strong attachment' characteristic demonstrated males were more likely to have a strong feeling about their neighborhoods than females [X^2 (7.0883), $p < 0.03$].

Table 7H₂ provided percentage distributions on the variable ‘I felt a strong attachment to my neighborhood growing up’ by race. Sixty-seven percent of the Blacks responded that they had ‘strong attachment’ to their residential neighborhoods compared to 68 percent of the White survey participants. Twenty-two percent of Blacks also reported a ‘somewhat’ strong attachment compared to 25 percent of the Whites in the sample. A chi-square test for independence by race on the ‘strong attachment’ characteristic demonstrated no significant differences between races on the contextual variable [χ^2 (0.3039), $p < 0.859$].

The study of neighborhood composition, including socioeconomic and cultural stratification has remained a steady concern among sociologists in general and urban sociologists specifically. The early pioneering work of Park and Burgess (1921/1969) describes and explains the effects of segregation and isolation on the social organization of a city and its surrounding environs.

However, the study of neighborhood ecology has expanded analyses to provide a more granular approach to the contextual effects neighborhoods have on residents (Sampson, Morenoff, and Gannon-Rowley 2002; Harding 2007). For example, Stoll (2008) has pointed out that the growing variety of neighborhood compositions within central cities, suburbs, and rural areas demonstrate a need to understand the dimensionality of how places form and reinforce sociocultural conditions. He wrote,

The sociological approach and the economic approach are not mutually exclusive, but sociologists are more focused on the spatial ordering of the quality of

social ties, the relationships and emotional bonds formed among and between people in a particular spatial context and the way, these relationships enhance or constrain social and economic opportunity and poverty. (2008:203)

Although economic conditions are an important factor related to neighborhood characteristics—especially concerning whom lives there—I am interested in demonstrating the contextual influences such as neighborhood attachment (among other variables as discussed in this section of the paper) that were meaningful to the study’s survey participants.

Why is this important? Because demographers (among others) have demonstrated that “social problems are geographically correlated with social inequality, with poor neighborhoods showing higher levels of crime, school dropout, social and physical disorder, and single-parent households”—a sociocultural formation of ecological disadvantage (Stoll 2008:204).

From a critical framework, it would be simple to describe the lower achievement levels of students residing in ecologically disadvantaged spaces. However, this project’s goal is to describe and explain the sociocultural variations of high achievers by gender and race. Recalling tables 3c and 3d, the sample participants were mostly raised in suburban areas, except for males who primarily were from rural designations and Blacks in the sample who made up the largest group from urban settings, albeit they remained primarily from suburban areas.

In fact, Small (2007:340) found that residential segregation had fostered racial hierarchies that relegated minorities to high-poverty neighborhoods, but with an additional caveat: “scholars looking at the impact of neighborhood poverty on racial differences in life chances should seriously consider the role of support and leverage ties as mediating mechanisms”. Thus, he concluded that it is poverty, not the racial makeup of neighborhoods that significantly weakened a group’s social network ties.

With that in mind, consider that the above tables on feelings of attachment that demonstrated males were more likely to have been raised in neighborhoods that bolstered positive social network ties compared to females. Similarly, at least 50 percent of Blacks and Whites in the sample responded they had ‘strong feelings of attachment for their neighborhoods, an advantage compared to a plethora of research on ecological disadvantages that minorities and poor whites face in urban settings.

Hence, a contributing exogenous or contextual variable that has minimized African American youth’s opportunity structures was the strength of their social ties, which can be inferred from their feelings of neighborhood attachment. Continuing this research direction, Table 7i and 7j provided percentage distributions on the variable ‘neighbors were a close knit group’ by gender and race.

From table 7i, 64 percent of the males responded that they believed their residential neighbors were a close-knit group compared to only 38.9 percent of the female participants. A chi-square test for independence by gender on the ‘neighborhood

sociality' characteristic demonstrated gender was a significant variable for predicting cell responses [X^2 (4.4184), $p < 0.036$ and Fisher's Exact, $p = 0.031$].

From table 7j, a chi-square assessment by race on survey participants' responses was not significant, although $p < 0.1$ level was obtained [X^2 (2.8193), $p < 0.093$ and Fisher's Exact, $p = 0.080$]. Whites were less likely to report their neighbors were 'close' compared to Blacks in the survey sample (65 percent versus 42 percent, respectively).

As a combined social capital factor, it appears reasonable to ask if other social conditions might contribute to males and Blacks in the survey perceiving their neighbors as close knit during their childhood years. This could be examined based on a more detailed description of the neighborhood's homogeneity and proximity to other neighborhoods as mentioned previously regarding the findings from Table 7f and 7g.

This is a difficult assessment to make given that researchers have reported significant and non-significant findings that neighborhood social capital was beneficial for children who lived in poor residential settings. The root cause of the mixed or ambiguous research findings could be attributed to the broad range of operationalizations used to construct neighborhood-specific social capital indices, and the conceptual overlap between researchers' varying markers of socioeconomic status and social capital (Vyncke et al. 2013).

As mentioned previously, a limitation of the neighborhood attachment findings was a failure to ask survey participants about the level of their neighborhood's racial makeup, thus, a complete characterization of survey participants' neighborhood

attachment was beyond the scope of this study. However, an attempt to overcome this limitation was subsumed with a counter-factual question that asked respondents' to reconsider their childhood neighborhood experiences and if given the choice, where might they have rather been raised.

Table 7k and 7l provided percentage distributions and chi-square assessments by gender and race to the question 'I wish I was raised in a rural setting'. Fifty-six percent of males and 60.3 percent of females reported they would have chosen a rural setting. However, about 40 percent of both gender identities expressed no desire for a rural childhood experience. A chi-square test statistic of 0.1364 demonstrated that gender was not a significant predictor of the survey question ($p < 0.712$).

Alternatively, 65.7 percent of the Whites in the sample agreed they would select a rural location versus 33.3 percent of Black survey respondents. In fact, 67 percent of Black survey participants reported no affinity for a rural location. A chi-square test statistic of 6.1258 demonstrated that Whites in the sample had an affinity for rural locations ($p < 0.013$).

Table 7m and 7n provided percentage distributions and chi-square assessments by gender and race to the question 'I wish I was raised in a suburban setting'. Twenty percent of males reported they would choose a suburban neighborhood in contrast to 33.2 percent of female survey participants. A chi-square test statistic of 1.2814 with a p-value of 0.258 demonstrated that gender was not a significant predictor of participants' affinity for a suburban location.

However, a majority of the sample apparently were unwilling to consider a suburban setting an ‘ideal’ space for ‘growing up’, 80 percent of males and 68 percent of females had no wish to have been raised in a suburban setting. The negative assessment of suburbia as a location might imply that suburban locations are similar to urban areas in terms of alienation. For example, traditionally, sociologists have relied on Ferdinand Tönnies’ (1887/1957) construction of *Gemeinschaft* and *Gesellschaft* to explain differences between strong ties and residential selection preferences in a community (*Gemeinschaft*) and the industrial urban city (*Gesellschaft*) where community members’ social ties weaken as isolation among people in urban spaces increases.

To further explore the results of Table 7m, two survey questions (see Table 7e and 7g) asked participants if their neighbors 1) ‘socialized together’ and 2) ‘looked out for one another’; a metric of social capital formation, i.e., accumulation and reciprocity. The results from Table 7e and 7f showed that nearly 70 percent of females did not socialize with their neighbors and 36.7 percent reported neighbors did not care for one another.

The percentage differences appeared to indicate that neighborhood selection preferences in a suburban setting were affected by gender social interaction patterns, gender age distribution, and how often families changed residence could have an effect on females overall neighborhood selection preferences. Unfortunately, age group differences and social interaction patterns, i.e., normative behavioral constraints were not controlled for in the survey.

However, from an examination of the summary data descriptions by gender and how often family changed residences as reported by survey participants were given in Table 4c. The results indicated that a significant majority of males (84 percent) reported 'never' having changes residences compared to females (55 percent) in the sample. Moreover, females who reported moving from one to three times during their stay-at-home years were 40 percent of the female sample compared to only 12 percent for males. This too could be a confounding variable.

Alternatively, Table 7n detailed race as a characteristic denoting affinity for a suburban geographic location. A chi-square assessment of the percentage differences was significant and showed that 65.7 percent of the Whites would have preferred a suburban location versus 33.3 percent of Blacks in the sample [χ^2 (1.2184), $p < 0.016$ and Fisher's Exact, $p = 0.019$]. In fact, 67 percent of Black respondents reported no affinity for a suburban location. This finding also provoked an interesting comparison similar to the differences by race discussed earlier from Table 7f.

For example, Table 7f showed that Black survey participants were more likely to report socializing with their neighbors compared to White respondents (64.7 percent versus 31.9 percent, respectively [χ^2 (6.2134), $p < 0.013$ and Fisher's Exact, $p = 0.014$]. Again, this could indicate differences were attributable to the level of census tract segregation and within neighborhood block segregation.

Table 7o and 7p provided percentage distributions and chi-square assessments by gender and race to the question 'I wish I was raised in an urban location. Of the total

males surveyed, 12 percent reported a preference for urban neighborhoods, mirroring the 15 percent of females surveyed. A chi-square test statistic of 1.2814 with a p-value of 0.258 demonstrated that gender was not a significant predictor of participants' affinity for an urban location.

However, as in previous neighborhood preference characteristics, race was a significant predictor [χ^2 (14.4517), $p < 0.000$, Fisher's Exact, $p = 0.001$]. Prior research has examined the macro-effects of segregation on residential patterns and documented that residents' race and ethnicity was a more significant driver of residential choice than income (Lichter, Parisi, and Taquino 2015).

In the sample, 91.2 percent of the Whites did not perceive urban neighborhoods as a favorable place compared to Black participants who were divided on their favorability (47.1 percent favorable and 52.9 percent unfavorable). This phenomenon might be explained by improvements in residential segregation (although this differs by region of the country), but in other cases Blacks moving into majority white suburban areas have reported hostile experiences (Rosenbaum, et al.1991).

Neighborhood Social Ecology: Summary Remarks

Which neighborhood characteristics provided positive social and cultural capital opportunities that apparently benefited Blacks in the study sample? For example, Black respondents reported "close knit" relations with their neighbors in larger percentages than White respondents did (64.7 percent versus 42 percent respectively). At least three-quarters of Black survey participants reported their neighbors 'looked out for one' (77.8

percent) and ‘socialized together’ (67.4 percent). Blacks in the sample also reported their neighborhoods were ‘friendly spaces’ and had ‘pleasing surroundings’ (88.9 percent for each question).

The data findings suggested that the micro-level differences observed were embedded in the sample participants’ residential ecology and varied by race and gender regarding social interaction and geographic location. Empirically, the differences observed require a more nuanced cultural explanation of ‘neighborhood attachment’ by race, gender, and social class. Moreover, the contrast in perspectives noted is not new to the community research tradition. For example, community studies have long followed Wirth’s (1938) classical ecological assessment of the effects of urbanization on individuals in communities.

Wirth’s macro-approach has examined a city’s size, population density, and heterogeneity of the community’s residents before inductively linking those conditions to the micro-variations of *gemeinschaft* and *gesellschaft*. Wirth hypothesized that as these variables increased in size, community attachment declined resulting in diminished social interactions and solidarity. However, recent community-level research has demonstrated that measuring ‘community attachment’ at the macro-level overshadows important micro-level distinctions.

Community attachment theories suffer critiques due to a operationalizing weakness: developed measures do not “adequately define what constitutes community attachment”, and thus have ignored the importance of contextualized micro-level social

interactions embedded in a community's social structure; i.e., the dimensionality of social and cultural capital resources and individuals/groups social positions (Theodori and Luloff 2000:407).

Thus, given the substantial higher ratings the survey's males and Blacks recorded on neighborhood influences on individuals' capital accumulation, additional studies should examine the relative weighting that *informs* individuals' gender identities and racial formations. This is a plausible, abductive inference given Wilkinson's (1970) theory of community as an interactive field of social experiences, whereby individuals' embedded in a relational community structure were subject to gender-specific habitus that includes sexuality, race, and social class (Webb et al. 2002).

For example, Wilkinson explained the relational character of community-individual interactions as embedded in metaphorical fields whereby social exchanges take place. He wrote,

Community is a place where people live, but it is also a cultural configuration, a field of collective action and a phenomenological experience of the individual...The distinctions necessary to differentiate social fields from phenomena at other levels are of value in conceptualization of the interactional community, as are the general assumptions about causal linkages among levels. The idea of a local society with multiple social fields differentiated along institutional-interest lines and related to one another through a coordinating process,

which itself is part of an emergent field, is clearly consistent with these general assumptions. Each of the interest areas in a locality may be examined at several levels, including the ecological, cultural, social, and personal. (P. 317-318)

Deconstructing Social and Cultural Factors

In the coming section, I discuss CVM students and practicing/faculty veterinarians' attitudes that inform their social interactions based on sexuality and race. As noted throughout this project, Black survey participants represented the study's outcome or dependent variable of selecting a career in veterinary medicine since they have overcome institutional barriers in a nearly all white profession.

The survey items allowed a deconstruction of the social and cultural factors that Whites and Blacks in the sample survey were associated with their decision to pursue a career in animal care and research. Survey questions also sought to solicit the participants' manifest and latent racial, gender, and sexual attitudes that could represent the United States' institutional forms of status inequality along a racial, gender, and sexual continuum.

Moreover, the survey questions investigated respondents' knowledge about recruitment shortages in the research and medical fields of veterinary medicine. Specifically, the questions probed survey participants for their familiarity with the historical underrepresentation of racial minorities. This included their knowledge of recent predicted shortages in the large animal veterinary practices, including a growing

demand for additional veterinary microbiologists (Walker 2009; Jarman et al. 2011; National Research Council. 2011; Center for Workforce Studies 2013). There were also questions that asked survey participants if they were willing to ‘pay’ increased student fees or professional association dues to bolster CM recruitment of minorities.

Veterinary Profession and Recruitment of Racial Minorities

Table 8a and 8b provided percentage distributions and chi-square assessments by gender and race to the question ‘the veterinarian profession and colleges of veterinary medicine should sponsor educational programs that would inform high school students about animal research careers. Of the females surveyed, 75 percent answered affirmatively compared to a split between males in the sample – 52 percent in support versus 48 percent unsupportive.

A chi-square test statistic obtained (4.3070) with a p-value of 0.038 and a Fisher’s Exact ($p < 0.045$) demonstrated that gender identity, i.e., female, was a significant predictor of support for promoting research medical careers in veterinary medicine to high school students.

Alternatively, 72.5 percent of Whites sampled supported recruitment efforts aimed at research careers for high school students compared to 47.4 percent of Blacks surveyed. Blacks were evenly divided in their support or non-support of recruitment efforts at the high school level. A chi-square test statistic obtained (4.2464) a p-value of 0.039 and Fisher’s Exact ($p < 0.054$) confirmed the significance of race as a predictor of recruitment efforts.

Table 8c and 8d provided percentage distributions and chi-square assessments by gender and race to the question ‘the veterinarian profession is proactive in its recruitment of racial minorities’. Of the females surveyed, 65 percent did not believe the veterinarian profession had done enough to recruit minorities compared to 35 percent who believed recruitment efforts were sufficient. Forty-eight percent of the males sampled did not believe their profession was actively recruiting racial minorities compared to 52 percent who believed efforts were sufficient.

A chi-square test statistic obtained (0.0077) with a p-value of 0.930 and a Fisher’s Exact ($p < 0.5604$) demonstrated that responses to the question were not significantly different based on gender identity. The above results indicated that men and women in the survey sample were unknowledgeable about the under recruitment of blacks and Latinos. For example, the American Veterinary Medical Association’s journal has published articles that confirmed the underrepresentation of minorities, and yet, about 40 percent of the survey’s gendered participants were less likely to perceive a need for expanding minority recruitment in their CVMs and in the profession generally.

Table 8d provided percentage distributions and chi-square assessments by race to the question ‘the veterinarian profession is proactive in its recruitment of racial minorities’. Of the Blacks surveyed, 89.5 percent believed the veterinarian profession had done enough to recruit minorities compared to 24.3 percent of the Whites in the survey.

A chi-square test statistic obtained (26.8989) with a p-value of 0.000 and a Fisher's Exact ($p < 0.000$) demonstrated that responses to the question were significant based on respondents' race. In this case, Black survey participants were more likely to believe the veterinary profession is doing all it can to increase minority recruitment compared to White respondents who were cognizant that as a profession, more could be done to increase the number of minorities.

The above would appear to present a paradox. The underrepresentation of blacks in the veterinary fields was unacknowledged by Blacks in the survey sample as linked to the profession's remedial diversity efforts. This might imply a confounding condition because most of the Black participants sampled were students and faculty of Tuskegee's College of Veterinary Medicine. Because Tuskegee is a historically African American school, it seems reasonable that social interactions among students, faculty, and staff would be less critical of the veterinary profession and perceive their positions as representative of the profession's efforts to bolster black graduation rates and participation in the field or were simply unconscious of their 'sensitivity' or 'distress' when considering such an inequality due to institutional forces.

Table 8e and 8f provided percentage distributions and chi-square assessments by gender and race to the question 'colleges of veterinary medicine (CVM) provide sufficient academic support to minority students'. Table 8e showed that females and males in the survey (86.7 percent compared to 84 percent, respectively). A chi-square

assessment found no significant differences by gender identity on the survey question [$X^2(1) = 0.1035$, $p < 0.748$ and Fisher's Exact, $p < 0.494$].

Table 8f provided percentage distributions and chi-square assessments by race to the survey question CVMs provided sufficient academic support to minorities. Blacks and Whites in the sampled populations agreed that CVMs were providing academic support to minority students (79 percent compared to 87 percent, respectively). A chi-square assessment found no significant differences by race [$X^2(1) = 0.8047$, $p < 0.370$ and Fisher's Exact, $p < 0.286$].

The above findings might appear as a contradiction to earlier responses that showed respondents did not believe veterinary schools had done enough to recruit minorities. Instead, the positive responses here likely represent a prevailing doxa of academia today: once admitted, colleges were expected to help retain and graduate their students.

The finding that neither gender nor race produced differences in the sample group's beliefs that sufficient academic support was provided to minority students is concerning. Prior education research has confirmed that minority students were more likely to enter university programs with significant academic disadvantages and lowered college aspirations (Stewart, Stewart, and Simmons 2007). In fact, studies have shown that until recently, without the emergence of Black campus associations and strengthened mentor relations on predominantly white college campuses, blacks' completion rates were subject to higher risk of failure (Brooms Davis 2017).

Moreover, since at last the 1990s, research into ‘stereotype threat’ has described how members of a group once negatively stereotyped in social settings, develop an “associated stigma” that produced “an extra burden to perform well, which subsequently impaired their performance” in schools (Von Robertson and Chaney 2015:21). This ‘social affect’ continues today and represents a linkage to W. E. B. Du Bois’ (2014) construction of double consciousness – a negative self-identity perception culturally transmitted to African American based on their unique status as a slave population that was institutionally deprived of equal rights and liberties under the Constitution of the United States for most of the country’s history.

CVM’s Need to Re-Evaluate Entrance Requirements

Table 8g and 8h provided percentage distributions and chi-square assessments by gender and race to the question ‘colleges of veterinary medicine (CVM) should increase entrance standards’. Table 8g showed that of the females surveyed, 65 percent did not favor increasing CVM entrance standards compared to 76 percent of the males in the sample. A chi-square assessment confirmed no significant differences by gender identity [$\chi^2(1) = 0.9852, p < 0.321$; Fisher’s Exact, $p < 0.233$].

Table 8h provided percentage distributions and chi-square assessments by race to the survey question as well; of Blacks surveyed, 74 percent opposed increased entrance requirements compared to 66 percent of Whites sampled. A chi-square assessment found no significant differences by race [$\chi^2(1) = 0.4321, p < 0.511$; Fisher’s Exact, $p < 0.358$].

The findings presented above indicated that students and practicing veterinarians believed their profession was adequately positioned to attract and retain the most qualified individuals. However, this belief begs the question by ‘whose standards’ were recruitment and retention representative of individuals’ abilities and talents. It is after all, an empirical fact that ethnic and racial minorities in the United States have significant disadvantages to overcome to attend college, much less earn a postgraduate degree and doctorate in veterinary medicine. Moreover, prior analyses demonstrated that Blacks in the sample were less likely to have exposure to agriculture science courses, membership in after-school programs such as FFA, and develop mentor relationships with veterinarians.

Bourdieu’s (1979/1984) work on distinction and habitus provides some instruction here. Individuals are immersed in a society’s educational institutions and thus learn how to interact with others based on accepted boundaries. Whites are less likely to view their system as exclusionary because in their habitus, anyone could learn and/or join relevant groups. However, what were not obvious to whites in general are the restrictions or structural barriers that result in coercive forces that marginalize and/or exclude minorities from such affiliations.

For example, in an interview with a long-time white male practicing veterinarian, I asked if the profession might develop its own affirmative action policies. He responded that affirmative action efforts in American society had only worked to allow less talented minorities’ access to positions they were unqualified to hold. When I pointed out that

affirmative action had produced positive results and helped to mitigate a history of discrimination in the country, he remained unconvinced and added that affirmative action was a “racist policy” that only served Blacks’ interests.

This conundrum – Whites and Blacks in the sample uncritical of CVM entrance standards – can be explained also by using Bourdieu’s (1994/1998) term ‘illusio’. Illusio denotes a cognitive acceptance and lack of reflexive recognition (class-consciousness) as a person acquiesces to ‘rules of the game’ that structure group interactions as individuals compete for material and immaterial social resources (Webb et al. 2002; Savage, Silva, and Warde 2010). Simply stated, illusio is a mental framework or landscape that informs individuals’ intentional acts with an uncritical eye that upholds institutional forms.

Thus, in the case discussed above, both Blacks and Whites in the sample due to their positions as CVM students and practicing veterinarians have acquired social positions they sought by following the rules of the game and have little motivation to question the logic of the process.

Minorities Receive Unfair College Admissions

Table 8i and 8j provided percentage distributions and chi-square assessments by gender and race to the question ‘do you agree that minorities receive unfair admissions to colleges’. Table 8i showed that females in the sample were evenly split on their agreement to the survey question (48 percent did not believe minorities received unfair admissions to colleges compared to 52 percent who agreed with the statement). Of the males in the sample, 64 percent disagreed with the statement compared to 36 percent

who agreed minorities received unfair college admissions. A chi-square assessment confirmed no significant differences by gender identity [$\chi^2 (1) = 1.0859, p < 0.297$; Fisher's Exact, $p < 0.212$].

However, the fact that neither gender could definitely agree or disagree with the statement about Blacks receiving unfair college admissions illustrates a 'social' or 'group' condition related to cognitive dissonance. Cognitive dissonance in a social context refers to variations or contradictions between two or more held beliefs, whereby one held normative standard is challenged based on new information. McKimmie (2015) explained either cognitive dissonance in social settings is a consequence of a person's social identity and contributes to its arousal or reduction based on the type of identity challenge that has occurred.

A person may experience dissonance even when their self-attributes (or in particular, behaviors) are in line with their personal standards if the most salient standard is the social standard and those self-attributes are inconsistent with those social standards. (McKimmie 2015:209). Certainly, there are literature and media representations that speak to discrimination and the need to continue and expand affirmative action policies; including re-examining standard entrance requirements. However, the fact that at least one-third of the men and nearly one-half of the women sampled believed minorities received 'unfair' admissions indicates that today's American society has adopted a color-blindness that is detached from past overt racist policies.

For example, Bonilla-Silva's (2014:233) observations in *Racism without Racists* demonstrated that "the attack on affirmative action" was a white-as-victim social attitude motivated by a neoconservative need to end "race-based social policy" in the country. Because female and male survey participants remained evenly divided on the survey question, is it possible that this divided response is interpretable as a representation of American society's dispute over race as a salient characteristic that describes Blacks' collective experiences.

Table 8j provided percentage distributions and a chi-square assessment by race to the survey question do minorities received unfair college admissions. Thirty-two percent of the Blacks surveyed agreed that minorities received unfair college admissions compared to nearly 50 percent of the Whites in the sample in agreement with the statement. A chi-square assessment offered some support that race was a determining factor in agreement or disagreement with the survey question [$\chi^2(1) = 1.7438, p < 0.187$; Fisher's Exact, $p < 0.144$].

Considering the previous discussion on social dissonance, discourses contesting affirmative action, and racial polarization in the United States, a p-value of 0.144 for the Fisher's Exact offered above (one cell had only six responses) provided an acceptable probability metric for the counter-factual analyses undertaken here. The probability that a prediction of the percentage distributions by race on the survey question implied 90 percent accuracy; moreover, the results further explained the earlier dissonance between genders on the survey item.

For example, it is obvious that Blacks in the sample would not view their entrance to college as the result of unfair advantages, and yet, one-third of the survey participants did agree with statements that affirmative Blacks received unfair social benefits compared to whites. To explain further this finding would require additional controls that were not used in this project.

Conversely, Whites in the sample were nearly evenly divided on their agreement or disagreement with the survey question, a transparent indicator of social dissonance or contemporary color blindness. Whites surveyed were unlikely to acknowledge their privileged status and instead held racial color-blindness attitudes as Bonilla-Silva (2014) has shown. Thus, color-blind Whites would use strategies or logics that justified their racial privilege and social beliefs implicitly. White attitudes regarding social policies meant to assist Blacks with college admissions or other areas that would bolster Blacks' social status were perceived in a color-blind framework and thus disfavored affirmative action policies.

To test the conclusions drawn above, Table 8k and 8l were provided from the survey question: Do you agree that Whites enjoy privileged status? Table 8k showed that 55 percent of the females sampled believed whites held a privileged status in the United States compared to 36 percent of the males surveyed. A chi-square test demonstrated that the categories of agreement/disagreement with whites holding a privilege status was different by gender [$\chi^2(1) = 2.5486$, $p < 0.110$ and Fisher's Exact, $p < 0.087$].

Once again, females were evenly split on their perceptions about white privilege while males overwhelmingly discounted such claims (64 percent). As previously discussed in Table 8i and 8j, males were more likely influenced by ‘invisible racist’ opinions regarding affirmative action and white privilege while females in the sample were likely to exhibit a form of social dissonance with regard to those survey questions.

Table 8l provided percentage distributions and a chi-square assessment by race to the survey question do whites enjoy privileged status. Eighty-four percent of the Blacks surveyed agreed that whites held privileged status in the United States compared to 40 percent of the Whites sampled. A chi-square assessment offered significant support that differences in responses was attributable to race, i.e., while Blacks viewed whites as having privilege status, a majority of the Whites in the sample did not [$X^2(1) = 11.6850$, $p < 0.001$ and Fisher’s Exact, $p < 0.001$].

The findings from Table 8l further confirmed the findings in Table 8j where ‘racism without racists’ attitudes prevailed among gender groups regarding the persistence of contemporary structural barriers effecting Blacks opportunities. Accordingly, as discussed in the Introduction to my dissertation, the American normative conceptualization of White culture as a social phenomenon has coercive force because it implicitly values practices that are more familiar and come more naturally from a white, European tradition that has long devalued other ethnoracial groups. Correlatively, the American neoconservative view that has gained politically and economically in the United States in the last several decades has reinforced the

reproduction of such cultural social practices by valuing individual meritocracy and discounting inequalities linked to social structure (Wormeli 2016).

Microaggression and Racist Communications

Public schools from K thru 12, formally and informally socialize youth about race, intergroup relations, their attitudes, and acceptable/unacceptable behaviors. For this paper, symbolic violence includes racial slurs and/or isolation in social settings that comprise microaggressions that “affect all marginalized groups and are felt through environmental cues as well as verbal and nonverbal hidden messages [meant to] “invalidate one’s experiential reality and perpetuates feelings of inferiority” (Allen 2012:175).

This is an important sociocultural factor to consider because past research has documented the negative socioemotional and academic consequences for minority students’ (especially in STEM-related careers) exposed to symbolic forms of racial discrimination (Grossman and Porche 2014; Benner and Wang 2017). For example, public schools have served as institutional settings whereby students are informed through textual materials and conversations (i.e., white-framed apologetic history and racial slurs) and materially (teacher-student discussions and differential school disciplinary enforcement) about “their capabilities, the importance of their contributions, and their expected life outcomes based on who they are” (Allen, Lokia, and Lewis 2013:118). These embodied dispositions continue into a student’s college years.

To examine for racial, gender, and sexual orientation microaggressions table 9a and 9b provided percentage distributions and chi-square assessments by gender and race to the question ‘were you exposed to racist comments during college-sponsored social events’. Table 9a showed that 72 percent of the females sampled were exposed to racial slurs during college social events. Of the males in the sample, 68 percent reported having heard racist comments. A chi-square assessment confirmed no significant differences by gender identity [$X^2(1) = 0.1143$, $p < 0.735$; Fisher’s Exact, $p < 0.463$], which counter-factually confirmed the prevalence of racist microaggressions at university social events.

Table 9b provided percentage distributions and a chi-square assessment to examine whether Blacks and Whites experienced responses to the survey question – racists words at social events – differed in the sample. Sixty-eight percent of the Blacks surveyed reported they had heard racist comments at university settings compared to 69 percent of Whites sampled. A chi-square assessment confirmed no differences by race on hearing racists comments [$X^2(1) = 0.0002$, $p < 0.990$; Fisher’s Exact, $p < 0.597$].

However, as mentioned in the previous paragraph regarding gender differences on the survey item, such large percentages highlighted the persistence of symbolic violence that has a marginalizing and negative emotional consequence for minorities while undermining whites’ abilities to develop sociocultural inclusiveness and alternate worldviews.

To investigate institutional racism and symbolic violence, a survey question asked participants if they agreed that there was ‘too much talk about increasing racial minorities in the veterinary field’. The data were categorized by gender and race as presented in Table 9c and 9d, respectively.

Table 9c showed that both females and males in the survey agreed that there was too much discussion about increasing the representativeness of minorities into the fields of veterinary medicine (68 percent). A chi-square assessment showed that there were no significant differences in the way females or males responded to the survey question [$\chi^2(1) = 0.0009$, $p < 0.976$ and Fisher’s Exact, $p < 0.584$].

Of note here is the large percentage agreements indicated a latent racist frame that attributes concerns about the underrepresentation of Blacks in the veterinary field to social discourses only.

Table 9d confirmed the paradoxical finding in table 9c. In the comparison of Blacks and Whites in the sample, both groups agreed that there was too much discussion about increasing the representativeness of minorities in the fields of veterinary medicine (74 percent and 79 percent, respectively). A chi-square assessment was significant and further confirmed that either race was likely to respond to a counter-factual social condition regarding minority participation in the veterinary field [$\chi^2(1) = 18.5763$, $p < 0.000$; Fisher’s Exact, $p < 0.000$].

However, an additional question is warranted here. Could the significant agreement between Blacks and Whites on this survey item emerge from two opposing

social realities? For example, as was shown in earlier tables (and Table 9c), whites were more likely to respond to questions about black social benefits or white privilege from a ‘racist without racism’ frame. Is it reasonable then to infer that the whites sampled consider racism as a minimal condition of U.S. society, especially following the election of Barack Obama as president?

Conversely, it seems reasonable to attribute Blacks’ attitudes in the sample to Bourdieu’s *illusio* because they have overcome structural barriers to attend colleges of veterinary medicine. The answer for either group is ‘yes’ but for different reasons. On the one hand, whites are embedded in a sociocultural *illusio* that contemporary American society currently claims is color-blind and re-constructs history and biographies to minimize inequities that Blacks continue to experience while promoting American society as more egalitarian and individualistic.

On the other hand, for Blacks, it seems reasonable that their sociocultural *illusio* has fostered reticent adoption of racial stigmas in the public sphere, i.e., generally unvoiced beliefs that *black lives do not matter as much* as they struggle for access to social resources⁵⁵ (Hughey 2012). DeFreece Jr (2016:127) confirmed this suspicion when he wrote, “Unsurprisingly, race and ethnic socialization messages [of Black youth] tend toward conformity, adaptation, awareness of, and subservience to the rules of the

⁵⁵ This form of social dissonance as I have defined it stems from my understanding of DeFreece Jr. ‘s (2016:119) commentary that significant issues surrounding race today are attempts to develop cultural and historical discourses that delegitimize “normalizing the knowledge that race was developed purely to justify prevailing power relations that are now enshrined in our institutions”.

game”. Hammon (2013) described the counterfactual conditions that have continued to embed racial formations in American society:

The cliché example of ‘playing the race card’ involves a Black person being criticized for something unrelated to his or her race and responding, ‘It's because I'm Black, right?’ Today, when White Americans do not attain their highest educational or vocational aspirations, many are beginning to exclaim, ‘It's because I'm White, right?’ (P. 97)

*Microaggression and Sexist Communications: Symbolic Violence and University
Campuses*

The following contingency tables provide count and percentage distributions of survey questions that targeted survey respondents’ attitudes regarding contemporary discourse about sexual orientation and gender identity discrimination in the veterinary medical field and professional associations by gender and race. Table 9e represents by gender the sample participants’ agreement or disagreement with the statement that there is ‘too much talk about sexual orientation” in the veterinarian profession’.

The question was designed to solicit sample participants’ attitudes that represent the country’s current politically polarized condition along racial and social justice issues. Social polarization is defined as that “situation where the factors determining individuals’ identities, and therefore social groups, are culturally, ideologically, biologically, or socially driven and do not depend solely on income (classic examples

are ethnic, racial, religious, and political polarization)” (Permanyer and D'Ambrosio 2015:312).

The contingency table's gender distribution indicated that 30 percent of females and 56 percent of males in the sample agreed there was 'too much talk' about a person's sexual orientation. However, 70 percent of the female participants did not appear to be hypersensitive to polarizing conversations that included sexual orientation. A chi-square assessment found significant differences by gender regarding agreement or disagreement with the survey item [$\chi^2(1) = 5.0820, p \leq 0.024$ and Fisher's Exact, $p \leq 0.023$].

Sociologically, is it reasonable that American women living outside the Southern regions of the country were less offended or polarized to open conversations related to a person's sexual orientation (Jelen 2017). Perhaps it is given that at least since the 1968 formation of the international student movements, the second wave of feminism has become an activist social movement focused on overcoming institutional patriarchy and sexism in the public sphere (Evans 2009).

The alliances and political formations that developed between feminists and marginalized groups, including lesbian, gay, bisexual, transgender, and queer groups (LGBTQ) has promoted and established public dialogues to combat “homoppressive”⁵⁶

⁵⁶ Hiebert (2016:491) has suggested this term for the sociological lexicon for three reasons: 1) it offers a more accurate description of those who both disapprove and restrain than the term homophobic, 2) it would align our language with the 21st-century discourses regarding sexual orientation, and 3) it would shift focus away “from the mental and emotional health of individual objectors to the morality of social systems”.

or “Standard North American Family” discourses most often associated with male patriarchy (Hiebert 2016:489; Edgell and Docka 2007:28).

For example, as early as 1962-1963 periods, Professor Mary King⁵⁷ volunteered and then became a staff member of the Student Nonviolent Coordinating Committee (SNCC) that worked to overcome racial segregation and the political marginalization of Black men and women throughout the southern states (Jacobs 2007). Her work there was credited with providing a safe space where second wave feminism could emerge and demonstrate its inclusiveness. Thus, because the veterinary profession historically has remained a white patriarchal profession that women have successfully penetrated, it is likely women in the veterinary fields understand the challenges facing not only racial and ethnic minorities, but LGBTQ individuals as well and would not find conversations about sexual orientation as ‘too common a topic’.

Alternatively, might female responses imply that people in the veterinarian profession simply did not talk about sexual orientation, a kind of *don’t ask, don’t tell*, normative standard? This is a likely explanation. For example, Miller, Donner, and Fraser (2004:377) have argued that although “conversations connect us to other people” our discourse involves much more; it represents the cultural expression of power, privilege, and oppression that emerges through our use of language.

⁵⁷ Mary King’s work, the position paper co-authored with Casey Hayden, “Sex and Caste: A Kind of Memo”, first appeared at the SNCC retreat in Waveland, Mississippi in the fall of 1964. The paper was published in the April 1966 issue of the pacifist and transatlantic *War Resisters League Liberation* magazine, and became a key text of second-wave feminism.

Conversations about one's sexual orientation are likely to require significant feelings of trust on the part of the acquainted given the various outcomes based on social distance and the settings' required decorum (moral versus instrumental) as Goffman has explained (1959). Table 9f represents the sample participants' agreement or disagreement by race with the statement that there is 'too much talk about sexual orientation' in the veterinarian profession'.

The data indicated that 11 percent of Blacks sampled and 44 percent of Whites in the sample agreed there was 'too much talk' about a person's sexual orientation. However, 89 percent of the Black participants and 56 percent of Whites did not agree there was too much talk about sexual orientation. A chi-square assessment found significant differences by race regarding agreement or disagreement with the survey item [$\chi^2(1) = 6.7234, p \leq 0.01$ and Fisher's Exact, $p \leq 0.007$].

At face value, the findings above indicated at least by race, a somewhat optimistic shift in attitudes about sexual orientation conversations in the veterinarian workplace or medical school. Although White respondents were nearly evenly split over their attitudes about too much discussion of sexuality in the veterinarian profession, Blacks did not appear to be hypersensitive to such topics.

However, as mentioned from the results in Table 9e by gender, perhaps the large percentage of respondents who did not agree that sexual orientation discussions were too often a topic simply were following the homophobic standard of 'don't ask, don't tell' that was initiated in the early 1990s. Additionally, it is possible that Blacks take an

ambiguous view of sexual orientation based on their minority, out-group status in American society (Billings, Vescio, and Biernat 2000).

What is important here is that ambivalence is just as likely for someone who is considered an outgroup member when they view other dominant groups, or other outgroups as is the use of the don't ask, don't tell norm. For example, given Blacks stigmatized status, if they responded to the question that there was *not* too much talk about sexual orientation, it would seem more reasonable that Blacks were more sympathetic to LGBTQ members than a simple don't ask, don't tell policy; a position that might increase conversations, minimize group hostility, and increase intergroup interactions (Bonaventura and Biondo 2016).

A follow-up question asked participants how comfortable they were if someone used a derogatory comment about LGBTQ people in a professional setting. Table 9g represents the sample participants' 'somewhat comfortable' or 'not at all comfortable' with hearing LGBTQ-related slurs in a professional setting.

The data indicated that 43.3 percent of females sampled and 16 percent of males agreed they would be 'somewhat comfortable' hearing such slurs, which could range from coarse jokes to typical stereotypical microaggressions. However, 57 percent of the female participants and 84 percent of males agreed they 'would not feel comfortable' hearing these remarks. A chi-square assessment found significant differences by gender responses on the survey item [$\chi^2(1) = 5.7731, p \leq 0.016$ and Fisher's Exact, $p \leq 0.013$].

It would appear that female survey participants were more polarized on this question about LGBTQ slurs than males. In fact, males' overwhelming negative response contradicts the homoppressive or don't ask, don't tell thesis. Alternatively, how comfortable one is with hearing LGBTQ slurs was aimed at soliciting participants' willingness to accept such derogatory comments as a normative, ethical/moral attitude.

Table 9h represents the sample participants' comfort levels by race with hearing LGBTQ slurs. The data indicated that 42 percent of Blacks sampled and 36 percent of Whites were somewhat comfortable with hearing such remarks. However, 58 percent of the Black participants and 64 percent of Whites responded they were somewhat 'bothered' by negative remarks about a person's non-heterosexual orientation. A chi-square assessment found no significant differences by race regarding their standing on this issue [$\chi^2(1) = 0.216, p \leq 0.609$ and Fisher's Exact, $p \leq 0.399$].

The non-significance of responses by race also provided significant empirical evidence that acceptance of the LGBTQ community remained a polarizing social condition for survey participants in general, regardless their race. Although Whites held nearly a 2-to-1 ratio against homophobic oppressive remarks, it is notable that the sample comprised two southern conservative regions of the country that represent more fundamentalist Protestant morality standards regarding same-sex relationships.

Measuring Stereotypical Attitudes

The following contingency tables and chi-square assessments examined and tested for significant differences by gender and race based on interviews with practicing

veterinarians and CVM students who reported exposure to negative stereotypes regarding Blacks' ability to care satisfactorily for companion animals and/or food production animals such as cattle, swine, poultry, and goats.

Table 10a represents the percentage distribution of sample participants' agreement by gender to the statement that 'Blacks were unlikely to have had opportunities to own and care for pets in their households'. The data indicated that 80 percent of female sampled and 64 percent of males did not agree with the survey statement, while 15 percent and 36 percent, respectively were undecided. A chi-square assessment partially supported there were significant differences by gender on the response categories [$\chi^2(2) = 5.3722$, $p \leq 0.068$ and Fisher's Exact, $p \leq 0.096$].

Given that some response category cells had five or less frequencies, the Fisher's exact test was selected as the test statistic; a p-value of 0.096 or 0.10 seems a reasonable level of significance given the size of the sample and the intent of the survey item, which was to measure for negative stereotypical attitudes specific to Blacks household experiences. Overall, it appears males and females did not hold negative attitudes on this item although in personal conversations with some practicing companion animal veterinarians, Blacks lack of animal knowledge, and care for animals was attributed to their generalized poverty status.

As a practicing white companion animal veterinarian said, "I don't think they know much if anything at all about taking proper care of animals if they were raised in

inner city areas. I remember when I was applying to graduate school they asked if you had pets at home”.

Table 10b provided the percentage distribution of sample participants’ agreement by race to the statement that ‘Blacks were unlikely to have had opportunities to own and care for pets in their households’. The data indicated that 77 percent of Blacks sampled and 74 percent of Whites did not agree with the survey statement, while 12 percent and 23 percent, respectively were undecided. A chi-square assessment did not find significant differences by race on the response categories [$\chi^2(2) = 3.1827, p \leq 0.204$ and Fisher's Exact, $p \leq 0.2126$].

Table 10c represents the percentage distribution of sample participants’ agreement by gender to the statement that ‘Blacks lack the temperament for animal care’. The data indicated that 93 percent of females sampled and 88 percent of males did not agree with the survey statement, while 3.4 percent and 12 percent, respectively were undecided. A chi-square assessment found no significant differences by gender on the response categories [$\chi^2(2) = 3.0866, p \leq 0.214$ and Fisher's Exact, $p \leq 0.228$]. The findings demonstrated that the sample participants did not report having discriminatory attitudes that Blacks did not have the ‘personality’ to perform in the veterinary profession.

Table 10d provided percentage distributions by race to the statement that ‘Blacks lacked the temperament to care for animals’. The data indicated that 94 percent of Blacks sampled and 91 percent of Whites did not agree with the survey statement. A chi-

square assessment did not find significant differences by race on the response categories [$\chi^2(2) = 2.4053$, $p \leq 0.30$ and Fisher's Exact, $p \leq 0.254$], which demonstrated that neither racial group held a negative stereotype regarding Blacks abilities to become veterinarians.

Table 10e represents the percentage distribution of sample participants' agreement by gender to the statement they selected their CVM because they would be with students from similar backgrounds'. The data indicated that 51 percent of females and 61 percent of males in the survey sample had selected their CVM based on their knowledge that the students were similar in background characteristics.

Although a chi-square assessment found no significant differences by gender on the response categories [$\chi^2(1) = 0.6242$, $p \leq 0.429$ and Fisher's Exact, $p \leq 0.461$], the results demonstrated that a majority of groups were concerned whether the students they would be interacting with comprised their CVM cohorts.

Counter-factually, this finding suggested that the 'egalitarian', non-racist responses described in the previous tables in this section might be due to an inherent social desirability bias. To examine further this condition, table 10f described the percentage distributions by race on the survey question. The results showed that 77 percent of Blacks and 47 percent of Whites in the survey sample had selected their CVM based on their knowledge that the students were similar in background characteristics. A chi-square assessment found significant differences by race on the response categories [$\chi^2(1) = 4.7266$, $p \leq 0.03$ and Fisher's Exact, $p \leq 0.027$].

However, Blacks sampled for this study were attending a historically Black CVM school, which could indicate sampling bias. On the other hand, it might confirm that Blacks are more comfortable in racially homogenous academic settings; it could also indicate that marginalized recruitment at predominantly white CVMs left blacks few choices except to apply to historically black education institutions.

Although Whites were evenly split on the survey item, it is worth mentioning that in general, college students apparently want to attend universities that offer social encounters with others of the same background characteristics. For example, research has shown that the mental health needs of college students have remained a major concern for administrators over the last decade as students seeking counseling services have significantly increased. Black and other minority students attending predominantly White colleges and universities have reported campus experiences “as distressing, isolating, and discriminatory” (McClain et al. 2016:101).

Hence, trying to identify racist attitudes held by CVM students and practicing/faculty veterinarians would require different controls than were provided in this study.

The prior analyses demonstrated that Whites and Blacks significantly diverged on whether whites were privileged (fewer whites than blacks agreeing), whether there was too much talk about sexual orientation (whites more so than blacks stated there was), that Whites were more comfortable in rural settings, and Blacks preferred attending CVMs made up of other minorities. The above findings also demonstrated a

hypersensitivity to solicited attitudes about racial discrimination. These findings make a strong argument for the differences in cultural schema that help Blacks and Whites in the sample make sense of their everyday practices.

These divergent findings are not new in terms of Blacks and Whites observed internal biases. Researchers have found that surveys focused on taboo topics such as racism, sexual orientation, sexual behaviors, and some criminal activities have caused inaccurate survey estimates based on respondents' "social desirability bias" (Krumpal 2013:2026).

Survey participants' self-presentation concerns could have affected them in such a way that they systematically underreported their socially sanctioned attitudes and over accounted for seemingly non-sanctioned responses. For example, as has been shown, Whites in the survey did not agree with the statement that Blacks received preferential college admissions but believed as Blacks did that there was too much talk about race in the veterinary fields.

This would appear a reasonable explanation for the similarity in Blacks and Whites' responses to 'normative views' of today's American nonracist ideology. Blacks and Whites in the sample did not agree with stereotypical views that inferred Blacks and other minorities were less likely to have owned and cared for a pet, but 36 percent of males and 23 percent of Whites were 'unsure' whether the stereotypical statement was true. Yet, Blacks and Whites overwhelmingly agreed that they were exposed to or heard racists comments during university sanctioned events or social gatherings.

Let us examine this observation closer. Blacks and Whites in the survey sample held significantly different views on whether whites enjoyed a ‘privileged status’ in American society. Both of these survey questions pointed to a significant social antinomy because on the one hand Whites (and Blacks) in the survey appeared to have adopted a ‘racism without racists’ view, but on the other hand they acknowledged that racism is a regular occurrence in the public sphere⁵⁸. Moreover, Blacks did not agree there was a need to increase recruitment of minorities in the profession while Whites acknowledged a need.

The results for Whites and Blacks clearly demonstrated Bourdieu’s *illusio*; an attitudinal condition that allowed both groups to simultaneously cherry-pick’ social inequalities to acknowledge and those they could ignore. Additionally, responding to the question that blacks receive unfair admissions to CVMs, Whites in the sample were evenly divided on a favorable or unfavorable response. If whites were in fact aware that affirmative action policies were acceptable social adjustments to end structural discrimination, an outside observer would have expected a majority of ‘educated’ whites to disagree with that survey statement, but as the data revealed, they did not.

⁵⁸ This finding in a way challenges cognitive dissonance theories that place too much emphasis on the motivational aspects of reflexivity that could reduce mental anxiety when confronted with a seeming moral paradox. Because cognitive dissonance described a condition when a person has two opposing cognitions (I prefer to say understandings) that were rationally inconsistent, they experience dissonance which allegedly produced “an unpleasant drive state (like hunger, thirst, or pain)” (Aronson 1999:105). Then people became motivated to minimize their ‘headaches’. I submit that cognitive dissonance theory’s attempt to show how we make sense out of our world, is misled. When dissonance would occur, it would have to originate with an individual’s propensity to skepticism, not because they were presented with some *alter* conditions. Especially when considering racism: If dissonance worked at the cultural and moral level, then racism would have vanished along with slavery in the 19th century.

Given the contradictions in the participants' comprehension of racism in the country and its effect on the veterinary profession, it seemed reasonable to seek a more granular observation regarding the student participants' comprehension of the issues facing the profession. Specifically, the underrepresentation of blacks in the subfield of large animal veterinarian (LAV) practitioners – a subfield that has received public exposure over the past decade as the workforce rapidly approaches retirement age and the group has remained more than 90 percent dominated by white males.

To accomplish this, CVM graduate students were asked whether they 'would agree to an increase in their student fees to fund LAV minority scholarships'. The results are presented in Table 10g and 10h by gender and race.

Table 10g provided percentage distributions by gender for the question whether participants would accept costs to help mitigate the underrepresentation of Blacks in the veterinary field general, and the LAV field specifically. The data indicated that 83 percent of females and 86 percent of males sampled were unwilling to bear additional student fees to increase minority representation into CM large animal programs. A chi-square assessment did not find significant differences by gender since both groups overwhelmingly rejected additional costs to them to mitigate the profession's racial imbalance [$\chi^2(2) = 0.0885$, $p \leq 0.957$ and Fisher's Exact, $p \leq 0.955$]. Because some response cells had less than five responses, the Fisher's exact was selected as a better test for significance.

Table 10h provided percentage distributions by race for the question whether participants would accept increased school costs to help mitigate the underrepresentation of Blacks in the veterinary field general, and the LAV field specifically. The data indicated that 64 percent of Blacks and 89 percent of Whites sampled were unwilling to bear additional student fees to increase minority representation into CM large animal programs.

A chi-square assessment did find significant differences by race with Whites in the survey overwhelmingly rejected additional costs to them to mitigate the profession's racial imbalance [$X^2(2) = 5.7201$, $p \leq 0.057$ and Fisher's Exact, $p \leq 0.049$]. Because some response cells had less than five responses, the Fisher's exact was selected as a better test for significance.

Table 10h findings revealed that at least 27 percent of the Black survey participants would contribute to helping other blacks attend a CVM program specializing in large animal practices compared to only five percent of Whites sample. These results once again illustrated a mismatch between 'voicing support' for social justice policies that would benefit the veterinary profession and the social appearance of being anti-racist. Blacks responses seemed to indicate they comprehended their 'racial community status' and were morally obligated to help, or simply wanted to be more proactive about balancing the profession's inequalities.

Although my attempt was meant to further clarify these seeming paradoxes among Blacks and Whites' responses to survey questions, it became apparent that to

understand the cultural similarities and differences among the sample participants would require placing them in a structural context.

Michele Lamont's (2000) study has examined social class and race from a structural and cultural context. She has described the similarities and dissimilarities across social class boundaries as indicative of a cultural paradox found in exchanges between blacks and whites in contemporary American society. She wrote that whites and blacks have different cultural perspectives because they use varying moral theaters or "schemas of evaluation" to navigate racist stereotypes they each hold (although Blacks attitudes seemed significantly less harsh about Whites compared to Whites stereotypes of Blacks) (2000:9).

Lamont's study demonstrated that upper-middleclass whites and blacks' cultural values were similar among working class whites and blacks in the United States based on moral grounds, but the evaluative metric or rationality was decidedly different across social class boundaries. Professionals' concern with trust and predictability valued conflict avoidance, team efforts, humbleness, and flexibility while working class individuals valued personal integrity and straightforwardness in social exchanges. She stated that working class blacks and whites' social class worldviews emerged from a similar morality but acquired different dimensions of expression.

Thus, upper class and lower class individuals regardless of their race would have similar moral intentionality, but would retain culturally prescribed nuances based on one's racial habitus and social position. Lamont's findings partially described what has

occurred in most studies focused on examining racial conflict simply as a matter of structural conditions. However, to explain the seeming cultural conflicts requires an understanding of Bourdieu's habitus, which it appears she has implicitly incorporated without direct reference to the concept. Nevertheless, Lamont (2000) is worth quoting at length here.

Black workers emphasize collective dimensions of morality, putting the 'caring self' above the 'disciplined self': they are particularly concerned with solidarity, egalitarianism, generosity, close interpersonal connections, fictive kinship, and defense of the black imagined community. In contrast, white workers have a more individualist understanding of altruism and are less exposed to cultural repertoires (such as the black church) that can sustain solidaristic notions.

Hence, the class cultures of black and white workers are somewhat different because they were fabricated from different cultural material and non-material symbols, and are exposed to harsher structural conditions. (P. 52)

Principle Component Factor Analysis: Ecological Capital

I now turn to the ecological capital factor constructed to measure the effect of survey participants' geographic, residential locations as they moved from childhood through their late adolescent years. As shown in Table 11, six variables were theorized as a metric of participants' ecological capital resources and assets. A reliability test revealed $\alpha = 0.60$ for the six variables in the scale. Although Cronbach's alpha fell short of accepted guidelines $\alpha > 0.70.$, the associated alpha demonstrated that 60 percent of

the variance in the true score for the survey items was accounted for and were thus kept in the exploratory factor analysis.

The EFA correlation solution revealed that the six items primarily loaded on a single eigenvector (1.428; chi-square (15) = 60.50, $p \leq 0.0001$). Factor loadings above 0.50 were considered high enough to include an item in a scale because these loadings represent an estimated correlation between each item and each factor studied (Acock 2016).

A subsequent principle components factor (PCF) analysis was computed for the variables, including orthogonal rotation, which resulted in a two-factor solution (FACTOR 1-EIGENVALUE = 2.1774 and FACTOR 2-EIGENVALUE 2 = 1.104). Factor 1 explained a significant portion of the total variance (36 percent) for the six items. However, because a PCF analysis was used to provide a parsimonious measure of the explained variance of items on a single latent construct, an orthogonal rotation was computed where all the factors were uncorrelated. This allowed for a transparent interpretation of the underlying latent factor (Acock 2016).

The orthogonal rotation pattern matrix results demonstrated that the items—family residence, how often changed residence as a child, preference for urban setting, and preference for suburban setting—loaded highest on Factor 1 and neighborhood attachment and preference for rural setting loaded highest on Factor 2.

This finding demonstrated that while *all* the items were related to the underlying construct, dropping the two items that loaded on Factor 2 would provide a simple

structure composite of the ecological capital factor. A second PCF analysis without the two variables confirmed a single dimension for ecological capital better explained total variance (47 percent) among the remaining survey items. Factor scores and factor means were then computed for later use in a multiple regression analysis.

The next sociocultural factor examined was family capital resources and assets inferred from 10 items related to immediate and extended family members' education, occupational, agricultural backgrounds, and type of family household as listed in Table 11. An initial Cronbach's alpha ($\alpha = 0.19$) demonstrated the survey items were not internally consistent and required adjustments. An acceptable Cronbach's alpha ($\alpha = 0.7454$) was obtained after dropping survey participant's age exposed to livestock, father and mother's education and occupations, and type family unit (traditional two-parent or single parent households).

A PCF analysis with orthogonal rotation revealed that the remaining four variables comprised a single dimension with each variable loading at 0.55 or higher. Chi-square model fit tests confirmed the model's estimates ($p \leq 0.0001$). This provided support that the latent sociocultural factor—family agricultural capital—explained the 'shared variance' among the scale items (0.59). Predicted factor coefficients or scores for the four items was computed, including a mean score for each of the four items for later analyses.

Examining the internal consistency for the racial capital factor had a weak initial Cronbach's alpha ($\alpha = 0.14$). As listed in Table 11, racial capital ranged from

veterinarian profession's minority recruitment efforts to participants' response to selecting a CVM based on racial similarity of students. After examining the inter-correlations among items, only three survey questions remained that provided reasonable internal consistency ($\alpha = 0.50$).

The items were 'veterinarian profession's minority recruitment efforts', 'whites hold a privileged status', and 'preference for college of veterinary medicine (CVM) with people of similar racial makeup'. The new capital construct was theorized as 'white racial frame'.

A PCF analysis with rotation revealed that the remaining three variables comprised a single dimension with each variable loading at 0.46 or higher. The lowest coefficient had a negative sign (-0.43) and represented 'blacks received unfair admissions to colleges of veterinary medicine'. This finding provided interesting insights. A negative loading meant that people who scored high on the white racial frame factor would tend to score low on the statement that blacks received unfair admissions to college of veterinary medicine and people who scored low on that factor would score high on the statement. For example, people who agreed that whites were privileged and the veterinary profession recruited blacks would not report that blacks received unfair admissions—high on the factor low on the item. This mirrors 'the racism without racists' concept that Bonilla-Silva (2014) has referred to.

On the other hand, if a person agreed that blacks received unfair admission standards (high on the item) they would tend to disagree that whites were privileged and

that the vet profession needed to be proactive in its recruitment of minorities (low on the factor). This was partially supported by previously computed chi-square tests of independence on these items as shown in Table 11. The percentage for whites was 40 percent agreed and 60 percent disagreed that whites were privileged while Blacks in the sample responded 84 percent agreed and 16 percent disagreed that whites were privileged.

The chi-square fit test confirmed the model's estimated parameters ($p \leq 0.0001$). This provided support that the latent sociocultural factor—white racial frame—explained the 'shared variance' (52 percent) of the scale items true score. Predicted factor coefficients or scores for the three items was computed, including a mean score for each of the four items for later analyses.

The cultural/educational factor referred to in Table 11 comprised five survey questions: 'promotes veterinarian careers', 'willing to pay increased student fees to recruit students to large animal fields', 'had high school mentors', 'agriculture science courses', and 'belonged to agriculture after-school organizations'. An initial Cronbach's alpha ($\alpha = 0.37$) demonstrated the survey items were weakly associated on the single dimension of cultural/educational capital, but additional attempts to drop variables did not increase the construct's overall internal reliability.

A closer inspection revealed that the responses were less about cultural capital per se than about the survey participants' attitudes regarding educational experiences.

Hence, the sociocultural factor was renamed educational capital for simplification and explanatory power after dropping identified variables as discussed below.

An initial PCF analysis revealed the items significantly loaded on two dimensions as shown in Table 15a. To adjust for the differences, two items—‘promote veterinarian careers to high school students’ and ‘pay increased fees to recruit students to large animal veterinarian practices’ were dropped as each item’s loading coefficient was below 0.50. Re-running the PCF analysis resulted in the remaining three variables—had ‘high school agriculture or veterinarian mentors’, ‘agriculture science courses’, and ‘belonged to agriculture after-school organizations’—loading at 0.7429 or higher on a single dimension.

Chi-square model fit tests further confirmed the model’s estimated parameters ($p \leq 0.0001$). This provided support that the latent sociocultural factor—educational capital—explained the ‘shared variance’ among the scale items (0.561). Predicted factor scores for the four items were computed and are displayed in Table 15b.

The sociocultural factor—social capital—comprised four survey items: ‘neighbors socialize together’, ‘neighbors care about one another’, ‘neighbors were a close knit group’, and respondents’ neighborhood was rated as a ‘friendly place’. A Cronbach’s alpha ($\alpha = 0.673$) demonstrated the four items were overall internally consistent with the theorized dimension as shown in Table 16a and 16b. A non-rotated and rotated principle components factor analysis obtained an eigenvalue of 2.05 that

explained 52 percent of the variance in the true scores comprising the latent variable, social capital.

Factor loadings on the variables ranged from a low of 0.6264 to a high of 0.7705, strong indicators of the neighborhood characteristics alignment with the latent variable as shown in Table 16a and 16b. Predicted factor coefficients or scores for the four survey items was computed including a mean score for each of the items for later analyses.

The sociocultural factor—moral capital—included four survey items that had Chi-square tests computed: ‘how often racist slurs heard in CVM and social settings’, ‘how comfortable with LGBTQ slurs in a professional setting’, ‘too much talk about sexual identity in the veterinarian field’, and ‘too much talk about increasing minorities in the veterinary field’.

Two additional survey items were included: ‘sexual orientation was not a concern’ in the veterinarian profession and CVMs were accepting of LGBTQ students. A Cronbach’s alpha ($\alpha = 0.4693$) demonstrated the four items were weakly acceptable. A PCF analysis resulted in a two factor solution (Factor 1 (eigenvalue = 1.89, Factor 2 eigenvalue = 1.113). Two survey items cross-loaded on both factors and a third item loaded very high only on Factor 2.

To overcome the ambiguity of the PCF results, an orthogonal rotation was computed to develop a simpler structure that maximized higher loadings on one factor and a minimized lower loadings (Brown 2006). A two-factor model emerged with two

survey items—‘racist remarks heard’ and ‘the veterinarian profession was not concerned with a veterinary’s sexual orientation’—loading very high on the second factor.

The two items on the second factor were dropped and a third PCF analysis was computed. Table 17 provides the final computations and analysis for a single factor solution on the moral-sexual attitudes scale items: ‘comfort with LGBTQ slurs’, ‘too much discussion about sexual identity in the veterinarian profession’, ‘there is too much talk about integrating the veterinary profession’, and ‘CVMs were accepting of LGBTQ students’.

Each indicator loaded very high on a single factor (coefficients ranged 0.6143 to 0.711; eigenvalue of 1.7534 that explained 43 percent of the total variance among the survey items with the latent factor). A Cronbach’s alpha was computed for the remaining survey items and was deemed acceptable at 0.57.

Summarizing Capital Matrix Social Spaces

The theoretical construction of a social capital matrix was initially derived from the chi-square tests summarized in Table 11. The ‘capital matrix of social spaces’ was then subjected to an exploratory factor analytic framework to discover and simplify the covariance matrix structure of the survey items selected as indicators that would account for the total variance subsumed under a theorized latent construct. As mentioned in the previous factor analytic section, where necessary to meet established guidelines of model parsimony and total variance explained, survey items that did not ‘fit’ a one-

factor model were dropped from the final factor analyses. A review of the retained capital matrix formations as depicted in Tables 12 to 17 follows.

The moral capital dimension included the survey variables specifically concerned with sexual orientation, gender, and racial discrimination in the veterinary fields. The label is appropriate given that in-group and outgroup discrimination was learned at an early age generally because from infancy through late adolescence individuals were embedded in a relatively 'closed' social system that informed their socio-cognitive development.

Ecological capital as a factor solution included: 1) type of family network a participant was raised, e.g., traditional heterosexual couple, single parent, extended family, etc., 2) how often a participant's family changed their residence, and 3) whether they preferred living in a rural, suburban, or urban setting. Participants' life trajectories were hypothesized to be relatively affected by conditions outside their control that would foster either opportunities or constraints as they moved from infancy to late adolescence in pursuit of academic and occupational goals.

A third capital formation, white racial frame, was derived from three survey items: 1) veterinary profession adequately recruits blacks and other minorities, 2) blacks receive unfair college admissions, and 3) whether whites have a privileged status in American society. The outcomes on the three variables were intended to demonstrate current observations that the majority of white Americans do not perceive themselves as having racist-informed beliefs.

The factor analysis solution for education capital comprised three survey items:

- 1) whether participants' had agriculture-related mentors during middle and high school,
- 2) whether they joined agriculture-related afterschool organizations in high school, and
- 3) whether their respective high schools offered agriculture science courses.

The theoretical intent was to conceptualize a space of educational capital that fostered opportunity structures specific to students' interests in veterinary medicine or animal research fields; a space similar to recent worldwide recognition to develop students' interest in science, technology, engineering, and math fields (STEM). In line with educational capital, participants' embeddedness within a family network that offered experiences related to agriculture, i.e., a cultural capital asset base, which was termed family agriculture background.

The construct was comprised from sample participants' responses to the following:

- 1) Did your family own livestock during your youth?
- 2) Did your father have an agricultural background?
- 3) Did your mother have an agricultural background?
- 4) Did your grandparents have an agricultural background?

Prior research reviewed for this project demonstrated that people choosing a career in veterinary medicine more often than not had early childhood experiences with animals. The final capital matrix spatial component affecting individuals' dispositions

was social capital. Although the term social capital has taken on expanded meanings in the literature which in principle have weakened its conceptual clarity, in the factor analysis computed, social capital was derived from the 'kind' of neighborhood attachments and relations that survey participants reported. Classical, modern ecological sociology, and most avidly, rural sociology, has documented the importance of the social relations individuals form in their respective neighborhood communities.

The survey items included in the social capital space were:

- 1) Did your neighbors socialize together often?
- 2) Do you believe your neighbors looked out for one another?
- 3) Would you agree your neighbors were a close-knit group?
- 4) Would you agree your neighbors were friendly to one another?

Testing the Social Capital Spatial Dimensions

The social spaces theorized for this project was identified through factor analyses. This is an important consideration for two reasons. First, theorizing social spaces is specifically a structural endeavor and cannot infer psychological states. Secondly, the dispositions solicited were considered observable proxies of a reciprocal and relational outcome of structure and agency in a multidimensional space specific to the pilot study sample.

However, the total number of people in the sample compounded by the limited number of African American participants in the overall sample restricted the study's generalizability. Nevertheless, the sociocultural framework provided an adequate

description of the subsequent opportunities and constraints survey participants faced as they entered a college of veterinary medicine or began their careers in veterinary medicine. The analyses demonstrated the plausibility of examining opportunity structures within a multidimensional social space and could offer a more robust theoretical and methodological framework for future research.

To test the theory and method's acceptability for description and interpretation, the following section offers logistic regression techniques to study the observed affects found in the chi-square and factor analyses. The first step in this confirmatory process examined the percentage change in the odds ratio associated with the capital matrix of social spaces on the dependent variable, preference for a career in large animal veterinary (LAV) practice as provided in Table 18.

Two capital formations offered partial significance ($p < 0.10$) that an individual's position along the two spatial dimensions—their ecological (geography) background and family agricultural background—contributed to their career choice. The results indicated that for every unit increase in the sample respondents' ecological capital formation, their likelihood of selecting a career in large animal medicine was 42 percent lower than other career choices such as companion animal practices.

This finding was reasonable given that 60 percent of the sample participants were not interested in a large animal veterinary career. Additionally, the items were reversed coded; that is lower integers indicated a preference for rural lifestyle, never having changed residential settings, and a preference for a rural setting.

The family agricultural background spatial dimension logistic regression analysis confirmed previously documented research findings. The odds of an individual selecting a LAV career was 71 percent higher for each unit increase in a person having a family with agriculture-related experiences. Although the social and educational capital dimensions showed a 17 percent and six percent higher odds of selecting a LAV career, respectively, neither finding was significant. Interestingly, the moral and white racial frame dimensions resulted in three percent and 18 percent lower odds of selecting a LAV career for every unit increase on those items making up this scale. This makes sense because these items were reverse coded, i.e., lower responses would indicate a respondent was not concerned with LGBTQ and gender issues, and did not believe whites held a privilege status.

Overall, these two dimensions indicated that diversity acceptance might be growing. However, those responses which demonstrated that individuals did not believe whites held higher status positions in society might also demonstrate the paradox of measuring racial sensitivity when a majority of respondents was white and from likely conservative backgrounds. While these findings were noteworthy, they were not statistically significant.

The capital matrix space that comprises the sociocultural formations investigated in this project is presented as Figure 3 in Appendix B for the reader. In addition to the social capital matrix illustrated, Figure 4 illustrates the percent odds ratio of a logistic regression that tested the hypothesized capital matrix formations with respondents'

preferences for a career in large animal veterinary practice. As was mentioned in the beginning of this project, the LAV field is facing critical occupational deficits in the coming decade, especially in rural areas as well as in the beef industry overall.

Table 18 also provides the results of an ordinal logistic regression for participants' race, gender, kinship household type, family religion, and age first exposed to livestock on the dependent variable, preference for a career in large animal veterinary medicine (LAV). Because of the LAV field's historical occupational dominance by white males, the dependent variable was deemed an appropriate point of departure for estimating predictive logistic regression equations.

Given the prior analyses by gender and race, Table 18's findings were less than surprising. Males compared to females and whites compared to blacks had significantly higher odds of selecting a LAV career. Odds of selecting an LAV career was 1,353 percent higher for whites than for blacks in the sample ($p < 0.02$). The odds were 244 percent higher for males than females in the survey sample ($p < 0.04$). Additionally, the odds of choosing a LAV career was 34 percent lower for traditional, heterosexual households than single parent homes ($p < 0.733$), 104 percent higher for protestant households ($p < 0.183$), and 45 percent higher for participants exposed to livestock by their 12th birthday ($p < 0.50$). Unfortunately, these findings were not significant.

Hypotheses Tests: Results and Discussion

Ecological Capital Resources

The null hypothesis for H1a stated there were no differences in the participants' residential setting during their childhood to late adolescence. The Fisher's exact test demonstrated significant differences between males and females, with males more likely to have spent their youth in a rural setting than females ($p < 0.01$). Concerning differences in residential setting by race, the Fisher's exact test failed to reject the stated null hypothesis ($p < 0.25$). However, as Table 3d showed, percentages obtained indicated that far more whites were raised in rural settings than Black survey participants were.

The null hypothesis H1b stated that there were no significant differences in survey participants' kinship household characteristic, i.e., traditional, single parent, etc. by gender or race. The Fisher's exact test for gender differences failed to reject the null hypothesis, with both males and females overwhelmingly having lived in traditional, two-parent, heterosexual households.

However, the Fisher's exact test provided partial support to reject the null hypothesis and accept the alternative hypothesis that there were significant differences in kinship household makeup by race ($p < 0.06$). For example, 21 percent of black participants were raised in single parent households compared to six percent of white survey respondents.

Family, educational, and cultural capital

The null hypothesis for H2a stated that participants' family social economic status and agricultural related experiences were not significantly different by gender or race on the human or cultural capital assets, resources, or opportunities afforded them. The analyses included examining for significant differences on the following survey items: their age at first exposure to farm/ranch animals, parents agricultural, occupational, and educational backgrounds, and grandparent's agricultural backgrounds.

The results of the chi-square and Fisher exact tests allowed rejecting the null hypothesis that there were not any significant differences ($p < 0.10$ or lower) by gender and race on the following characteristics: 1) family-owned livestock, 2) age survey participants were first exposed to farm animals, 3) father's educational levels, 4) father's agricultural-background characteristics, 5) mother's educational achievement level, 6) mother's agricultural background, and 7) grandparent's agricultural background.

However, a Fisher's exact test ($p < 0.001$) allowed rejecting the null hypothesis of no significant differences by respondents' gender. Conversely, the null hypothesis of no differences by race of survey respondent was supported ($p < 0.778$). Similarly, participants' classifying of their mother's occupation were significantly different between males and females ($p < 0.04$) whereas the null hypothesis was accepted there were no differences in survey responses on mother's occupations by participants' race.

As mentioned previously, males were more likely to have classified their mother's occupation as 'homemaker' or 'housewife' than females, who reported their mothers were active in the workforce during their years at home.

The null hypothesis for 2b stated there were no significant differences by survey participants' high schools offering after-school agriculture-related activities by gender and race. In both cases, the null hypothesis was rejected for gender (chi-square, $p < 0.05$) and race (Fisher's exact, $p < 0.02$).

The null hypothesis for 2c stated there were no significant differences in survey participants' high schools offering agriculture science courses by their gender or race. As discussed previously, the chi-square test failed to reject the null hypothesis for gender differences ($p < 0.53$) but failed to accept the null hypothesis based on respondents' race ($p < 0.06$).

The null hypothesis for 2d stated there were no significant differences by survey participants' middle and high school opportunities to establish agricultural-related mentor relationships by gender or race. The chi-square tests for gender failed to reject the null hypothesis ($p < 0.19$) but failed to accept the null hypothesis for differences by respondents' race ($p < 0.04$).

The null hypothesis (H2e) that survey participants did not experience significant differences in their high schools' promotion of careers in veterinary medicine and/or research by gender or race was rejected (chi-square p-value of 0.04 in both cases).

Racial Capital

The null hypothesis (H4a) that participants' believed blacks received unfair college of veterinary medicine admissions were not significantly different by gender and race (chi-square $p < 0.30$ and 0.20 , respectively). Although the statistical results demonstrated no significant differences by gender, at least 45 percent of males and females sampled believed blacks received unfair CVM admissions, a strong counterfactual argument that CVM students and faculty likely consider affirmative action laws and policies as unfair to whites.

Interestingly, as previously mentioned with Table 8j, blacks and whites believed blacks had received unfair CVM admissions as well (32 percent versus 49 percent, respectively).

The null hypothesis 4b stated that study participants' belief that racial discrimination remained an issue for the veterinary medical fields were not significantly different by gender and race. The hypothesis was composed of three related questions: 1) Does the veterinary profession promote racial and ethnic diversity? 2) Do you believe your CVM academically supports minorities? Moreover, 3) Do you believe there is too much talk about race in the veterinary profession?

The chi-square and Fisher exact tests failed to reject the null hypothesis based on respondents' gender for the three items (chi-square $p < 0.93$, Fisher's exact $p < 0.50$, and chi-square $p < 0.90$), but did reject the null hypothesis based on respondents' race for item 1 (chi-square $p < 0.001$) and item 3 (chi-square $p < 0.001$).

The null hypothesis for item 2 was not rejected for either group category (Fisher exact tests of $p < 0.50$ and $p < 0.30$, respectively).

Although there were no significant gender differences on item 1, it is important to note that at least 65 percent of males and females surveyed believed the veterinary profession was adequately recruiting minorities into the profession in light of the fact that the field has received severe criticism for its underrepresentation of minorities by veterinarian professionals and civil rights advocates.

Seemingly, at odds with the no differences by gender groups on item 1, significant differences were recorded based on participants' race. In fact, whites (76 percent) compared to blacks (11 percent), reported the veterinary field was not actively recruiting minorities.

The second survey item of H4b showed no significant differences by survey participants' gender or race on their belief that the CVM they attended was academically supporting minority students. Males and females overwhelmingly reported their CVMs did a good job supporting minority students (about 86 percent for each gender) as did whites and blacks (87 percent versus 79 percent).

The third item examined if survey participants believed there was 'too much talk about race' in the veterinary profession. While there were no significant differences found by gender classification, at least 30 percent of respondents thought there was. From a social encounter perspective, minority students could expect that a minority of

students would likely consider general media accounts of affirmative action and diversity were unnecessary.

The previous statement is at least partially supported from the significant differences attributed by participants' race on the survey question (chi-square $p < 0.001$). Surprisingly, 75 percent of blacks and whites held there was too much talk about race in the profession. Counterfactually, it could be that this outcome demonstrated that blacks in the veterinary and/or professional white-collar fields were likely to support such an obviously anti-diversity statement because they felt a kind of 'sensitivity' over recent public debates that compared efforts to mitigate social inequalities by alleged actions that were 'hollowing out' the American middle classes.

The null hypothesis of H4c stated there was not a significant difference by gender or race regarding study participants' social perceptions that whites have a privileged status in American society. The chi-square test for gender differences partially supported rejecting the null hypothesis ($p < 0.10$) although percentages affirming and negating the statement were nearly identical for the two groups.

However, the chi-square test for differences by participants' race firmly supported rejecting the null hypothesis ($p < 0.001$). As mentioned in earlier discussions related to Table 81, 84 percent of blacks believed whites held a privileged social advantage compared to only 40 percent of the white survey participants. This is a troubling finding on many levels.

Of the total number of whites surveyed, 60 percent may have been unknowledgeable of the historical, economic, and social institutions that have favored Caucasian races' dominance since the country's founding.

The null hypothesis for H4d stated there were no significant differences by respondents' gender or race on their responses to the question they selected a CVM based on the college's racial composition mirroring their race (see Tables 10e and 10f). The Fisher's exact statistical results demonstrated no differences by gender ($p < 0.56$).

However, significant differences by race were found ($p < 0.04$), indicating the null hypothesis could be rejected. Of the blacks surveyed for this project, 77 percent responded they selected their CVM because the racial makeup more closely mirrors theirs. These findings were troubling because it is possible that black students considering a veterinary career could believe they were less likely to succeed at a predominantly white CVM or that acceptance and admission to a predominantly white CVM was less than at a predominantly black CVM.

Social Capital

The null hypothesis for H5a stated there were no significant differences by gender or race of the respondents regarding the sociability and social interaction of their neighborhood. The null hypothesis was accepted for the gender groups (chi-square, $p < 0.17$), but was rejected for the racial categories ($p < 0.01$). Interestingly, the data demonstrated 65 percent of blacks compared to 32 percent of whites in the sample stated their neighbors often socialized together.

This might indicate African Americans more often than not reside in segregated neighborhoods with other blacks regardless their economic status have experienced more daily contact with one another compared to whites in suburban and urban settings (Stoll 2008). However, other researchers have questioned whether race is a significant factor that necessarily conditions daily social exchanges or is it instead the “neighborhood conditions” that contextualize the exchanges among and between social networks found in residential settings (Small 2007:321). This requires further study.

The null hypothesis for H5b stated that study participant did not demonstrate significant differences on their responses that their neighborhoods were ‘friendly places’ to live during their youth by gender or race. Neither null hypothesis was rejected as all groups examined considered their neighborhoods as friendly spaces. This is noteworthy given the plethora of social research that details the negative effect of violent criminal activities in neighborhoods proximate to mainly African American neighborhoods (Peterson 2009).

The null hypothesis for H5c stated that study participants did not differ on their perceptions that their neighbors demonstrated care and concern for one another by their gender or race. The results of Fisher’s exact tests allowed rejection of the null hypothesis by gender category ($p < 0.02$), but failed to reject the null based on the race of respondents ($p < 0.60$). As mentioned earlier, the construct of ‘care’ was based on the question ‘do you agree that your neighbors looked out for one another’ (see Tables 7g and 7h).

The percentage distribution by gender indicated a need for further study given nearly 40 percent of female respondents reported their neighbors 'did not care' or 'look out for one another'. This provoked the question what qualitatively different gender biases were at work in terms of neighborhood social interactions that young female students would experience that negatively affected their neighborhood perceptions. Given the levels of violence and sexual assault reported by females of either race, this component of neighborhood attachment requires further study.

The null hypothesis for H5d stated that survey respondents did not significantly differ on their perceptions that their neighbors were a 'close knit' group during their childhood years by gender or race. Somewhat surprisingly given respondents' prior characterizations of their neighborhood settings, the chi-square results for gender ($p < 0.04$) and race ($p < 0.10$) failed to accept the null hypothesis of no significant differences among participants' perceptions of their neighbors as 'close knit' groups.

However, the findings by gender offered some support for the above findings that female respondents might have qualitatively different social exchanges and thus perceptions at the neighborhood level than males. The percentage distribution as given in Table 7i shows that females in the survey were more likely to perceive their neighbors as less than a close-knit group compared to their male counterparts (39 percent versus 64 percent).

Moral Capital

The null hypothesis for H6a stated that study participants were not significantly different on their beliefs after their undergraduate experiences that people living in rural and urban settings exhibited substantial cultural differences by gender or race. The Fisher's exact tests failed to reject the null hypothesis for both groups investigated ($p < 0.23$ and $p < 0.40$). These results however also provided additional insights that traditional beliefs that 'country and city' peoples have different cultural standards persisted in a time of practically universal access to the worldwide web in postindustrial countries.

The null hypothesis for H6b stated that survey respondents were not significantly different on having heard racist slurs/derogatory comments in their CVM's classrooms and university social settings by gender or race. The chi-square tests did not allow for rejecting the null hypothesis for either of the groups examined (gender = $p < 0.74$ and race = $P < 0.98$). In contrast to current white public views that racism is less observable in society, this finding also demonstrated that about 70 percent of males and females reported hearing racist slurs as well as blacks and whites surveyed. This highlights the fact that public perceptions that the United States has become a less racialized society were premature.

The null hypothesis for H6c stated that sampled survey participants were not significantly different on their acceptance of discussions about LGBTQ relationships by gender or race. The chi-square results for gender differences allowed rejection of the null

hypothesis ($p < 0.02$), with males more likely to find offense with sexual orientation concerns than females (56 percent to 30 percent, respectively).

The data indicated that males might be exhibiting social biases that some might arguably perceive as a phobia related to males comfort with acknowledging gay, queer, bisexual, or transgender sexual orientations (Parent, Batura, and Crooks 2014; Jadwin-Cakmak et al. 2015). This seemed a reasonable observation given the gender-specific roles that males in the United States were expected to exhibit, i.e., dominant views that heterosexuality is a sanctioned sexual activity.

The null hypothesis for H6d stated that respondents were not significantly different on their comfort with hearing LGBTQ derogatory comments by race or gender. A Fisher's exact test for gender categories allowed rejecting the null hypothesis ($p < 0.01$), but did not allow for rejection of the null hypothesis based on respondent's race ($p < 0.40$) (see tables 9g and 9h). While males and females surveyed reported 'not being comfortable at all' with hearing negative comments or jokes related to the LGBTQ community, blacks and whites were almost evenly divided in their feeling 'somewhat comfortable' with hearing such remarks.

CHAPTER X

CONCLUSION

This dissertation project was conceived with a single guiding question: why is the veterinary medical and research profession predominantly white and what were the sociocultural factors that have contributed to the profession's historical underrepresentation of minorities in its companion and large animal practices. As the literature reviewed for this project well indicated, any answer required a complex theoretical framework to identify the various sociocultural factors effecting individuals' life choices in general, and minority groups' specifically.

Because race, social class, gender identities, and sexuality intersect at the individual and institutional levels, a critical cultural method was used to examine the autonomous and heteronomous structures informing survey participants' everyday social practices. The project extended the sociological theories of Durkheim, Weber, Dubois, Bourdieu, Archer, Giddings, Lamont, Stryker, Goffman, Massey, Howard Kaplan, Feagin, Bonilla-Silva, and Alexander by addressing the relational conditions of structure, culture, and agency, and the consequent effects on everyday social practices.

Incorporating and expanding on these past social theorists and practioners allowed for a description of the dynamic effects of culture and structure on minority group members and the historical social forces in the United States that have contributed to and sustained racial inequality in general, and in the fields of veterinary medicine

specifically. Additionally, counterfactual analyses were used to augment empirical findings that appeared to have minimized a more transparent, granular understanding of the institutional forces that contextualized actors social exchanges. The combination of theory and statistical techniques used in the project's analyses of differences among and across gender and racial categories fostered six latent constructs that were conceptualized in a multidimensional sociocultural space.

The composite 'capital matrix' allowed for a comprehensive testing of various conditions that might have contributed to the underrepresentation of Blacks and other minority groups in the veterinary fields. Each space in the capital matrix was termed: ecological, family, racial, cultural, educational, social, and moral latent formations. As was noted in the literature review, each of these social formations were generally studied as a single item of interest in the past. Additionally, a significant gap was identified in the published literature on the underrepresentation of minority groups' recruitment and retention in colleges of veterinary medicine and subsequently their assimilation into the medical and research fields of the profession.

A majority of the studies as cited in the literature as shown in Table 2 revealed minimal data points related to minority participation in the veterinary fields, including a significant gap in studies that had examined the marginalization of minority participation in large animal practices. As demonstrated in Table 11, a summary of the chi-square and Fisher's exact tests for group independence on specified categorical variables, helped to delineate the social capital matrix formations each gender and racial group was

embedded. For example, the analyses revealed that Black survey participants were significantly disadvantaged on specific data points across the six multidimensional social formations. Moreover, males and females also differed significantly across the social formations, indicating further study is warranted.

Of special interest to this study was the opportunity to develop a comparative measure that would allow transparent indicators of significant differences between gender and racial groups within the theorized multidimensional social spaces. Although a lack of participation from the three colleges of veterinary medicine identified for this study severely limited group comparisons and the generalizability of the research findings, some key differences were found in each capital formation that favored white males over blacks and females.

For example, white males were generally raised in a rural setting and preferred a rural lifestyle compared to blacks and females; a background characteristic that confirmed earlier researchers' findings that white male dominance in the fields of large animal practice were correlated with having been raised in rural settings. Additionally, white males were more likely to have been in contact with large farm and ranch animals and have attended middle and high schools that provided agricultural science courses and/or offered afterschool agricultural-related activities than females and blacks in the sample were.

Each significant difference identified as a single event would not necessarily explain the overwhelming advantage white males and females had in some cases

compared to the disadvantaged positions of blacks. The study's outcome helped to make the intersection of these details more transparent and pointed to the success of blacks in the sample however unlikely their chances of attending a CVM and later becoming practitioners. However, the effects of racist institutional forces were well documented in this study, with some findings demonstrating Dubois and Bourdieu's critique of social hegemony and its widespread acceptance upon those who become dominated through symbolic forms of violence. For example, blacks surveyed for this study did not acknowledge institutional failings or limitations that became barriers to blacks' entry into the veterinary fields; in fact, a majority of black participants responded they believed the veterinarian profession was actively recruiting minorities.

Additionally, black participants agreed with whites that 'there was too much talk about race' in the veterinary profession. Finally, black participants were more likely to have selected a CVM because its student body's racial characteristics mirrored their own. This is a sad commentary on affirmative action and recent attempts to encourage diversity in institutions of higher learning as well as in our society. The fact that blacks were self-selecting out of predominantly white CVMs further undermines the profession's social standing and minimizes its opportunity to expand its role as an effective force for social change in American society.

Summary

We end in part where we began by asking: Why so white?

The analysis of data points bounded by each sociocultural factor revealed institutional forces that contribute to racism, poverty, geographic segregation, and stratified access to educational resources explain a significant amount in the lack of minority participation in the veterinary profession specifically as well as STEM fields in general. As was discussed earlier, symbolic violence originating from the sanctioning forces of federal, state, county, and local governments' policies in predominantly agricultural areas had effectively promoted the forced migration of blacks from their farmlands and homesteads from the early to mid-20th century.

Alone this empirical fact does not adequately reveal the force of institutional structures on other spheres of social life. However, similar to the estrangement from their lands forced on Native Americans, African American farmers had little recourse except to migrate to American industrial cities where local government policies and white-cultural tropes relegated them to black-only reservations. Thus, to encourage minority groups to consider occupations in the veterinary fields would require expanding agricultural experiences—academic and practical—to those young Blacks and Latinxs living in and around urban centers in the U.S. major metropolitan regions.

Additionally, American veterinarians must accept responsibility for their lack of commitment to increasing the academic, financial, and mentor opportunities that would prove most effective in the recruitment and retention of minority groups to the

agricultural sciences in general and the practices of veterinary medicine and research specifically. Arguably, many of the survey items used in this study received ambiguous or what appeared as contradictory statements reflective of a white dominant society repressing its traditionally held views of racial superiority.

For example, when asked if they believed their profession was doing enough to recruit minorities, black and white survey participants responded 'no', but when asked if CVMs did enough to support minorities' academic success, they answered 'yes'. Yet, black survey participants believed the American Veterinary Medical Association was not doing enough to attract urban minority students to agricultural sciences compared to whites who believed the association was.

The results discussed above demonstrated the mismatch of professional and social attitudes that on one hand could bolster minority participation in the fields of veterinary medicine and on the other undermine those efforts.

Future Research Opportunities

The research project has described and partially explained those social forces and structural conditions that have contributed to the underrepresentation of minorities in the fields of veterinary medicine. More than one hundred years of sociological research has informed the theoretical framework used in the analyses here. However, the complexity of the underrepresentation of minorities of the fields of veterinary medicine cannot be minimized.

Future research aimed at providing policymakers with resources allocation strategies would require expanded surveys in terms of participant numbers and samples from various geographic entities such as rural, suburban, and urban neighborhoods and school districts. Additionally, a national diversity climate survey of veterinarian professionals and graduate students would provide important insights into social and professional attitudes that might encourage or discourage minority groups' participation in the medical and research fields of veterinary medicine. Finally, the U.S. census could initiate a more comprehensive and detailed survey of the demographic characteristics of current CVM students, faculty, and practitioners in the various agricultural science fields to bolster scientific inquiries.

Study Limitations

As mentioned previously, a significant limitation of the dissertation project was the sample size of participants and the number of colleges of veterinary medicine that agreed to encourage students and faculty to participate in the study. In fact, participation by students and faculty from the three veterinary medical schools was low (N = 89). A key condition contributing to poor participation rates was a lack of commitment on the part of partner schools in this project.

Additionally, the length of the survey instrument was likely a key detriment as well (about 128 survey questions). It was noted that one administrator at a study site apparently made little effort to either encourage participation or ensured that the web link to the Qualtrics survey was accessible made available to potential participants from

their school. A second administrator also did not appear to have offered encouragement to faculty and students nor in retrospect did the administrator's scientific and policy interest in the project seem especially keen.

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APPENDIX A

TABLES

Table 1. Texas Veterinarian Workforce by Race, CVM Graduation

Race	% CVM graduate after 2004	% CVM graduate after 2009	% Change 2004 to 2009
Asian	0.8	1.3	0.5
Black	2	2.5	0.5
Latino	2.8	3.2	0.4
White	92.5	91.3	-1.2
Other / unknown	1.9	1.7	-0.2
Total	100	100	

Source: Race-Ethnicity of Texas Veterinarians.
Texas Department of State Health Services. Oct. 22, 2015.

Table 2. Large Animal Veterinarian Studies: A Selected Review.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Amass, et al., 2011	Impact of Gender and Race-Ethnicity on Reasons for Pursuing a Career in Veterinary Medicine and Career Aspirations	Retrospective cross-sectional study—Personal statements from 694 veterinary medical school applications submitted in 2008	Results suggested that veterinary practice experience and animal ownership were important factors; some differences noted by gender, race, and ethnicity.	More Caucasian applicants than underrepresented minority (URM) applicants stated veterinary practice experience and more minority applicants than Caucasian applicants cited animal ownership as a reason for pursuing a veterinary career
Andrus, Gwinner, and Prince 2006	Job Satisfaction, Changes in Occupational Area, and Commitment to a Career in Food Supply Veterinary Medicine	Three surveys of large animal vets (students, graduates and practicing vets) were conducted to examine job satisfaction, changes in occupational area, and commitment; suburban and rural sample	Students: No differences between changed career focus and those who did not change by gender, size of town grew up in, size of town desired to live after graduation. Recent Graduates: Proud and enthusiastic about their careers as food animal veterinarians. Tenured Vets: common factor that influenced change in career was veterinarians who changed jobs had received an extremely attractive alternative employment.	Only considered gender differences

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Asare 2007	The Attitudes of Minority Junior High and High School Students toward Veterinary Medicine	Survey attitudes of minority junior high and high school students toward veterinary medicine in New York City	Minority students have positive view of veterinary medicine; deficiency of minority role models; lack of interest in vet medicine; perception that vet medicine does not provide a satisfying lifestyle; inadequate student exposure to veterinarians	Examined Black and non-white Latino students
Carbajal 2005(Dissertation)	An Assessment of the Educational Preparation of Texas A&M University College of Veterinary Medicine Graduates	Descriptive research design included a questionnaire that was provided to Texas A&M University's College of Veterinary Medicine graduates one year following graduation	predominant interest in small animal or mixed practices; overall satisfaction for the educational preparation on their education is 90% or more;	Diversity issues not examined
Chigerwe, Boudreaux, & Ilkiw 2010	Factors Affecting Track Selection by Veterinary Professional Students Admitted to the School of Veterinary Medicine at the University of California, Davis	Survey 118 students of the graduating class of 2009; descriptive study	Background experience before admission and other personal reasons were significant factors affecting small-animal and mixed-animal track choices;	Diversity issues not examined

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Chubin & Mohamed 2009	Increasing Minorities in Veterinary Medicine: National Trends in Science Degrees, Local Programs, and Strategies	Descriptive study on national data, Veterinarian graduate schools and comparison of Science, Technology, Engineering, Mathematics minority participation findings	Minorities are more likely to enter traditional STEM programs than veterinary medicine	Description of minority participation in STEM programs and deficit of minority participation in Vet programs
Daly & Erickson 2012	Attitudes Toward Becoming a Veterinarian in a Group of Undergraduate Agriculture and Biomedical Sciences Students	Cross-sectional study of 585 university students in South Dakota enrolled in 2 veterinary science courses over a 6-year period. Each year, students enrolled in the 2 courses answered survey questions pertaining to their interest in becoming a veterinarian, background, and future plans.	Most students developed vet interest during grades 10 to 12. Females developed interest earlier than did males. Enjoyment of animals, intellectual stimulation, and the opportunity to actively work outdoors were cited frequently as reasons for interest in vet medicine. Increased duration of education, high educational costs, and prevet course difficulty reasons for disinterest in becoming a veterinarian. Type prior animal experience important to type vet practice.	Gender differences reported but no data reports on minority underrepresentation or lack of racial or ethnic minorities in the sampled groups.

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Education News 2012	Minority Report: Students Cite Strong Support from Veterinary Schools, But Racism, Sexism Remain	Campus climate, diversity study press report	Diversity efforts improving but racism and sexism remain issues of concern	Focused on diversity efforts and concerns
Elmore 2003	The Lack of Racial Diversity in Veterinary Medicine	Commentary-Description	Demographic information to characterize Vets by race not available; indicates 91% of all veterinarians are white, 5% are Hispanic, 2% are black	Focus on underrepresentation of minorities and lack of research
Gwinner, Prince & Andrus 2006	Attracting Students into Careers in Food Supply Veterinary Medicine	Series of surveys students & Vet school admin, groups on factors influencing path choices & effectiveness of strategies increasing students into field	Students' experiences gained in high school or before important; Educational debt and salary; Family considerations; Job availability; geographic preferences and hours spent on the job	Diversity Issues Not Examined
Heath, et al. 2006 (Australian study)	Effect of Different Methods of Selection On The Background, Attitudes And Career Plans of First Year Veterinary Students	Survey questionnaires were completed during class time in the first few weeks of enrolment by incoming veterinary students	Groups indicate choice of veterinary science based on their affinity for animals and desire to work in a vet practice	Diversity issues Not Examined

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Ilgen et al. 2003	Personal Characteristics , Knowledge of the Veterinary Profession, and Influences on Career Choice Among Students in the Veterinary School Applicant Pool.	Surveyed individuals from 3 population. Two of the 3 groups represented potential applicants to veterinary schools or colleges. Data collected from vets & students: work, work conditions, lifestyles, values, and influences on career	Those with the requisite skills, knowledge, aptitudes, and attitudes to meet the challenges facing the vet field must be attracted, trained, and nurtured over their career	Gender shift results inconclusive on why more females than males are attracted to vet careers; No examination of racial or ethnic differences
Jelinski et al. 2008 (Canadian study)	Factors Affecting the Career Path Choices of Graduates at the Western College of Veterinary Medicine	Describe the demographics of the Class of 2006, Western College of Veterinary Medicine, and to determine which factors influenced the graduates' career path choices	Three factors associated with food animal choice: 1) rural center more so than a large center population (> 10 000), and 2) graduates with a bachelor of science in agriculture were 4.5 times more likely to begin their career as a FAR practitioner and 3) family occupation in agriculture	Diversity or gender not examined

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Jarman et al. 2011	Veterinary Public Health Capacity in the United States: Opportunities for Improvement	<p>Surveyed a convenience sample of public health Vets at CDC to identify vet workforce recruitment and retention problems; responses categorized into themes.</p> <p>A focus group of staff vets prioritized the categorized themes.</p> <p>Participants identified activities to address the three recruitment concerns with the highest combined weight.</p>	<p>Findings: (1) lack of awareness of vets' contributions to public health practice, (2) competitive salaries, and (3) employment and training opportunities.</p>	<p>Did not report on or address group differences, i.e., gender, race, or ethnicity.</p> <p>Report did not ask questions that would have examined possible occupational or recruitment discrimination in a federal or state public health institution.</p>

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Lenarduzzi, Sheppard & Slater 2009	Factors Influencing the Choice of a Career in Food-Animal Practice among Recent Graduates and Current Students of Texas A&M University, College of Veterinary Medicine	Vet career choices among currently enrolled vet students (2007–2010) and recent graduates in Texas (classes of 2002–2006), an online survey was developed.	72% of students and 55% of recent graduates interested in large/mixed-animal practice. More than 70% indicate veterinarian had strongest personal influence on career choices. Previous and current interest in large/mixed-animal practice were associated with working in a large/mixed-animal practice, any agricultural experience, and working for at least 6 months on a farm or ranch. Any 4-H experience increased the likelihood. Student contact with practitioners (82%) and financial considerations (77%) were most commonly cited as factors	Diversity Issues Not Examined.
Marshak 2005	Veterinary Schools and the Profession: A Search for Bearings in the New Century	Commentary on coming shortages and current educational recruitment challenges	Adopt new training programs; more involvement by state and federal officials	Diversity Issues Not Examined

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Narver 2007	Demographics , Moral Orientation, and Veterinary Shortages in Food Animal and Laboratory Animal Medicine	Commentary of Gender Shift of Female majority in vet schools and profession	Shortages of vets in food animal and laboratory animal medicine are problems, thus, the changing demographics and concomitant changes in the underlying ideologies of the profession must be analyzed .	Gender shift focus, but no examination of ethnic or racial underrepresentation.
Prince, Andrus & Gwinner 2006	Future Demand, Probable Shortages, and Strategies for Creating a Better Future in Food Supply Veterinary Medicine	Delphi forecasting process used to evaluate 13 areas of the FSVM sector: 303 experts agreed to serve on the 13 panels.	2 sets of factors logically related to common themes. The first set comprised 3 factors with a strong influence that were related to negative student experiences in veterinary school. The second set comprised 3 factors logically related to rural economic and cultural constraints that decrease the flow of veterinarians into FSVM careers.	Diversity Issues Not Examined

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Schmitz et al. 2007	Factors Associated with Practice Decisions of Nebraska Veterinarians Regarding Type of Practice and Community Size	Questionnaires sent to 721 veterinarians, 530 responded in Nebraska. Questions defining occupational pursuits were included to ensure that the data reflected only veterinarians engaged in private veterinary practice, either full or part time.	More likely to be engaged in FA practice: (1) raised on working farm or ranch; (2) parents owned livestock; (3) home town population less than 10,000; (4) undergraduate major was in animal science; (5) male; and (6) primary interest at the time entered veterinary college was farm animal or mixed animal practice.	Underrepresented minority groups not examined; gender differences described.

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Serpell 2005	Factors Influencing Veterinary Students' Career Choices and Attitudes to Animals	<p>Survey Questionnaire: Pt 1: sociodemographics, type community (rural, urban, suburban), kinds of animals they or family had kept, and whether they spent significant time on a farm; preferred type of employment after graduation</p> <p>Pt 2: All these related to moral values on treatment of animals including influences of others on their moral feelings.</p> <p>Sample: 329 first-year vet students, University of Pennsylvania from 2000 to 2003 during their first class at school</p> <p>Response rate 92%</p>	<p>35% had worked or lived on a farm</p> <p>significant male gender bias to work in large animal practice, but whether lived or worked on a farm was not significant if compared to geographic location;</p> <p>Significant female preference for equine if not small animal practice</p>	<p>Gender differences examined, but did not examine ethnic or racial minority differences.</p>

Table 2 continued.

<p>Shepherd & Pikel 2011</p>	<p>Employment of Female and Male Graduates of US Veterinary Medical Colleges</p>	<p>Secondary Data Analysis of the AVMA annual survey of fourth- year veterinary medical students in the spring of 2011.</p>	<p>Describes salaries, educational indebtedness, graduate characteristics, employment preferences by gender. Percentage graduation rates by ethnic and race were given.</p>	<p>Diversity issues are group comparisons by race or ethnicity not accomplished. Gender differences were reported.</p>
<p>Sterner 2006</p>	<p>An Invited Perspective on the Shortage of Veterinarians in Food Supply Veterinary Medicine</p>	<p>Results of the studies that have been conducted to this point lend credence and support to the claim that currently, as well as for the foreseeable future, there is a shortage of veterinarians in FSVM. The debate must now go forward on how to provide creative solutions to the problem within the context and reality of budgetary and manpower considerations that can be brought to bear.</p>	<p>Gender shift due to more urban recruitment in the vet field. Association with agricultural enterprise or agriculturally associated organizations (4-H and National FFA Organization), more likely to pursue a career in FSVM.</p>	<p>Gender shift mentioned, but does not address diversity recruitment issues.</p>

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Strayhorn 2009	The Absence of African-American Men in Higher Education and Veterinary Medicine	Keynote address based on secondary data analysis of national statistics and findings from an analysis of National Educational Longitudinal Study; The dependent variable measured one's educational Aspirations of black men and women	"Educational aspirations" was not simply a function of race and gender. Black men who attended historically Black colleges had higher educational aspirations than those at primarily white-majority schools; high-school credits in math and science, and undergraduate GPA, associated with educational aspirations; Understand the extent to which background and contextual factors converge to influence the educational outcomes of Black men	Study examined racial characteristics and issues facing Black students educational aspirations and success at vet schools.
Tomlin, Brodbelt & May 2010 (British study)	Influences on the Decision to Study Veterinary Medicine: Variation with Sex and Background	Survey questionnaire on attitudes to vet medicine as a career choice among students at different stages of the veterinary course at the Royal Veterinary College	Students indicate their top three reasons for wanting to become a vet, men were 9.5 times as likely as women to select 'Want to train as a scientist', 5.3 times as likely to select 'Join a profession' and 13.2 times as likely to select 'Hardest course to get in to'; the top choice for both sexes was 'Want to work with animals'. Thirty-one per cent of the students felt their careers adviser had been a negative influence on their decision to become a vet.	Examined some gender differences, but survey was comprised mostly of females. Other racial or ethnic groups were not mentioned or reported in descriptive tables.

Table 2 continued.

Authors	Title	Methodology	Findings	Race, Ethnicity, Gender Differences Reported
Tyler & Larson 2006	Assessing Veterinary Medical Education with Regard to the Attraction, Admission, and Education of Students Interested in Food Supply Veterinary Medicine and Retention of Student Interest in a Career in The Food Supply Sector	Commentary on the findings of a series of surveys supported by the Food Supply Veterinary Medicine Coalition	veterinary schools should be aggressive in recruitment of potential trainees with strong agricultural backgrounds; veterinary profession has lagged behind other professions, such as the law and human medicine, in recruiting members of underrepresented groups; the desire or motivation for vet students to change their career plans is impacted by their classmates; financial constraints; school biases favor companion animal practices	Discussed ethnic and racial minorities issues in the field.

Table 2 continued.

<p>Villarroel et al. 2010</p>	<p>A Survey of Reasons Why Veterinarians Enter Rural Veterinary Practice in the United States</p>	<p>Identify factors associated with interest in or choosing a career in rural veterinary practice (RVP). Cross-sectional descriptive study; online survey of U.S. Vets & vet students. Proportions of respondents assigning high importance to various factors were analyzed for differences among gender, age, and background groups</p>	<p>Responses indicated that RVP should not be confused with large animal or food animal exclusive practice. Most respondents (38.9%) developed an interest in RVP early in life (before 8th grade), with 13.0% reportedly developing their interest in RVP during veterinary school. The most highly ranked factors on developing RVP interest were having relatives with a farm background, having a veterinarian in RVP as a mentor, and exposure to RVP during veterinary school. Gender, generational category, background (rural vs urban), and livestock experience were significantly associated with when respondents developed an interest in RVP and with factors important in developing that interest.</p>	<p>Gender differences reported</p> <p>Diversity data examination for underrepresented minority groups not examined</p>
<p>Walker 2009</p>	<p>Food Animal Medicine in Crisis</p>	<p>Commentary on Food, Animal Medicine recruitment</p>	<p>Review contributes to FAV recruitment issues: vet curriculum, lack of mentors in food animal medicine, student debt, and low retention within food animal medicine.</p>	<p>Does not address gender shift or minority underrepresentation</p>

Table 3a. Survey Sample by Race, Gender: Percent Distribution (N =85)

	Faculty				Student				Row (N)	Row (%)
	Black	%	White	%	Black	%	White	%		
Female	3	4	16	18	7	8	34	40	60	70
Male	2	2	9	11	4	5	10	12	25	30
Total	5	6	25	29	11	13	44	52	85	100

Table 3b. Subjects' Race, Gender by Family Residence Location

Race	Black/Asian				White				N = 83	
	Female	%	Male	%	Female	%	Male	%	Row Marginals	Row %
Rural	3	4%	2	2%	17	21%	15	18%	37	45%
Suburb	5	6%	3	4%	27	33%	3	4%	38	47%
Urban	2	2%	1	1%	5	5%	0	0%	8	8%
Total	10	12%	6	7%	49	59%	18	22%	83	100%

Table 3c. Chi-Square Independence Test: Gender and Residence

Residence	Rural	Suburban	Urban	Total
Gender				
Female	20 (33.9%)	32 (54.2%)	7 (11.9%)	59
Male	17 (70.8%)	6 (25.0%)	1 (4.2%)	24
Total	37	38	8	83

Chi²(2) = 9.45; P = 0.0089; Fisher's exact, P = 0.010

Table 3d. Chi-Square Independence Test: Race and Residence

Residence	Rural	Suburban	Urban	Total
Race				
Black	5 (27.7%)	10 (55.5%)	3(16.7%)	18
White	32 (47.7.8%)	30 (44.7%)	5 (7.5%)	67
Total	37	40	8	85

Chi²(2) = 2.93; P = 0.2311

Table 4a. Chi-Square: Family Unit by Gender

Kinship	Single Parent	Traditional	Total
Gender			
Female	4 (6.6%)	56 (93.3%)	60
Male	3 (12.5%)	22 (88%)	25
Total	7	78	85

Chi-sq (0.6642), (df=1), p < 0.415; Fisher's exact, p = 0.336

Table 4b. Chi-Square: Family Unit by Race

Kinship	Single Parent	Traditional	Total
Race			
Black	4 (21.1%)	15 (78.9%)	19
White	4 (5.7%)	66 (94.3%)	70
Total	8	81	89

Chi-sq (4.30), (df=1), p < 0.04; Fisher's exact, p = 0.06

Table 4c. How many Times Family Changed Residence by Gender

	Never	1-3 times	4-6 times	> 6	Total
Gender					
Female	33 (55.0%)	24 (40.0%)	2 (3.3%)	1 (1.7%)	60
Male	21 (84.0%)	3 (12.0%)	1 (4.0%)	0 (0.0%)	25
Total	54	27	3	1	85

Chi-sq (7.1306), (df=3), $p < 0.068$ Fisher's exact, $p = 0.027$

Table 4d. How many Times Family Changed Residence by Race

	Never	1-3 times	4-6 times	> 6	Total
Gender					
Black	9 (56.2%)	5 (31.2%)	1 (6.3%)	1 (6.3%)	16
White	45(65.2%)	22 (31.9%)	2 (2.9%)	0 (0.0%)	69
Total	54	27	3	1	85

Chi-sq (4.8919), (df=3), $p < 0.180$ Fisher's exact, $p = 0.268$

Table 5a. High School Ag-Organizations by Gender

Response	Yes	No	Total
Female	27 (45.0%)	33 (55.0%)	60
Male	17 (68.0%)	8 (32.0%)	25
Total	44	41	85

Pearson $\chi^2(1) = 3.7388$, $p = 0.053$; Fisher's exact, $p = 0.044$

Table 5b. High School Ag-Organizations by Race

Response	Yes	No	Total
Black	5 (26.3%)	14 (73.7%)	19
White	39 (55.7%)	31(44.3%)	70
Total	44	45	89

Pearson $\chi^2(1) = 5.1669$, $p = 0.023$; Fisher's exact, $p = 0.021$

Table 5c. High School Ag-Science Courses by Gender

Response	Yes	No	Total
Female	34 (56.7%)	26 (43.3%)	60
Male	16 (64.0%)	9 (36.0%)	25
Total	50	35	85

Pearson $\chi^2(1) = 0.3918$, $p = 0.531$; Fisher's exact, $p = 0.353$

Table 5d. High School Ag-Science Courses by Race

Response	Yes	No	Total
Black	7 (36.8%)	12 (63.2%)	19
White	43 (61.4%)	27 (38.6%)	70
Total	50	35	89

Pearson $\chi^2(1) = 3.6694$, $p = 0.055$; Fisher's exact, $p = 0.07$

Table 6a. Public School Ag-related Mentors by Gender

Response	Yes	No	Total
Female	29 (48.3%)	31 (51.7%)	60
Male	16 (64.0%)	9 (36.0%)	25
Total	45	40	85

Pearson chi2(1) = 1.7386, p = 0.187 Fisher's exact, p = 0.140

Table 6b. Public School Ag-related Mentors by Race

Response	Yes	No	Total
Black	6 (31.6%)	13 (68.4%)	19
White	41 (58.6%)	29 (41.4%)	70
Total	47	42	89

Pearson chi2(1) = 4.3690, p = 0.037; Fisher's exact, p = 0.033

Table 6c. Attended Same Race School by Gender

Response	Yes	No	Total
Female	49 (81.7%)	11 (15.3%)	60
Male	19 (76.0%)	6 (24.0%)	25
Total	68	17	85

Pearson chi2(1) = 0.3542, p = 0.552 and Fisher's exact, p = 0.563

Table 6d. Attended Same Race School by Race

Response	Yes	No	Total
Black	8 (50.0%)	8 (50.0%)	16
White	60 (87.0%)	9 (13.0%)	69
Total	68	42	85

Pearson $\chi^2(1) = 11.0870$, $p = 0.037$; Fisher's exact, $p = 0.033$

Table 6e. Family-owned Livestock by Gender

Response	Yes	No	Total
Female	26 (43.3%)	34 (56.7%)	60
Male	18 (72.0%)	7 (28.0%)	25
Total	44	41	85

Pearson $\chi^2(1) = 5.8080$, $p = 0.016$; Fisher's exact, $p = 0.014$

Table 6f. Family-owned Livestock by Race

Response	Yes	No	Total
Black	3 (15.8%)	16 (84.2%)	19
White	41 (58.6%)	29 (41.4%)	70
Total	44	45	89

Pearson $\chi^2(1) = 10.942$, $p = 0.001$; Fisher's exact, $p = 0.001$

Table 6f1. Age First Exposed to Livestock by Gender

Age Group	Child	Teen	Adult	Never	Total
Female	27 (45.0%)	17 (28.3%)	11 (18.4%)	5 (8.3%)	60
Male	19 (76.%)	3 (12.0%)	1 (4.0%)	2 (8.0%)	25
Total	46	20	12	7	85

¹never, infant (1-12 yrs), teen (13-19 yrs), adult (20-30 yrs), never (0).

Chi²(3) = 7.7050, P ≤ 0.05; Fisher's Exact, P ≤ 0.05

Table 6f2. Age First Exposed to Livestock by Race

Age Group	Child	Teen	Adult	Never	Total
Black	5 (26.3%)	3 (15.8%)	5 (26.3%)	6 (31.9%)	19
White	43 (61.4%)	17 (24.3%)	8 (11.4%)	2 (2.9%)	70
Total	48	20	13	8	89

¹never, infant (1-12 yrs), teen (13-19 yrs), adult (20-30 yrs), never (0).

Chi²(3) = 19.8783, P ≤ 0.001; Fisher's Exact, P ≤ 0.001

Table 6g. Grandparents Ag-Related Background by Gender

Response	Yes	No	Total
Female	32 (55.2%)	26 (44.8%)	58
Male	19 (76.0%)	6 (24.0%)	25
Total	51	32	83

Pearson $\chi^2(1) = 3.1989$, $p \leq 0.074$ and Fisher's exact, $p \leq 0.06$

Table 6h. Grandparents Ag-Related Background by Race

Response	Yes	No	Total
Black	8 (44.4%)	10 (55.6%)	18
White	44 (64.7%)	24 (35.3%)	68
Total	52	34	86

Pearson $\chi^2(1) = 2.4442$, $p \leq 0.118$ and Fisher's exact, $p \leq 0.175$

Table 6i. Father's Ag-Related background by Gender

Response	Yes	No	Total
Female	13 (21.7%)	47 (78.3%)	60
Male	13 (52.0%)	12 (48.0%)	25
Total	25	60	85

Pearson $\chi^2(1) = 5.8943$, $p \leq 0.015$ and Fisher's Exact, $p \leq 0.02$

Table 6j. Father's Ag-Related background by Race

Response	Yes	No	Total
Black	1 (5.6%)	17 (94.4%)	18
White	24 (34.3%)	46 (65.7%)	70
Total	25	63	88

Pearson $\chi^2(1) = 5.8110$, $p \leq 0.016$ and Fisher's Exact, $p \leq 0.018$

Table 6k. Father's Occupation by Gender

Occupation	STEM	Ag-Related	All Other	Total
Female	21 (35.0%)	5 (8.3%)	34(56.7%)	60
Male	5 (20.0%)	11 (44.0%)	9 (36.0%)	25
Total	26	16	43	85

$\chi^2(2) = 14.714$ $P \leq 0.001$; Fisher's Exact, $P \leq 0.001$

Table 6l. Father's Occupation by Race

Occupation	STEM	Ag-Related	All Other	Total
Black	6 (33.3%)	2 (11.1%)	10(55.6%)	18
White	21 (30.0%)	14 (20.0%)	35 (50.0%)	70
Total	27	16	45	88

$\chi^2(2) = 0.7605$; $P \leq 0.684$; Fisher's Exact, $P \leq 0.778$

Table 6m. Father's Education Level by Gender

Education Attained	Middle School	High School	Some College	Bachelor's Degree	Master's or higher	Total
Female	0 (0.0%)	12 (20.0%)	5 (8.3%)	24 (40.0%)	19 (31.7%)	60
Male	5 (20.0%)	5 (20.0%)	1 (4.0%)	9 (36.0%)	5 (20.0%)	25
Total	5	17	6	33	24	85

Chi²(4) = 13.3929 P ≤ 0.01; Fisher's Exact, P ≤ 0.015

Table 6n. Father's Education Level by Race

Education Attained	Middle School	High School	Some College	Bachelor's Degree	Master's or higher	Total
Black	3 (16.6%)	3 (16.6%)	1 (5.6%)	10 (55.6%)	1 (5.6%)	18
White	2 (2.9%)	15 (21.4%)	5 (7.1%)	24 (34.3%)	24 (34.3%)	70
Total	5	18	6	34	25	88

Chi²(4) = 10.8540 P ≤ 0.03; Fisher's Exact, P ≤ 0.02

Table 6o. Mother's Agriculture Background by Gender

Response	Yes	No	Total
Female	49 (81.7%)	11 (8.3%)	60
Male	14 (56.0%)	11 (44.0%)	25
Total	63	22	85

Pearson $\chi^2(1) = 6.0602$, $p \leq 0.014$ and Fisher's Exact, $p \leq 0.028$

Table 6p. Mother's Agriculture Background by Race

Response	Yes	No	Total
Black	1 (6.9%)	16 (94.1%)	17
White	21 (30.0%)	49 (70.0%)	70
Total	22	65	87

Pearson $\chi^2(1) = 4.2111$, $p \leq 0.040$ and Fisher's Exact, $p \leq 0.022$

Table 6q. Mother's Occupation by Gender

Occupation	STEM	Ag-Related	General	Homemaker	Total
Female	16 (26.2%)	1 (1.6%)	29 (47.5%)	15 (24.6%)	61
Male	4 (16.0%)	3 (12.0%)	7 (28.0%)	11 (44.0%)	25
Total	20	4	36	26	86

$\chi^2(3) = 8.7177$ $P \leq 0.033$; Fisher's Exact, $P \leq 0.036$

Table 6r. Mother's Occupation by Race

Occupation	STEM	Ag-Related	General	Homemaker	Total
Black	2 (12.5%)	1 (6.3%)	10 (62.5%)	3 (18.8%)	16
White	18 (25.7%)	3 (4.3%)	26 (37.1%)	23 (32.9%)	70
Total	20	4	36	26	86

Chi²(3) = 3.9436 P ≤ 0.268, Fisher's Exact, P ≤ 0.242

Table 6s. Mother's Educational Achievement by Gender

Education Attained	Middle School	High School	Some College	Bachelor's Degree	Master's or higher	Total
Female	1 (1.7%)	6 (10.0%)	7 (11.7%)	32 (53.3%)	14 (23.3%)	60
Male	3 (12.0%)	7 (28.0%)	3 (12.0%)	8 (32.0%)	4 (16.0%)	25
Total	4	13	10	40	18	85

Chi²(4) = 9.8991 P ≤ 0.042; Fisher's Exact, P ≤ 0.043

Table 6t. Mother's Educational Achievement by Race

Education Attained	Middle School	High School	Some College	Bachelor's Degree	Master's or higher	Total
Black	3 (15.8%)	1 (5.2%)	4 (21.1%)	8 (42.1%)	3 (15.8%)	19
White	2 (2.9%)	12 (17.1%)	8 (11.4%)	33 (47.2%)	15 (21.4%)	70
Total	8	13	12	41	18	89

Chi²(4) = 7.2364 P ≤ 0.124; Fisher's Exact, P ≤ 0.143

Table 7a. Neighborhood Pleasing Surroundings by Gender

Response	Yes	No	Total
Female	55 (91.7%)	5 (8.3%)	60
Male	21 (84.0%)	4 (16.0%)	25
Total	76	9	85

Pearson $\chi^2(1) = 1.0956$, $p = 0.295$; Fisher's exact, $p = 0.248$

Table 7b. Neighborhood Pleasing Surroundings by Race

Response	Yes	No	Total
Black	16 (88.9%)	2 (11.1%)	18
White	62 (89.9%)	7 (10.1%)	69
Total	78	9	87

Pearson $\chi^2(1) = 0.0144$, $p = 0.905$; Fisher's exact, $p = 0.596$

Table 7c. Neighborhood Friendly Place by Gender

Response	Yes	No	Total
Female	49 (81.7%)	11 (18.3%)	60
Male	20 (80.0%)	5 (20.0%)	25
Total	79	16	85

Pearson $\chi^2(1) = 0.02$, $p = 0.8875$; Fisher's exact, $p = 0.597$

Table 7d. Neighborhood Friendly Place by Race

Response	Yes	No	Total
Black	16 (88.9%)	2 (11.1%)	18
White	60 (86.9%)	9 (13.1%)	69
Total	76	11	87

Pearson $\chi^2(1) = 0.0483$, $p = 0.826$; Fisher's exact, $p = 0.593$

Table 7e. Neighbors Socialized Together by Gender

Response	Yes	No	Total
Female	19 (32.2%)	40 (67.8%)	59
Male	12 (48.0%)	13 (52.0%)	25
Total	31	53	84

Pearson $\chi^2(1) = 1.887$, $p = 0.170$; Fisher's exact, $p = 0.131$

Table 7f. Neighbors Socialized Together by Race

Response	Yes	No	Total
Black	11 (64.7%)	6 (35.3%)	17
White	22 (31.9%)	47 (68.1%)	69
Total	33	53	86

Pearson $\chi^2(1) = 6.2134$, $p = 0.013$; Fisher's exact, $p = 0.014$

Table 7g. Neighbors Looked Out for One Another by Gender

Response	Yes	No	Total
Female	38 (63.3%)	22 (36.7%)	60
Male	22 (88.0%)	3 (12.0%)	25
Total	60	25	85

Pearson $\chi^2(1) = 5.1718$, $p = 0.023$; Fisher's exact, $p = 0.019$

Table 7h. Neighbors Looked Out for One Another by Race

Response	Yes	No	Total
Black	14 (77.8%)	4 (22.2%)	18
White	46 (66.7%)	23 (33.3%)	69
Total	60	27	87

Pearson $\chi^2(1) = 0.8235$, $p = 0.364$; Fisher's exact, $p = 0.272$

Table 7h₁. Strong Attachment to Neighborhood by Gender

Response	Yes	Somewhat	No	Total
Gender				
Female	35 (58.3%)	19 (31.7%)	7 (10.0%)	60
Male	22 (88.0%)	2 (8.0%)	1 (4.0%)	25
Total	57	21	7	85

Chi-sq (7.0883), (df=2), $p \leq 0.03$; Fisher's exact, $p \leq 0.022$

Table 7h₂. Strong Attachment to Neighborhood by Race

Response	Yes	Somewhat	No	Total
Race				
Black	12 (66.7%)	4 (22.2%)	2 (11.1%)	18
White	47 (68.1%)	17 (24.6%)	5 (7.3%)	69
Total	59	21	7	87

Chi-sq (0.3039), (df = 2), $p \leq 0.859$; Fisher's exact, $p \leq 0.829$

Table 7i. Childhood Neighbors were Close Knit Group by Gender

Response	Yes	No	Total
Female	23 (38.9%)	36 (61.1%)	59
Male	16 (64.0%)	9 (36.0%)	25
Total	45	39	84

Pearson $\chi^2(1) = 4.4184$, $p = 0.036$; Fisher's exact, $p = 0.031$

Table 7j. Childhood Neighbors were Close Knit Group by Race

Response	Yes	No	Total
Black	11 (64.7%)	6 (35.3%)	17
White	29 (42.0%)	40 (58.0%)	69
Total	40	46	86

Pearson $\chi^2(1) = 2.8193$, $p = 0.093$; Fisher's exact, $p = 0.080$

Table 7k. I Wish I was Raised in a Rural Setting by Gender

Response	Yes	No	Total
Female	35 (60.3%)	23 (39.7%)	58
Male	14 (56.0%)	11 (44.0%)	25
Total	49	34	83

Pearson $\chi^2(1) = 0.1364$, $p = 0.712$; Fisher's exact, $p = 0.448$

Table 7l. I Wish I was Raised in a Rural Setting by Race

Response	Yes	No	Total
Black	6 (33.3%)	12 (66.7%)	18
White	44 (65.7%)	23 (34.3)	67
Total	50	35	85

Pearson $\chi^2(1) = 6.1258$, $p = 0.013$; Fisher's exact, $p = 0.014$

Table 7m. I Wish I was Raised in a Suburban Setting by Gender

Response	Yes	No	Total
Female	19 (32.2%)	40 (67.8%)	59
Male	5 (20.0%)	20 (80.0%)	25
Total	24	60	84

Pearson $\chi^2(1) = 1.2814$, $p = 0.258$; Fisher's exact, $p = 0.194$

Table 7n. I Wish I was Raised in a Suburban Setting by Race

Response	Yes	No	Total
Black	9 (33.3%)	8 (66.7%)	17
White	16 (65.7%)	53 (34.3)	69
Total	25	61	86

Pearson $\chi^2(1) = 5.8557$, $p = 0.016$; Fisher's exact, $p = 0.019$

Table 7o. I Wish I was Raised in a Urban Setting by Gender

Response	Yes	No	Total
Female	9 (15.5%)	49 (84.5%)	58
Male	3 (12.0%)	22 (88.0%)	25
Total	17	71	83

Pearson $\chi^2(1) = 0.1747$, $p = 0.676$; Fisher's exact, $p = 0.482$

Table 7p. I Wish I was Raised in a Urban Setting by Race

Response	Yes	No	Total
Black	8 (47.1%)	9 (52.9%)	17
White	6 (8.8%)	62 (91.2%)	68
Total	14	71	85

Pearson $\chi^2(1) = 14.4517$, $p = 0.000$; Fisher's exact, $p = 0.001$

Table 8a. Promote Vet Research Careers in High School by Gender

Response	Yes	No	Total
Female	45 (75.0%)	15(25.0%)	60
Male	13 (52.0%)	12 (48.0%)	25
Total	58	27	85

Pearson $\chi^2(1) = 4.3070$, $p = 0.038$; Fisher's Exact, $p = 0.045$

Table 8b. Promote Vet Research Careers in High School by Race

Response	Yes	No	Total
Black	9 (47.4%)	10 (52.6%)	19
White	50 (72.5%)	19 (27.5%)	69
Total	59	29	88

Pearson $\chi^2(1) = 4.2464$, $p = 0.039$; Fisher's Exact, $p = 0.054$

Table 8c. Vet Profession Recruiting Minorities by Gender

Response	Yes	No	Total
Female	21 (35.0%)	39 (65.0%)	60
Male	9 (36.0%)	16 (48.0%)	25
Total	30	27	85

Pearson $\chi^2(1) = 0.0077$, $p = 0.930$; Fisher's Exact, $p = 0.560$

Table 8d. Vet Profession Recruiting Minorities by Race

Response	Yes	No	Total
Black	17 (89.5%)	2 (10.5%)	19
White	17 (24.3%)	53 (75.7%)	70
Total	34	55	89

Pearson $\chi^2(1) = 26.8989$, $p = 0.000$; Fisher's Exact, $p = 0.000$

Table 8e. CVMs Academically Support Minorities by Gender

Response	Yes	No	Total
Female	52 (86.7%)	8 (13.3%)	60
Male	21 (84.0%)	4 (16.0%)	25
Total	73	12	85

Pearson $\chi^2(1) = 0.1035$, $p = 0.748$; Fisher's Exact, $p = 0.494$

Table 8f. CVMs Academically Support Minorities by Race

Response	Yes	No	Total
Black	15 (79.0%)	4 (21.0%)	19
White	61 (87.1%)	9 (12.9%)	70
Total	76	13	89

Pearson $\chi^2(1) = 0.8047$, $p = 0.370$; Fisher's Exact, $p = 0.286$

Table 8g. CVMs Should Increase Entrance Standards by Gender

Response	Yes	No	Total
Female	21 (35.0%)	39 (65.0%)	60
Male	6 (24.0%)	19 (76.0%)	25
Total	27	58	85

Pearson $\chi^2(1) = 0.9852$, $p = 0.321$; Fisher's Exact, $p = 0.233$

Table 8h. CVMs Should Increase Entrance Standards by Race

Response	Yes	No	Total
Black	5 (26.3%)	14 (73.7%)	19
White	24 (34.3%)	46 (65.7%)	70
Total	29	60	89

Pearson $\chi^2(1) = 0.4321$, $p = 0.511$; Fisher's Exact, $p = 0.358$

Table 8i. Blacks Receive Unfair CVM Admissions by Gender

Response	Yes	No	Total
Female	29 (48.3%)	31 (51.7%)	60
Male	9 (36.0%)	16 (64.0%)	25
Total	47	38	85

Pearson $\chi^2(1) = 1.0859$, $p = 0.297$; Fisher's Exact, $p = 0.212$

Table 8j. Blacks Receive Unfair CVM Admissions by Race

Response	Yes	No	Total
Black	6 (31.6%)	13 (68.4%)	19
White	34 (48.6%)	36 (51.4%)	70
Total	40	40	89

Pearson $\chi^2(1) = 1.7438$, $p = 0.187$; Fisher's Exact, $p = 0.144$

Table 8k. Whites Enjoy a Privileged Status by Gender

Response	Yes	No	Total
Female	33 (55.0%)	27 (45.0%)	60
Male	9 (36.0%)	16 (64.0%)	25
Total	42	43	85

Pearson $\chi^2(1) = 2.5486$, $p = 0.110$; Fisher's Exact, $p = 0.087$

Table 8l. Whites Enjoy a Privileged Status by Race

Response	Yes	No	Total
Black	16 (84.2%)	3 (15.8%)	19
White	28 (40.0%)	42 (60.0%)	70
Total	44	45	89

Pearson $\chi^2(1) = 11.6850$, $p = 0.001$; Fisher's Exact, $p = 0.001$

Table 9a. Exposed to Racist Slurs in Social Settings by Gender

Response	Yes	No	Total
Female	43 (71.7%)	17 (28.3%)	60
Male	17 (68.0%)	8 (32.0%)	25
Total	60	25	85

Pearson $\chi^2(1) = 0.1143$, $p = 0.735$; Fisher's Exact, $p = 0.463$

Table 9b. Exposed to Racist Slurs in Social Settings by Race

Response	Yes	No	Total
Black	13 (68.4%)	6 (31.6%)	19
White	48 (68.6%)	22 (31.4%)	70
Total	61	28	89

Pearson $\chi^2(1) = 0.0002$, $p = 0.990$; Fisher's Exact, $p = 0.597$

Table 9c. Too Much Talk About Race in Veterinary Field by Gender

Response	Yes	No	Total
Female	41 (68.3%)	19 (31.7%)	60
Male	17 (68.0%)	8 (32.0%)	25
Total	58	27	85

Pearson $\chi^2(1) = 0.0009$, $p = 0.976$; Fisher's Exact, $p = 0.584$

Table 9d. Too Much Talk About Race in Veterinary Field by Race

Response	Yes	No	Total
Black	14 (73.7%)	5 (26.3%)	19
White	55 (78.6%)	15 (21.4%)	70
Total	60	29	89

Pearson $\chi^2(1) = 18.5763$, $p = 0.000$; Fisher's Exact, $p = 0.000$

Table 9e. Too Much Talk in Vet Profession About Sexual Orientation by Gender

Response	Yes	No	Total
Female	18 (30.0%)	42 (70.0%)	60
Male	14 (56.0%)	11 (44.0%)	25
Total	32	53	85

Pearson $\chi^2(1) = 5.0820$, $p \leq 0.024$ and Fisher's Exact, $p \leq 0.023$

Table 9f. Too Much Talk in Vet Profession About Sexual Orientation by Race

Response	Yes	No	Total
Black	2 (11.1%)	16 (88.9%)	18
White	31 (44.3%)	39 (55.7%)	70
Total	33	55	88

Pearson $\chi^2(1) = 6.7234$, $p \leq 0.010$ and Fisher's Exact, $p \leq 0.007$

Table 9g. How Comfortable With LGBTQ Slurs by Gender

Response	Somewhat	Not at All	Total
Female	26 (43.3%)	34 (56.7%)	60
Male	4 (16.0%)	21 (84.0%)	25
Total	30	55	85

Pearson Chi2(1) = 5.7731, $p \leq 0.016$ and Fisher's Exact, $p \leq 0.013$

Table 9h. How Comfortable With LGBTQ Slurs by Race

Response	Somewhat	Not at All	Total
Black	8 (42.1%)	11 (57.9%)	19
White	25 (35.7%)	45 (64.3%)	70
Total	33	56	89

Pearson Chi2(1) = 0.2616, $p \leq 0.609$ and Fisher's Exact, $p \leq 0.399$

Table 10a. Blacks Unlikely to Care for Pets in Home by Gender

Response	Yes	No	Unsure	Total
Female	3 (5.1%)	47 (79.7%)	9 (15.2)	59
Male	0 (00.0%)	16 (64.0%)	9 (36.0%)	25
Total	3	63	18	84

Pearson chi2(2) = 5.3722, $p = 0.068$; Fisher's Exact, $p = 0.096$

Table 10b. Blacks Unlikely to Care for Pets in Home by Race

Response	Yes	No	Unsure	Total
Black	2 (11.7%)	13 (76.5%)	2 (11.8%)	17
White	2 (2.9%)	52 (74.3%)	16(22.8%)	70
Total	4	65	18	87

Pearson chi2(2) = 3.1827, p = 0.204; Fisher's Exact, p = 0.212

Table 10c. Blacks Lack Temperment for Animal Care by Gender

Response	Yes	No	Unsure	Total
Female	2 (3.4%)	55 (93.2%)	2 (3.4%)	59
Male	0 (00.0%)	22 (88.0%)	3(12.0%)	25
Total	2	65	18	84

Pearson chi2(2) = 3.0866, p = 0.214; Fisher's Exact, p = 0.228

Table 10d. Blacks Lack Temperment for Animal Care by Race

Response	Yes	No	Unsure	Total
Black	1 (5.9%)	16 (94.1%)	0 (00.0%)	17
White	1 (1.4%)	64 (91.4%)	5 (7.2%)	70
Total	2	80	5	87

Pearson chi2(2) =2.4053, p = 0.30 and Fisher's Exact, p = 0.254

Table 10e. CVM With Students of Similar Background by Gender

Response	Yes	No	Total
Female	26 (51.0%)	25 (49.0%)	51
Male	14 (60.9%)	9 (39.1%)	23
Total	40	34	74

Pearson $\chi^2(1) = 0.6242$, $p = 0.429$; Fisher's Exact, $p = 0.461$

Table 10f. CVM With Students of Similar Background by Race

Response	Yes	No	Total
Black	13 (76.5%)	4 (23.5%)	17
White	28 (46.7%)	32(53.3%)	60
Total	41	36	77

Pearson $\chi^2(1) = 4.7266$, $p = 0.03$; Fisher's Exact, $p = 0.027$

Table 10g. Pay Increased CVM Fees for LAV Recruitment by Gender

Response	Yes	No	Unsure	Total
Female	4 (9.8%)	34 (82.9%)	3 (7.3%)	41
Male	1 (7.2%)	12 (85.6%)	1 (7.2%)	14
Total	5	46	4	55

Pearson $\chi^2(2) = 0.0885$, $p = 0.957$ and Fisher's Exact, $p = 0.955$

Table 10h. Pay Increased CVM Fees for LAV Recruitment by Race

Response	Yes	No	Unsure	Total
Black	3 (27.3%)	7 (63.6%)	1 (9.1%)	11
White	2 (4.6%)	39 (88.6%)	3 (6.8%)	44
Total	5	46	55	

Pearson $\chi^2(2) = 5.7201$, $p = 0.057$ and Fisher's Exact, $p = 0.049$

Table 11. SOCIOCULTURAL FACTORS: Chi-Square & Fisher's Exact Significance Tests

Contextual Variables	Gender		χ^2 (p-values)	Fisher's Exact (p-values)	Race		χ^2 (p-values)	Fisher's Exact (p-values)
	Male	Female			Black	White		
Ecological Capital								
Prefer Rural	56%	60%	0.71	---	33%	66%	0.01	---
Prefer Suburban	20%	32%	---	0.19	33%	66%	0.02	---
Prefer Urban	16%	12%	---	0.48	47%	9%	---	0.001
Neighborhood Attachment- STRONG	88%	58%	0.03	---	67%	68%	0.859	---
Changed Residence while growing up (NO)	84%	55%	---	0.03	56%	65%	---	0.30
Family Residence: RURAL	71%	34%	---	0.01	28%	48%	---	0.25
Family Capital								
Family OWNED Livestock	72%	43%	0.02	---	16%	59%	---	0.001
Age Exposed to Livestock (child)	76%	45%	---	0.05	26%	61%	---	0.001
Type Family Unit- TRADITIONAL	88%	93%	---	0.34	79%	94%	---	0.06
Father's Ed: B.A. or higher	56%	72%	---	0.02	61%	69%	---	0.02
Father's Agricultural Background	52%	22%	0.015	---	6.0%	20%	---	0.018
Father's Occupational- Agriculture	44%	8.30%	---	0.001	11%	20%	---	0.778
Mother's Ed: B.A. or Higher	48%	77%	---	0.04	58%	69%	---	0.10
Mother's Agricultural Background	56%	82%	0.01	---	7.0%	30%	---	0.02
Mother's Occupation: homemaker	44%	25%	---	0.04	19%	33%	---	0.24
Grandparents Ag-Background (YES)	76%	55%	---	0.06	44%	65%	0.10	---
Racial Capital								
Vet Profession Recruiting Minorities (NO)	48%	65%	0.93	---	11%	76%	---	0.001
Blacks Unfair CVM Admissions (YES)	36%	48%	0.3	---	32%	49%	0.20	---
Blacks Pet Experience (YES)	80%	64%	---	0.10	77%	74%	---	0.23
Too Much Talk about Race (YES)	68%	68%	0.97	---	74%	79%	---	0.001
Whites Privilege Status (YES)	36%	55%	0.11	---	84%	40%	---	0.001
Same Race High School (YES)	76%	82%	---	0.56	50%	87%	0.04	---
Same Race Vet School (YES)	61%	51%	0.43	---	47%	77%	---	0.03
Cultural/Education Capital								
Promote Vet Careers in high school (YES)	52%	75%	0.04	---	47%	73%	0.04	---
Increase fees to Recruit LAV (NO)	86%	83%	---	0.95	64%	89%	---	0.05
High School Ag-Mentors (YES)	64%	48%	0.20	---	32%	59%	---	0.03
High School Ag Organizations (YES)	68%	45%	0.05	---	26%	56%	---	0.02
High School Ag-Science Courses (YES)	64%	57%	0.53	---	37%	61%	0.05	---
Social Capital								
Neighbors Socialize Together (YES)	48%	32%	0.20	---	65%	32%	0.01	---
Neighborhood Friendly (YES)	80%	82%	---	0.60	89%	87%	---	0.60
Neighbors Care (YES)	88%	63%	---	0.02	78%	67%	---	0.30
Neighbors Close Knit (YES)	64%	39%	0.04	---	65%	42%	0.10	---
Moral Capital								
Cultural Differences between rural/urban (YES)	76%	83%	---	0.227	75%	83%	---	0.402
Exposed to Racist Slurs (YES) at CVM	68%	72%	0.735	---	68%	69%	0.98	---
Comfortable w/Sexual Orientation Talk (YES)	16%	43%	0.02	---	42%	36%	0.61	---
Too much Talk about Sexual Orientation (YES)	56%	30%	0.02	---	11%	44%	---	0.01

* Note: P-values ≤ 0.10 were considered acceptable for hypothesis testing. Fisher's Exact used when cell count ≤ 6 .

Table 12. PCF Analysis (Oblique Rotation) and Pattern Matrix: Ecological Capital

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	1.8792	--	0.47	0.47

Variable	Factor 1	Unique Error Variance	(Explained or Common Variance) ¹	Factor Score (coefficients)
Type Family Residence (q4_3)	0.755	0.43	0.57	0.46681
Changed Residence (q4_2a)	0.6561	0.57	0.43	0.34916
Prefer Urban Setting (q4_8)	0.55	0.70	0.3025	0.29044
Prefer Suburb Setting (q4_9)	0.7714	0.41	0.60	0.41051

LR test: independent vs. saturated: $\chi^2(6) = 36.59$ Prob> $\chi^2 = 0.0000$, obs = 83; Cronbach's = 0.60

Note ¹ Explained variance provides estimate of variance in the indicator accounted for by the latent factor.

Table 13. PCF Analysis (Rotated): Family Ag-Background Capital

Factors	Variance	Difference	Proportion	Cumulative
Factor 1	2.36997	--	0.5925	0.5925
Variables	Factor 1	Uniqueness	Factor 1 Score	
Family Owned Livestock (newq11)	0.5457	0.7022	0.23027	
Father's Ag-background (newq51)	0.8848	0.2171	0.37334	
Mother's Ag-background (newq52)	0.8514	0.2751	0.35925	
Grandparents Ag-Background (newq43_a)	0.7512	0.4356	0.31698	

LR test: independent vs. saturated: $\chi^2(6) = 106.16$ Prob > $\chi^2 = 0.0000$.

Cronbach's alpha = 0.7454

Table 14. PCF Analysis (Rotated): White Racial Frame

Factors	Variance	Difference	Proportion	Cumulative
Factor 1	1.54395	--	0.5147	0.5147
Variables	Factor 1	Uniqueness	Factor 1 Score (coefficients)	
Vet Profession Recrute Blacks newq30_b	0.8494	0.2785	0.55	
Blacks Unfair CVM Admissions newq29_b	-0.4286	0.3612	-0.30	
Whites Privilege Status newq31	0.7992	0.8163	0.52	

LR test: independent vs. saturated: $\chi^2(3) = 25.45$ Prob> $\chi^2 = 0.0001$, obs: 89 $\alpha = 0.50$.

Table 15. Principle Components Factor Analysis (Rotated; Dropped Variables): Education Capital

Factors	Variance	Difference	Proportion	Cumulative
Factor 1	1.68264	--	0.5609	0.5609
Variables	Factor 1	Uniqueness	Factor 1 Score (coefficients)	
High School Ag-Mentors (newq13)	0.7572	0.4266	0.45002	
High School Ag Organizations (newq5)	0.7466	0.4426	0.4437	
High School Ag-Science Course (newq9_a)	0.7429	0.4481	0.44149	

LR test: independent vs. saturated: $\chi^2(3) = 27.46$ Prob> $\chi^2 = 0.0000$; obs: 89; $\alpha = 0.37$.

Table 16. Principle Components Factor Analysis (Rotated): Social Capital

Factors	Variance	Difference	Proportion	Cumulative
Factor 1	2.05807	--	0.5145	0.5145
Variables	Factor 1	Uniqueness	Factor 1 Score (coefficients)	
Neighbors Socialize Together (newq4_6a)	0.6264	0.6077	0.30435	
Neighbors Care (newq4_6b)	0.7705	0.4064	0.37436	
Neighbors Close Knit (newq4_6c)	0.7297	0.4676	0.35454	
Neighborhood friendly (newq4_4b)	0.7346	0.4603	0.35696	

LR test: independent vs. saturated: $\chi^2(6) = 57.39$ Prob> $\chi^2 = 0.0000$; obs: 86; $\alpha = 0.6728$

Table 17. PCF Analysis (Rotated): Moral Capital and Attitudes Regarding Sexuality

Factors	Variance	Difference	Proportion	Cumulative
Factor 1	1.7534	--	0.4383	0.4383
Variables	Factor 1	Uniqueness	Factor 1 Score (coefficients)	
Somewhat Comfortable with LGBTQ Slurs (q34_1)	0.65	0.5794	0.37	
Gender Discrimination is not an Issue in the Vet Field (newq34_a)	0.7105	0.4952	0.40522	
Racial Discrimination is not an Issue in the Vet Field (newq35)	0.6712	0.5495	0.38	
CVMs are Accepting of LGBTQ students (q38)	0.6143	0.6226	0.35	

LR test: independent vs. saturated: $\chi^2(6) = 35.57$ Prob> $\chi^2 = 0.0001$, obs: 88 $\alpha = 0.57$.

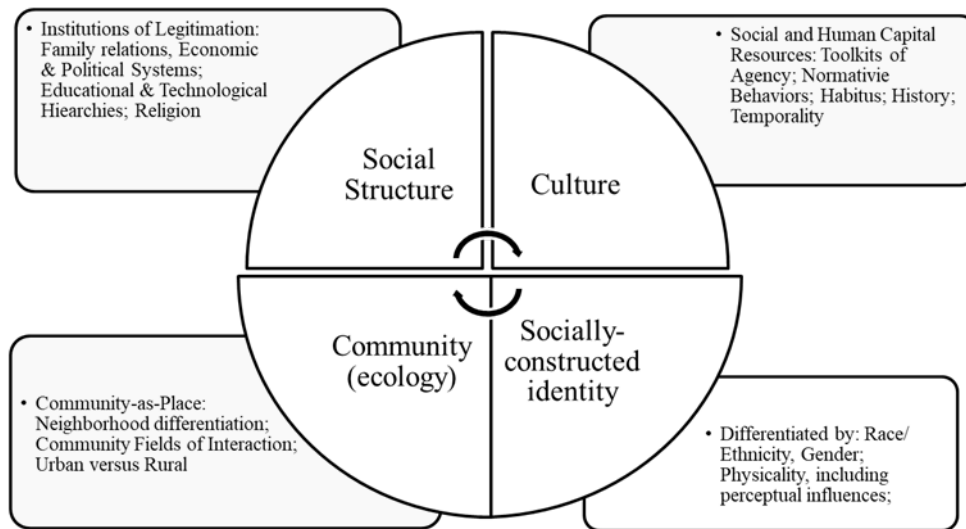
Table 18. Logistic Regression: Preference Large Animal Vet Practice: Percentage Change in Odds

Dependent Variable	β	Z	P > Z	%	% Change in Odds/Std. Deviation Increase
Large Animal Field (newq24)					
Moral Capital	-0.02874	-0.078	0.938	-2.8	-2.8
Ecological Capital	-0.53882	-1.672	0.1	-41.7	-41.9
Education Capital	0.05576	0.178	0.859	5.7	5.7
White Frame Family	-0.19587	-0.502	0.616	-17.8	-18
Agriculture Capital	0.53691	1.71	0.09	71.1	70
Social Capital	0.15675	0.59	0.555	17	16.8
Race = White	2.67621	2.296	0.022	1353	187.8
Gender = Male	1.23405	2.033	0.042	243.5	76.4
Kinship Household	-0.40771	-0.342	0.733	-33.5	-10.7
Houshold Religion	0.71636	1.333	0.183	104.7	41.9
Age Exposed to Livestock	0.42286	0.757	0.449	52.6	23.6

APPENDIX B

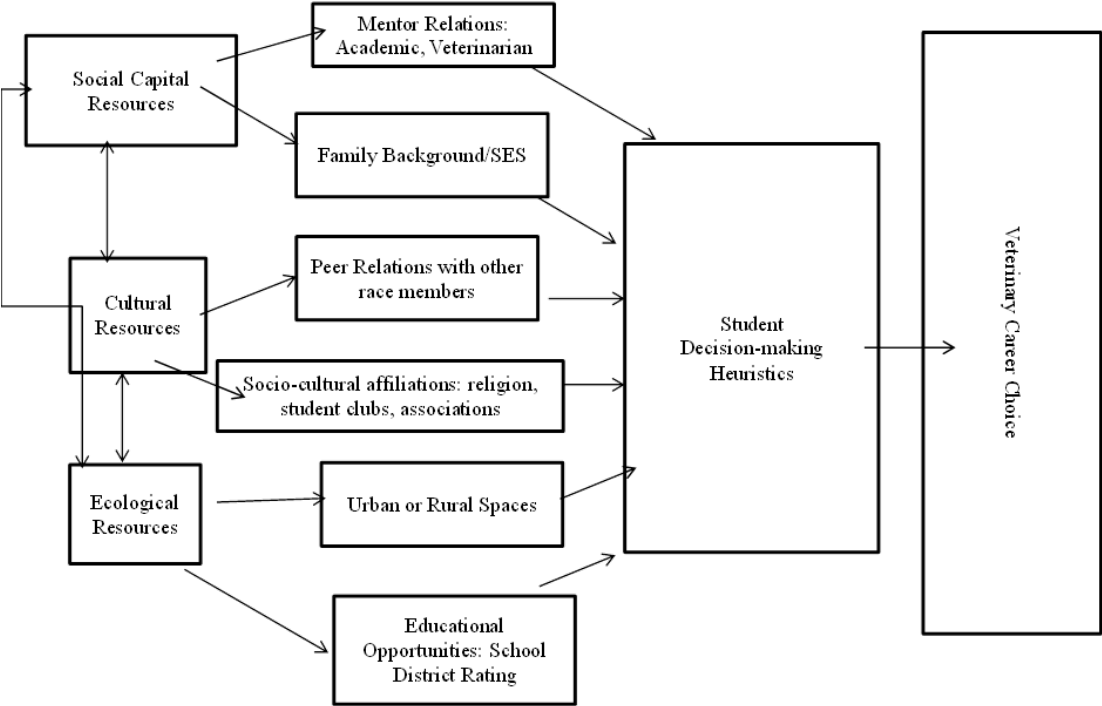
FIGURES

Figure 1. Phenomenological Framework



Note: The above figure illustrates the ideal types of the social and cultural forces affecting individuals' phenomenological experiences. Although social structure and culture denote the macro conditions of phenomenological existence for societal members, the micro conditions of community and individual-as-beingness, demonstrate the equally important, but variation among individuals within a sociocultural milieu.

Figure 2. Sociocultural Attributes Influencing Veterinary School Choices



Note: The path scheme proposed here reflects the hypothesized capital matrix formations presented in the factor analyses and Table 11 chi-square and Fisher exact tests performed for this dissertation project.

Figure 3. Livestock Exposure by Age and Gender

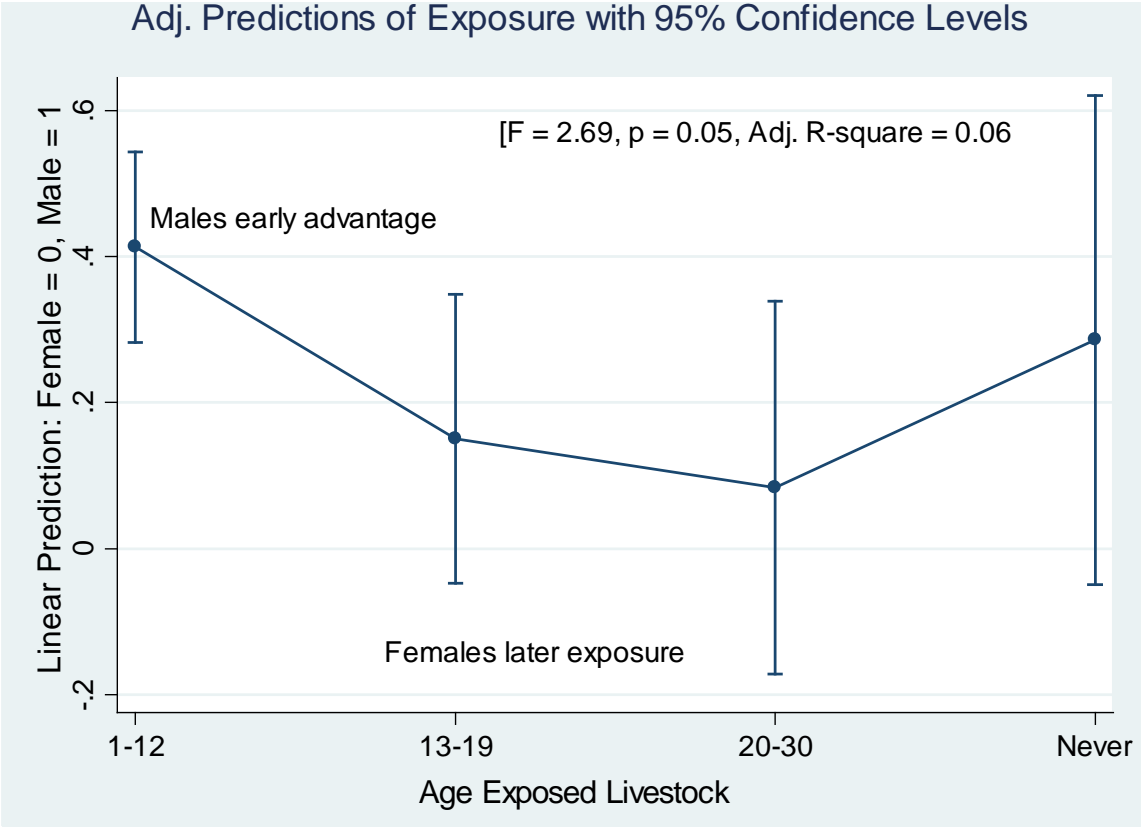


Figure 4. Adj. Livestock Exposure by Age & Race

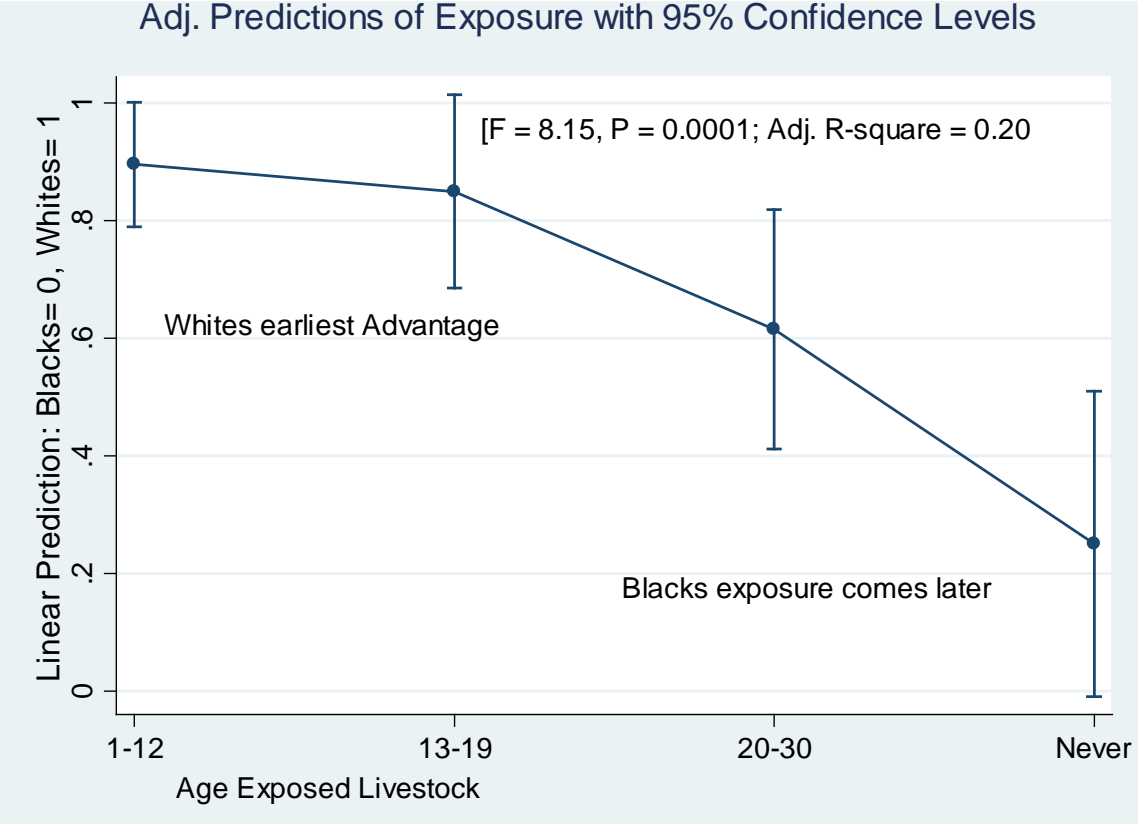


Figure 5. Sociocultural Factors and the Formation of Racial Capital

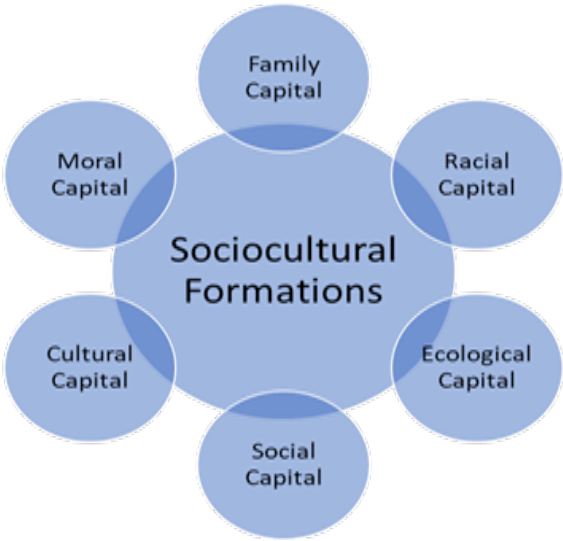


Figure 6. Social Capital Matrix Percentage Change in Odds: Veterinary Practice

